Dunkettle EIAR

Main Statement

Volume II

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

O'Flynn Group

O'Flynn Construction
Co. Unlimited Company

Dunkettle EIAR

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CHAPTER 1

Introduction

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1 Introduction

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) sets out the results of the environmental assessments which have been completed for the proposed development to inform the planning consent process.

The assessment has been completed as a statutory environment assessment. The environmental impact assessment process has been completed in line with Directive 2014/52/EU, based on the guidance presented in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022).

Environmental Impact Assessment (EIA) is a process for anticipating the effects on the environment caused by a development. The document produced for the proposed development, on behalf of the applicant, as a result is termed the EIAR. Article 1(2)(g) of the 2014 Directive (2014/52/EU) states that:

> *"Environment impact assessment" means a process consisting of:*
>
> *(i) The preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2).*
>
> *(ii) The carrying out of consultations as referred to in Article 6 and, where relevant, Article 7.*
>
> *(iii) The examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7.*
>
> *(iv) The reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*
>
> *(v) The integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."*

The EIAR is a presentation of the potential environmental impacts of the proposed development with a focus on significant impacts.

Chapter 1 introduces the project and describes the scope and methodology of the EIA process. The consultation process which was undertaken is outlined and the competencies of the environmental assessment team are provided.

1.1.1 Author Information and Competency

This chapter was prepared by Louise O'Leary, Associate Director at McCutcheon Halley Chartered Planning Consultants. Louise has a Masters in Regional and Urban Planning (BA MRUP Hons), obtained in 2005, and a Diploma in EIA Management, obtained in 2014, both from University College Dublin. Louise is also a Corporate Member of the Irish Planning Institute.

With over 18 years' experience in planning and development projects, Louise has directed and contributed to the preparation of environmental impact assessments for a variety of projects including residential, mixed use and infrastructural developments.

1.1.2 The Applicant

O'Flynn Construction Co. Unlimited Company (OFC) is part of the wider O'Flynn Group. Established in 1978, O'Flynn Group has extensive investment, development, and asset management capability in the core property sectors (especially residential, offices, industrial and retail). It also has expertise in property backed operating businesses such as student accommodation and senior living.

O'Flynn Group has a highly experienced team who together developed very successful schemes in Ireland, UK and Europe. The platform benefits from in house resources that can carry out in-depth assessment of potential options using strong property skills and finance capability.

Examples of large scale developments which the team have been involved in Cork include the development of the Elysian residential development in Cork city, Ballincollig town centre and residential development, Mount Oval residential development and more locally to this EIAR, the Ballinglanna, Glanmire development.

1.1.3 Reference to Guidelines Relevant to Discipline

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

- Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency (EPA), May 2022).
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003).
- EU Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017).
- EU Environmental Impact Assessment of Projects: Guidance on Scoping (EU, 2017).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (OPR,2018).

1.1.4 Brief Project Description

A detailed description of the project is provided in Chapter 2. The following is a summary of the proposed works for the three sub-areas with the EIAR Study area, with a total of 1036 no. residential units in the LRD Phase 1 and LRD Phase 2 areas.

LRD Phase 1 - Permission for 550 no. units, comprising a mix of semi-detached and terraced dwelling houses and duplex/apartment units, a childcare facility and commercial floorspace and the provision of landscaping and amenity areas and all associated infrastructure and services including vehicular and pedestrian/cycle access, roads, parking, lighting and drainage. Vehicular access will be provided from Dunkettle Road (east of the site), including pedestrian and cycling facilities. There will also be a connection to existing bicycle network connections to Glanmire in the north and to the existing urban Cycling network to the south.

LRD Phase 2 – Permission for 486 no. units comprising a mix of semi-detached and terraced houses, duplex and apartment units and the provision of landscaping and amenity areas and all associated infrastructure and services, vehicular and pedestrian/cycle access, roads, parking, lighting and drainage. A second access point from Dunkettle Road will be included.

Dunkettle House – This House will remain in its current traditional residential use. At the time of writing this EIAR, no detailed design proposals have been prepared but a feasibility study is being undertaken to identify potential future uses including the sympathetic re-use of the eighteenth- and nineteenth-century buildings. It is not envisaged that any future development at Dunkettle House would necessitate an assessment under EIA requirements on its own, but for completeness, the concept of the future development proposals is included in this EIAR.

The following is a general location plan of the sub areas identified above.

Figure 1-1 General Location of Sub Areas within EIAR Study Boundary

1.2 Proposed Development Site

The study area comprises the entire Masterplan area (refer to Figure 1-1).

In general, the study areas are defined individually for each environmental topic, according to guidance and the geographic scope of the potential impacts or of the information required to assess those impacts. Details are provided by each discipline as part of the description of baseline conditions of the site.

It is noted that this EIAR is being prepared to accompany a planning application for development on the LRD Phase 1 lands only. A future LRD application (large scale residential development) will be made for the LRD Phase 2 lands and the principal of its development has been included in this EIAR. It is not envisaged that any future development at Dunkettle House would necessitate an EIA on its own, but for completeness, the concept of the future development proposals is included in this EIAR.

1.2.1 Site Description

The subject lands measuring c.63.78HA are located to the south of the defined settlement boundary of Glanmire within the townland of Dunkettle, on the southwestern edge of Glanmire village. These lands are approximately 5 kilometres to the east of Cork City Centre.

The lands are located at Dunkettle (townland), Glanmire, Co. Cork, generally to the north of Dunkettle Interchange and south of Glanmire Village, with the Glashaboy River to the west and Dunkettle Road to the east. The overall landholding includes Dunkettle House, its outbuildings and historic landscape that surround it.

See Figure 1-2.

The site has an undulating topography generally sloping in a westerly and southwest direction towards the Glashaboy River, which bounds the site to the west. It generally consists of a mix of agricultural lands and woodland. There are 3 main wooded areas including the Riparian woodland along the entire western boundary of the site above the Glashaboy River. Trails / tracks are found within the woodland, with many areas overgrown and inaccessible.

This woodland continues south along the ridge line above the Glashaboy, connecting via a strip of woodland separating the lands zoned from development from the lands immediately around Dunkettle House to a third cluster east of Dunkettle House.

Mature trees are also located in the attendant grounds of Dunkettle House also. These tree stands are evident in the aerial image below, including the hedgerows / trees of the field boundaries.

A further small area of natural woodland to the northeast of the site, located north of The Avenue housing estate.

The lands are broken up into a number of separate agricultural fields, with hedgerows and a number of strong treelines, particularly to the southern portion of the lands acting as field boundaries. The lands slope generally towards the estuary, with a further sloped area around the natural woodland in the northeast of the site, close to the potential access point off the Dunkettle Road.

The irregular shaped site is largely utilised for agricultural purposes, excluding Dunkettle House located in the southern part of the site. This house, its associated outbuildings and attendant grounds are in private residential use.

Part of the study area adjoining Dunkettle Road, adjacent to Woodlands Cottage, was previously used as a construction compound for the Part Viii works on Dunkettle Road.

The survey drawings identify ruins/structures including a former dwelling on the northern part of the site.

Aside from lands in public ownership on Dunkettle Road (where pedestrian facilities are being proposed), the applicant owns all lands within the EIAR Study Area.

Figure 1-2 Aerial Image of Study Area

1.2.2 Existing Structures

The overall landholding largely consists of a mix of agricultural lands and wooded areas.

The survey drawings identify ruins/structures including a former dwelling on the northern part of the site, within LRD Phase 1.

Dunkettle House and its outbuildings and associated grounds is located on the southern portion of the EIA study area with the N8 and Dunkettle Interchange located to the south of the site. Dunkettle House is a protected structure (Ref. No.'s PS1190 and other associated structures are included within the grounds (protected structures – PS1238, PS1239, PS1240, PS1170).

As noted above, Dunkettle House does not form part of the Phase 1 or Phase 2 LRD lands, but its proximity has been taken into consideration in the EIAR and when designing the residential units to the north and possible future access.

Extensive areas of mature woodland bound the entire northern and western boundary of the site. This area is zoned ZO 17 Landscape Preservation Zone.

Refer to Figure below.

Figure 1-3 Dunkettle House, with walled garden in the background, and historic landscape surrounding (Source: Architect's Design Statement)

An existing foul sewer traverses the study area from north to south, conveying discharge from an existing Uisce Éireann pumping station at Glanmire Bridge onwards to Carrigrenan Wastewater Treatment Plant.

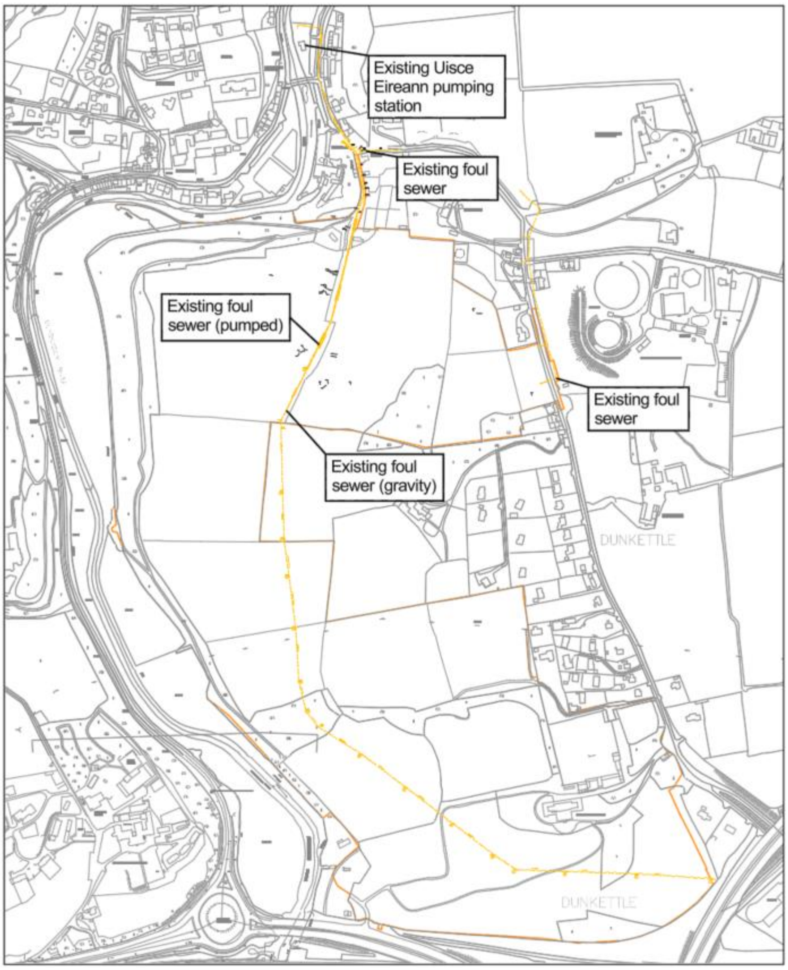

Figure 1-4 Existing Uisce Éireann wastewater drainage services

1.2.3 Surrounding Context

The site is bounded to the east by various housing estates at Woodville Estate, and a number of individual detached dwellings built along Dunkettle Road (L2998). Lands to the east of Dunkettle Road are largely agricultural, with the Glashaboy Waterworks to the northeast and Ballinglanna estate north and northeast.

The site is bound to the north and west by mature woodland with the Glashaboy River below. North and west of Glashaboy river is Glanmire Village and Glanmire road respectively, with the latter providing access to Vienna Woods hotel.

The area has a number of local services located within proximity of the site including schools, creches and both a primary and secondary school. A number of convenience stores are located with a kilometre radius of the site.

1.2.4 Core Strategy

The *Cork City Development Plan 2022-2028* (CDP) sets out Cork City Council's policies for the development of Cork City to 2022 and beyond. It establishes the following vision for Cork City:

> *"The vision for Cork City over the period of this Development Plan and beyond is to be a successfully, sustainable regional capital and to achieve a high quality of life for its citizens and a robust local economy, by balancing the relationship between community, economic development and environmental quality. It will have a diverse innovative economy, will maintain its distinctive character and culture, will have a network of attractive neighbourhoods serviced by good quality transport and amenities and will be a place where people want to live, work, visit and invest in."*

In the CDP, Glanmire is identified as one of the four 'Urban Towns'. The Role in the Core Strategy of the Urban Towns is as follows:

> *"Phased delivery of strategic sites by targeting growth proportionate to the existing population within the four urban towns. All development shall focus on prioritising walking, cycling and public transport use. Apply a mixed-use approach to regenerating key underutilised locations. Use a range of designs and densities that reflect and enhance the individual character of each town."*

The site forms part of the South Glanmire Urban Expansion Area, which is one of seven urban expansion areas designated within the City Council's administrative area and where Objective 10.69 (South Glanmire Expansion Area) supports the compact and strategic expansion of the area:

> *"To support the compact growth and development of South Glanmire Expansion Area as a strategic City consolidation and expansion area, as identified in the Core Strategy. All development shall be designed, planned and delivered in a co-ordinated and phased manner, using a layout and mix of uses that form part of an emerging neighbourhood integrated with the wider area."*

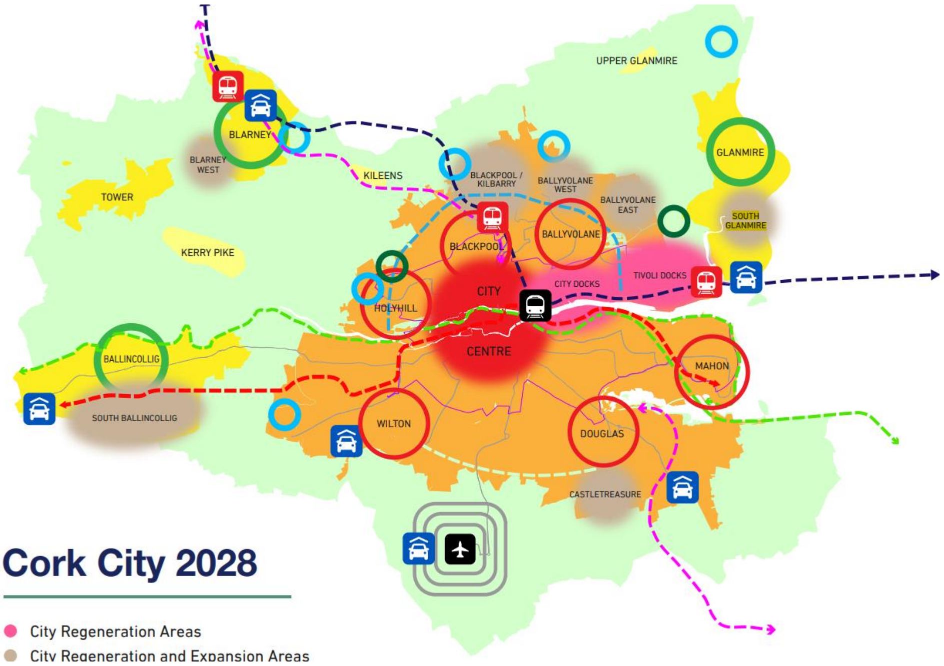

Figure 1-5 Extract from the 2022 Cork CDP - Core Strategy Map 2022-2028 (Figure 2.20).

1.2.5 Land Use Zoning Objective

The subject site lies within the development boundary of Glanmire and is zoned *ZO 02 New Residential Neighbourhood* where the following objective applies:

> *"To provide for new residential development in tandem with the provision of the necessary social and physical infrastructure."*

The surrounding lands to the north, west and south of the site are zoned *ZO 17 Landscape Preservation Zone* where the following objective applies:

> *"To preserve and enhance the special landscape and visual character of landscape Preservation Zones."*

This area is also subject to Objective NE15 where the following applies:

> *"This zone to the southern end of Glanmire includes:*
>
> - *A visually important hillside to the southern end of Glanmire.*
> - *The riparian woodland adjoining the Cork Harbour Special protection Area.*
> - *Forms part of the setting for Dunkettle House.*
> - *Provides local biodiversity benefit.*
> - *Forms part of an attractive gateway entrance to the city and*
> - *Forms part of the wider landscape setting from the southern side of the River Lee /Blackrock Area.*
>
> *Given the extensive development proposed to adjoining lands, the mixed nature riparian woodland should be extended to compliment the biodiversity and visual benefits of this zone. For these reasons, there is a presumption against development within this zone."*

See Figure below.

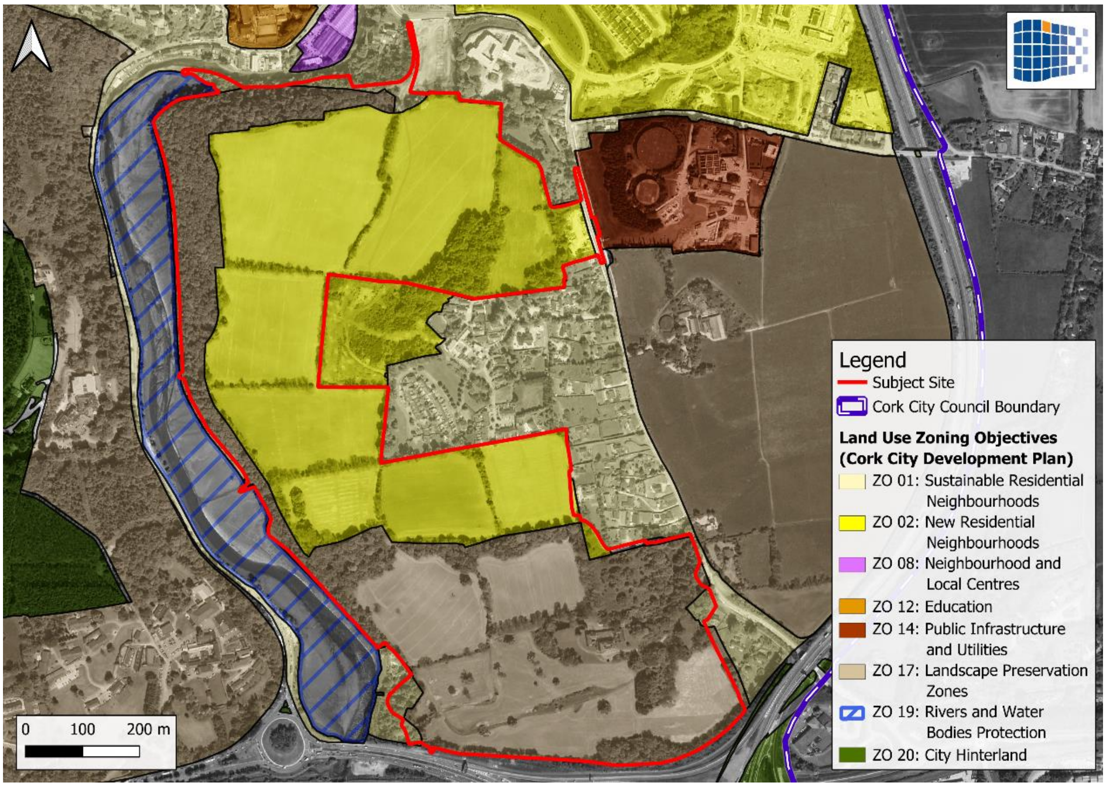

Figure 1-6 Land Use Zoning Objective

1.3 Requirement for EIAR

Environmental Impact Assessment (EIA) requirements derive from EU Directives. Council Directive 2014/52/EU amended Directive 2011/92/EU and is transposed into Irish Law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

Proposed development which falls within one of the categories of development specified in Schedule 5 of the Planning and Development Regulations 2001, as amended, which equals or exceeds, a limit, quantity, or threshold prescribed for that class of development must be accompanied by an EIAR.

This EIAR has been prepared in accordance with the aforementioned legislative provisions and the following guidelines, among others, as specified in the various specialist EIAR chapters:

- Department of Housing, Planning and Local Government (DHPLG) (2018). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.
- DHPLG (2017). Circular letter PL 1/2017 – Advice on Administrative Provisions in Advance of Transposition.
- European Commission (EC) (1999). Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.
- EC (2013). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.
- EC (2017). Environmental Impact Assessment of Projects. Guidance on Scoping.

- EC (2017). Environmental Impact Assessment of Projects. Guidance on the preparation of Environmental Impact Assessment Report.
- EPA (2015). Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.
- EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

1.4 Purpose of Environmental Impact Assessment

The objective of the Directive (Directive 2011/92/EU), as amended by Directive 2014/52/EU, is to ensure a high level of protection of the environment and human health, through the establishment of minimum requirements for environmental impact assessment (EIA), before development consent being given, of public and private developments that are likely to have significant effects on the environment.

The 2014 Directive, for the first time, provides a definition of EIA and this is now defined by section 171A of the Planning and Development Act, 2000 (as inserted by Regulation 16 of the 2018 Regulations).

It is defined as a process consisting of:

a) the preparation of an EIAR by the developer;

b) the carrying out of consultations with the public, prescribed bodies (and, where relevant, any affected Member States);

c) the examination by the competent authority of the EIAR, any supplementary information provided, where necessary, by the developer and relevant information received through the consultation process;

d) the reasoned conclusion of the competent authority on the significant effects of the project on the environment; and

e) the integration of the competent authority’s reasoned conclusion into any development consent decision.

The definition of EIA thus provides for a clear distinction between the process of environmental impact assessment to be carried out by the competent authority and the preparation by the developer of an EIAR.

Section 2 of the 2000 Act has been amended to define an EIAR as ‘a report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive.

1.5 Content of Environmental Impact Assessment Report

The EIAR entails a systematic analysis and assessment of the potential environmental effects of a proposed development on its receiving environment. Article 3(1) of the amended Directive prescribes a range of environmental topics that must be addressed in the EIAR, as follows:

> *"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) A description of the likely significant effects of the project on the environment;

b) A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

c) 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 options chosen, considering the effects of the project on the environment; and

d) A non-technical summary; and,

e) Any additional information specified in Annex IV of the Directive/Schedule 6 to the 2001 Regulations, as amended, relevant to the specific characteristics of the project and to the environmental features likely to be affected.

As is required by Annex IV of the 2014 Directive, this EIAR addresses matters including proposed demolition works, risks to human health, major accidents/disasters, biodiversity, climate change and cumulative effects with other existing and/or approved projects.

1.6 Competency

It is a requirement that the EIAR must be prepared by competent experts. For the preparation of this EIAR, the Applicant engaged McCutcheon Halley Chartered Planning Consultants to direct and coordinate the preparation of the EIAR and a team of qualified specialists were engaged to prepare individual chapters, the consultant firms and lead authors are listed in the Table 1-1. Details of competency, qualifications, and experience of the lead author of each discipline is outlined in the individual chapters.

Various environmental specialists were commissioned to complete the specialist chapters of the EIAR, as required by Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment:

> *"Experts involved in the preparation of [EIARs] 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".*

1.7 Format and Structure of the EIAR

This EIAR is prepared according to the 'Grouped Format Structure' as described in the Guidelines on information to be contained in Environmental Impact Statements (EPA, 2022). This means that each topic is considered as a separate section. The advantages of using this format are that it is easy to investigate a single topic and it facilitates easy cross-reference to specialist studies.

The EIAR is sub divided into 3 no. volumes as follows:

- **Volume I** Non-Technical Summary;
- **Volume II** Environmental Impact Assessment Report; and
- **Volume III** Appendices to Environmental Impact Assessment Report.

Volume II is presented as 17 chapters as outlined in Table 1-1.

Table 1-1 EIAR Chapters and Contributors

Chapter	Aspect	Contributor	Lead Consultant
1	Introduction	McCutcheon Halley Planning Consultants	Louise O'Leary
2	Development Description	McCutcheon Halley Planning Consultants	Louise O'Leary
3	Alternatives	McCutcheon Halley Planning Consultants	Louise O'Leary
4	Population & Human Health	McCutcheon Halley Planning Consultants	Louise O'Leary
5	Landscape & Visual	Doyle McDonogh Nash Architects John Cronin & Associates G-Net	Kieran McDonagh John Cronin Alan O'Neill
6	Material Assets: Traffic & Transport	MHL Consulting Engineers	Ken Manley
7	Material Assets: Built Services	JODA Engineering Consultants John Kelleher & Associates Building Services Engineers	Paul Murphy John Kelliher
8	Material Assets: Waste	Enviroguide	Laura Griffin
9	Land & Soils	Viridus Consulting Ltd.	Darragh Musgrave
10	Water & Hydrology	Viridus Consulting Ltd.	Darragh Musgrave
11	Biodiversity	Enviroguide	Tom Ryan Ben Lansbury
12	Noise & Vibration	AWN Consulting	Aoife Kelly Robert Holohan
13	Air Quality	AWN Consulting	Aisling Cashell
14	Climate	AWN Consulting	Aisling Cashell
15	Cultural Heritage	John Cronin & Associates	Tony Cummins John Cronin
16	Interactions of the Foregoing	McCutcheon Halley Planning Consultants	Louise O'Leary
17	Summary of Mitigation Measures	McCutcheon Halley Planning Consultants	Louise O'Leary

In addition, contributors have had regard to other relevant discipline-specific guidelines, these are noted in individual chapters of the EIAR.

1.8 Scoping

The purpose of scoping is to identify the information to be contained in an EIAR and the methodology to be used in gathering and assessing that information. The scope of this EIAR is informed by the requirements of the Directive 2014/52/EU and the transposing Regulations together with the Guidelines set out above. Applicants are not required to seek a formal scoping opinion.

The scope of individual assessments is informed by discipline specific guidelines and, where this is the case, they are referenced in each chapter.

Scoping requires the consideration of the nature and likely scale of the potential environmental impacts likely to arise from a proposed development or project. It is an iterative process that is ongoing throughout the development of the EIAR. The following topics, which include those stipulated in the amended Directive, have been scoped in for this assessment.

- Population and Human Health
- Biodiversity
- Land and soils
- Water and geology
- Air quality
- Climate
- Noise and vibration
- Landscape
- Cultural heritage
- Traffic and transportation
- Waste
- Built Services and
- Interactions between the above-listed topics.

1.9 Scope of Cumulative Effects

Directive 2014/52/EU substituted a new Annex IV into Directive 2011/92/EU. Annex IV of the EIA Directive is to be read in conjunction with article 5(1) and sets out the information to be included in an EIAR. Annex IV was transposed into national law via article 97 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (the “2018 Regulations”) which substituted a new Schedule 6 into the Planning and Development Regulations 2000, as amended.

The Directive requires that the EIAR describes the cumulation of effects with other existing and/or approved projects.

Cumulative effects may arise from:

“- The interaction between the various impacts within a single project;

- The interaction between all the differing existing and / or approved projects in the same areas as the proposed project." [1]

In August 2018, the Department of Housing, Planning and Local Government issued Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. The Guidelines summarise "cumulative effects" in the following way at page 40;

> *"Effects are not to be considered in isolation but cumulatively i.e., when they are added to other effects. A single effect on its own may not be significant in terms of impact on the environment but, when considered together with other effects, may have a significant impact on the environment. Also, a single effect which may, on its own, have a significant effect, may have a reduced and insignificant impact when combined with other effects.*

Paragraph 2(e)(i)(V) of Schedule 6 (paragraph 5(e) of Annex IV) provides as follows;

> *"the cumulation of effects with other* ***existing or approved developments, or both****, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources." (emphasis added).*

Accordingly, each chapter of this EIAR assesses the cumulative effect of this permitted development in combination with the proposed development.

Individually, each specialist consultant has reviewed under construction, permitted, and or under consideration development in the local area, and using their expertise they have identified projects relevant to their discipline that may interact to produce a cumulative effect. The detail of the identified projects and plans is set out within each specialist chapter of this EIAR.

While the Directive does not require a cumulative assessment of future proposals where a planning application has not been lodged, recognising the broad scope and purpose of the EIA Directive, regard is had to the judgement of *Fitzpatrick v An Bord Pleanála* [2019] IESC 23, henceforth referred to as the 'Apple Case'. The Supreme Court in the Apple Case held that:

1) An EIA must contain an assessment of the cumulative effects of future developments that form an "integral part" of the development applied for (i.e., where there is a "functional or legal interdependence" between the development applied for and the envisaged future development).

A search of the Cork City Council planning register and An Bord Pleanála case files indicates that there are a number of proposed construction projects in the vicinity of the proposed development which may overlap with this development. It is possible that other planned projects will be under construction / completed in the area at the same time as the project being considered in this EIAR,

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[1] Department of Housing, Planning and Local Government, "Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment" (August 2018), page 40.

including minor urban developments of single houses or extensions or alterations to existing developments. These are not considered material to the assessment of the proposed development.

Ballinglanna residential development (ABP Ref. SHD ABP-300543-18, Reg. Ref. No.'s 20/39179 and 23/42154) - This is a large residential development at Ballinglanna that is currently under construction by the applicant. The permitted developments are located to the north-east of the site of the proposed project. The final phase of this development is currently under construction. The applicant has noted that construction of the permitted developments at Ballinglanna will be close to completion or completed before works commence on the proposed project.

Nursing home and childcare facility at the former Glanmire Rectory (Reg. Ref. No.'s 19/38900 and 21/40423) - This is a care facility on a site adjacent to the site of the proposed development. Construction of the facility is partially completed but at the date of writing of this document is paused.

Residential development at Glanmire Lodge, Glanmire (Reg. Ref. No. 20/39719) - This is a residential development of 30 dwellings that is currently under construction on a site adjacent to the northern extent of the study area boundary.

Glanmire Roads Improvement Scheme - This is a Part 8 scheme which involves a suite of projects to improve the accessibility, sustainability, capacity and safety of the transport network in the Glanmire, Riverstown and Sallybrook areas. The elements of the scheme planned and with funding secured in the vicinity of the study area are projects 1, 3, 9 I.e. Church Hill Junction, Glanmire Bridge / Village and Dunkettle Road upgrade respectively. Projects 1, 3, and 9A of this scheme commenced in Feb 2022, with substantial completion achieved in Q1 2023. Some works are currently continuing. Project 9B (Dunkettle Road South – Woodville to Dunkettle) has yet to commence but is at detailed design stage. The construction of this element of the scheme and other remaining approved projects has the potential to overlap with the construction of the proposed development.

Glanmire to City Centre Cycle Route – This is a Part 8 Scheme by the local authority to provide dedicated cycle tracks and improved pedestrian footpaths between Glanmire and the city centre. Phase 1A comprises improved pedestrian and cycling facilities along the Glashaboy River, from Glanmire village to the Dunkettle / Tivoli Roundabout. This development is located west of our site, separated by the Glashaboy River. Works commenced on Phase 1A of the scheme in January 2024 and is scheduled to be completed by Q4 2024.

Glashaboy Flood Relief Scheme - Construction of this flood relief scheme commenced in July 2023 and is due for completion in Q2 of 2026. It is therefore expected that the construction of the proposed development will overlap with this flood relief scheme for a period of c.12 months. The scheme includes defences, such as walls and embankments; culvert upgrades; channel widening and road re-grading, and are mainly focussed/located on the northern part of Glanmire.

There are no projects (off-site or secondary) occurring as a direct result of this project.

Cumulative effects are not limited to projects, and it is necessary to also consider relevant Plans. According to the Environment Protection Agency (2020), in Ireland, key cumulative effects – where environmental receptors are at, or near, their thresholds or their capacity to assimilate more change

– include climate change; water quality, flood risk, air quality, biodiversity and landscape. For the purpose of this EIAR, the following have been considered in relation to culminative impacts:

- **Cork City Council Development Plan 2022 - 2028** - gives spatial expression to the city's economic, social, housing, and cultural development. The Plan has a key role in protecting the environment, heritage, and amenities of the city and in mitigating against the impacts of climate change. It includes policies and objectives for all of the aspects included in this EIAR. Accordingly, each chapter of the EIAR has considered the cumulative effect of the proposed development together with the Development Plan policies and objectives.
- **The Climate Action Plan, 2024** - Climate change is the ultimate cumulative effect, nationally and internationally. The Climate Action Plan 2024 (CAP24) is the third annual update to Ireland's Climate Action Plan. The Plan was approved by Government on 20 December 2023, subject to Strategic Environmental Assessment and Appropriate Assessment. Thresholds for greenhouse gas emissions are being exceeded. The Plan acknowledges that rapid and significant reductions in greenhouse gas (GHG) emissions are required if we are to meet the 2015 Paris Agreement Goals. The European Green Deal commits to delivering net-zero GHG emissions at EU level by 2050; with Ireland committed to achieving a 51% reduction in emissions from 2021 to 2030, and to achieving net-zero emissions no later than 2050. The cumulative effects of this Plan together with the proposed project are considered in the following chapters: Population & Human Health, Material Assets: Traffic & Transport and Air Quality and Climate.
- **Glashaboy Catchment Flood Risk Management Plan** – the Glashaboy Catchment Flood Risk Management Plan was first published in February 2010 and identified a preferred option for the alleviation of flood risk in the Glashaboy catchment i.e. the Glashaboy Flood Relief Scheme (see cumulative projects above).
- **National Biodiversity Plan** - The Plan sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland's 'Vision for Biodiversity. It has been developed in line with the EU and International Biodiversity strategies and policies. The cumulative effects of this Plan together with the proposed project is considered in the Biodiversity chapter.
- **Cork Metropolitan Area Transport Strategy 2040** - Land use and the way it is developed is the primary influencing factor for travel demand. The cumulative effect of this strategy together with the proposed project is considered in the Material Assets – Transport & Traffic chapter.
- **Standards in the EU Air Quality Directive and 'daughter' directives** - establish the levels of air pollutants that have no significant impacts on human health or the environment. The cumulative effects of the Directive together with the proposed project is considered in the Population & Human Health Chapter and the Air Quality Chapter.
- **Water Framework Directive & The Draft River Basin Management Plan 2022-2027 –** The EU Water Framework Directive (2000/60/EC) (WFD) requires all Member States to protect and improve water quality in all waters so that we can achieve good ecological status by 2015 or, at the latest, by 2027. It was given legal effect in Ireland by *inter alia* the European

Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) (as amended), European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended) . It applies to rivers, lakes, groundwater, and transitional coastal waters.

The River Basin Management Plan sets out the actions that Ireland will take to improve water quality and achieve 'good' ecological status in water bodies by 2027, as per the WFD. The cumulative effect of the Directive and Plan together with the proposed project is considered in the Material Assets: Built Services and Water & Hydrology chapters of this EIAR.
The transposing legislation that should be referred to is as follows:

- European Communities (Water Policy) Regulations 2003, as amended
- European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended
- European Communities Environmental Objectives (Ground Waters) Regulations 2010, as amended.

In addition, each of the specialist chapters (4 - 15) considers the cumulative effects of projects and plans relevant to the zone of influence and discipline specific factors.

1.10 Impact Assessment Methodology

Each chapter of this EIAR assesses the direct, indirect, cumulative, and residual impact of the proposed development for both the construction and operational stage of the proposed development.

The impact assessment methodology is detailed in the respect of the various environmental topics in the respective chapters herein. The assessment of impacts is based on the source-pathway-receptor model, which dictates that, for an environmental impact to occur, there must be a source, a receptor which is sensitive to the effect in question, and a pathway by which the effect can reach the receptor. Unless otherwise stated, the criteria for effect / impact characterisation are as per the EPA guidelines (as set out in Table 1-2). The significance of an impact is determined through comparison of the character of the predicted effect to the sensitivity of the environment / receptor in question.

Table 1-2 Impact Rating Terminology

Quality of Effect	
Positive	A change which improves the quality of the environment (for example, by increasing species diversity, or the improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative/Adverse Effects	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance of Effect	
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 Effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effect	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effect	An effect which, by its character, magnitude, duration, or intensity, alters a sensitive aspect of the environment.
Very Significant Effect	An effect which, by its character, magnitude, duration, or intensity, significantly alters most of a sensitive aspect of the environment.
Profound Effect	An effect which obliterates sensitive characteristics.
Duration of Effects	
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Frequency	Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).
Extent and Context of Effects	
Extent	Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?).
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Type of Effects	
Indirect (Secondary or Off-site)	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
Do-Nothing	The environment as it would be in the future should the subject project not be carried out.
Worst-Case	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable	When the full consequences of a change in the environment cannot be described.
Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

1.11 Consultation

A dedicated website for this proposed development is established and the EIAR is available at **www.dunkettlelrd.ie**

Additionally, prior to lodging this application, the required information has been issued for the Department of Housing, Planning and Local Government's EIA Portal. The purpose of this tool is to inform the public, in a timely manner, of applications that are accompanied by an EIAR.

The proposed development has been designed in consultation with Cork City Council Planning Department and other departments responsible for roads, water services, parks, housing and conservation.

An Opinion was received from Cork City Council following the S247 pre-application consultation and LRD Meeting and it contained details of discussions which is attached to Appendix 1 of the Planning Statement, submitted under separate cover by McCutcheon Halley Planning Consultants.

Consultation took place between the Section 247 and LRD Meeting and continued to date on the LRD Phase 1 development, with discussions ongoing in relation to LRD Phase 2 and the future of Dunkettle House.

Where the respective authors of the assessment chapters engaged / consulted with the Local Authority, Uisce Eireann, utility providers, other prescribed bodies etc., details are provided in the relevant chapter.

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 2

Development Description

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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2 Development Description

2.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) sets out the proposed development and provides details in relation to the demolition, construction and operational phases of the scheme. The chapter was prepared in conjunction with the relevant members of the Design Team, and it should be read in conjunction with the submitted drawings together with supporting reports.

2.2 Expertise and Qualifications

This chapter was prepared by Louise O'Leary, Associate Director at McCutcheon Halley Chartered Planning Consultants. Louise has a Masters in Regional and Urban Planning (BA MRUP Hons), obtained in 2005, and a Diploma in EIA Management, obtained in 2014, both from University College Dublin. Louise is also a Corporate Member of the Irish Planning Institute.

With over 18 years' experience in planning and development projects, Louise has directed and contributed to the preparation of environmental impact assessments for a variety of projects including residential, mixed use and infrastructural developments.

2.3 Proposed Development

The proposed development will function as a natural extension to the town of Glanmire by consolidating development in the area and ensuring the retention of a compact settlement.

As outlined in Chapter 1, the study area (measuring c.63.78HA) is located to the south of and within the defined settlement boundary of Glanmire. The lands are located within the townland of Dunkettle, generally to the north of Dunkettle Interchange and south of Glanmire Village centre, with the Glashaboy River to the west and Dunkettle Road to the east. The overall landholding includes Dunkettle House, its outbuildings and historic landscape that surround it.

The proposed development is proposed across 3 development areas as described below. The general location of the 3 areas is shown on Figure 2-1.

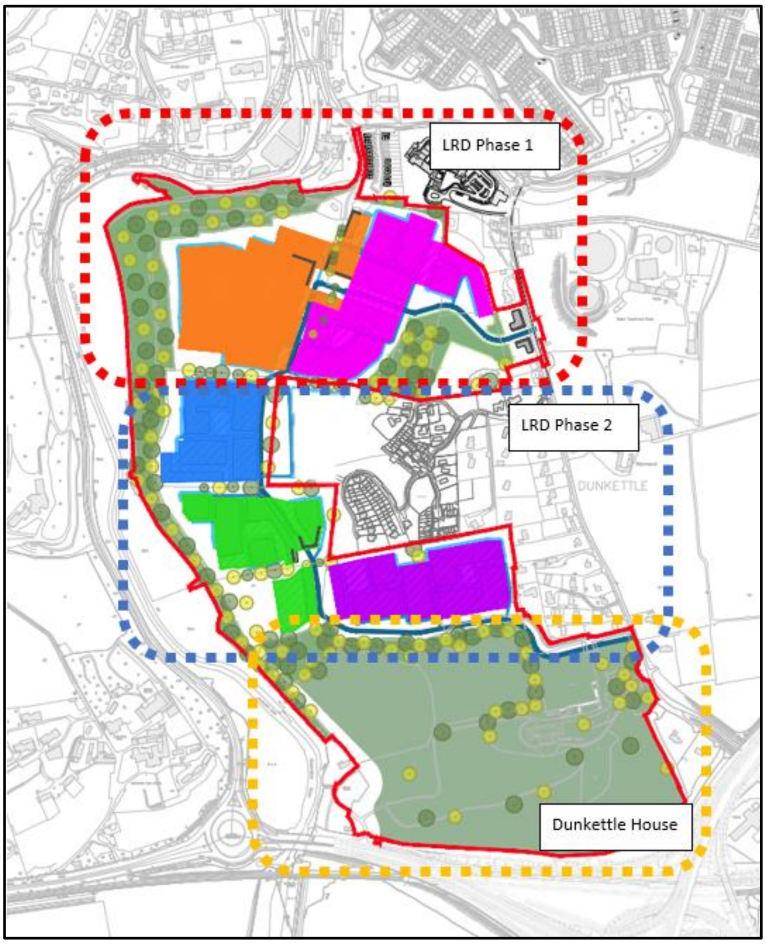

Figure 2-1 General Location of 3 Sub Areas within EIAR Study Boundary

2.3.1 LRD Phase 1 (c.26 ha)

The development proposed in the LRD Phase 1 area, the subject of the accompanying planning application, consists of a Large Scale Residential Development (LRD) comprising the following: -

- The demolition/removal of existing ruins/structures (including a former dwelling on the northern part of the site).
- The construction of 550 no. residential units to include 394 no. dwelling houses comprising a mix of 2,3 and 4 bed semi-detached and townhouse/terraced units and 156 no. apartment/duplex units comprising a mix of 1 and 2 bed units in 10 no. blocks ranging in height from 2 to 6 storeys.
- 1 no. creche.
- 3 no. commercial units comprising a shop, cafe and medical/general practice facility.
- New vehicular access, new pedestrian access, a traffic signal controlled Toucan pedestrian crossing and upgrades to the road markings on the L2998 Road to the east
- new greenway through the development connecting to the L2998 to the north and to the existing (Dunkettle to Carrigtwohill) Greenway to the south,
- All associated ancillary development works including drainage (including attenuation pond), footpaths & cycle lanes, landscaping, amenity and open space areas, boundary treatments,

bicycle and car parking, bin storage, 7 no. ESB substations, the undergrounding of the existing overhead electricity lines currently traversing the site, public lighting and all other ancillary development.

- An 8 year permission is sought for the above works.

This development is located on lands at the northern end of the study area in the townland of Dunkettle, with vehicular access from the east and pedestrian/cycle access to the east, north and south (via the proposed greenway). The application site boundary extends south along the western boundary of the site to provide for the greenway route and drainage infrastructure.

Refer to Figures below.

Figure 2-2 LRD Phase 1 Application Site Boundary

Figure 2-3 Proposed Layout of LRD Phase 1 (Extract from Drawing by Doyle McDonogh Nash Architects)

2.3.2 LRD Phase 2 (c.15 ha)

The development proposed in LRD Phase 2 consists of phase 2 of the proposed Large Scale Residential Development (LRD). This development, described below, will be subject to a future separate planning application but is included in this EIAR Assessment for completeness.

The proposed development will comprise of the following: -

- The construction of 486 no. units comprising a mix of 301 no. 2, 3 and 4 bed semi-detached and terraced dwelling houses and 185 no. 1 and 2 bed duplex/apartment units in blocks ranging in height from 3 to 5 storeys.
- All associated ancillary development works including drainage, footpaths & cycle lanes, landscaping, amenity and open space areas, boundary treatments, bicycle and car parking, bin storage, ESB substations, undergrounding of the existing overhead electricity lines currently traversing the site, public lighting and all other ancillary development.

A second access point from Dunkettle Road (L2998) is proposed in the LRD Phase 2 development. This access will utilise an existing access serving the applicants lands and a number of private dwellings on Woodlane. It is envisaged that the existing access will be upgraded to facilitate vehicular, pedestrian and cyclist movements. The design and specification of this second access are currently being developed in consultation with Cork City Council officials.

2.3.3 Dunkettle House

This House will remain in its current traditional residential use. The applicant is committed to the continued maintenance of the house, associated outbuildings and grounds.

At the time of writing this EIAR, no detailed design proposals have been prepared for Dunkettle House, the outbuildings or its grounds. The owners are embarking on a feasibility study to identify potential future uses including the sympathetic re-use of the eighteenth- and nineteenth-century buildings. It is not envisaged that any future development at Dunkettle House would necessitate an EIA Assessment on its own, but for completeness, the house and its associated grounds have been included within the EIAR Study area.

2.3.4 Development Overview

An overview of the key development statistics is set out in the following Table:

Table 2-1 Development Overview

Development Statistics	LRD Phase 1	Overall EIAR Study
Site Area	26.64 Ha gross (13.08 Ha net)	63.84 Ha study boundary (25.71 Ha net)
No. Units	550 no. units	1,036 no. new units 1 no. existing unit (Dunkettle House)
Non-Residential Uses	Childcare Facility (769.6 sqm, 118 child spaces) 3 no. Commercial Units (531.2 sqm total)	–
Density	42.05 uph	40.3 uph
Building Height	2-6 storeys	3-5 storeys
Unit Mix Summary	394 houses (71.64%) 104 2 bed (26.40%) 260 3 bed (65.99%) 30 4 bed (7.61%) 156 duplexes/apartments (28.36%) 75 1 bed (48.08%) 81 2 bed (51.92%)	695 houses (68.41%) 172 2 bed (24.75%) 463 3 bed (66.62%) 60 4 bed (8.63%) 321 duplexes/apartments (31.59%) 143 1 bed (44.55%) 178 2 bed (55.45%)

2.3.5 Existing Structures

The survey drawings identify ruins/structures including a former dwelling on the northern part of the site, within LRD Phase 1. These will be demolished / removed as part of the LRD Phase 1 proposals.

To the south, the site includes Dunkettle House (protected structure – PS1190) and associated structures (protected structures – PS1238, PS1239, PS1240, PS1170).

As noted above, LRD Phase 2 will include a second access point from Dunkettle Road (L2998) via an existing access serving the applicants lands and a number of private dwellings on Woodlane. It is envisaged that this existing access will be upgraded to facilitate vehicular, pedestrian and cyclist movements. The design and specification of this second access are currently being developed in consultation with Cork City Council officials.

At the time of writing this EIAR, no detailed design proposals have been prepared for Dunkettle House, the outbuildings or its attendant grounds. The owners are embarking on a feasibility study to identify potential future uses including the sympathetic re-use of the eighteenth- and nineteenth-century buildings. It is not envisaged that any future development at Dunkettle House would necessitate an

EIA Assessment on its own, but for completeness, the house and its associated grounds have been included within the EIAR Study area.

2.3.6 Drainage

In respect of the proposed sub areas as described above, at the time of writing this document the following outlines the basis of a design status of the services infrastructure and facilities (i.e. Surface Water drainage, Wastewater drainage, Water Supply Services and Public Lighting) for the development as follows:

- **LRD Phase 1** – A detailed design is available.
- **LRD Phase 2** – An outline drainage strategy/scheme has been considered but a detailed design of services has not yet been prepared.
- **Dunkettle House** – At present there is no proposed development scheme for Dunkettle House and so there is no design scheme for new services. The current situation will remain.

A full description of the LRD Phase 1 proposals is contained in the *Site Civil Infrastructure Design Statement and SuDS Impact Assessment*, prepared by JODA Engineering Consultants, that accompanies this application under separate cover and it should be read in conjunction with this Report.

Further information on the services infrastructure and facilities for the proposed development as considered in this EIAR is outlined in Chapter 7 - Material Assets: Built Services of this EIAR.

2.3.6.1 Surface Water

The surface water catchments of the proposed drainage system are shown in the Figure below and will respect the overall surface water catchment regime of the existing site. Flows will drain eastwards towards Dunkettle Road discharging to an existing engineered piped system on Dunkettle Road or north and west to the Glashaboy river with 2 new outfalls proposed.

Surface water from the site will be attenuated to the equivalent run-off from the existing greenfield site in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) for discharges to existing drainage systems on Dunkettle Road. Surface water runoff from the site that is directed towards the Glashaboy river/tidal area will not be attenuated.

SuDS features incorporated in the surface water drainage system provide for mitigation of surface water pollutants in the discharge to the receiving surface water environment in accordance with CIRIA (Construction Industry Research and Information Association) C753 guidelines.

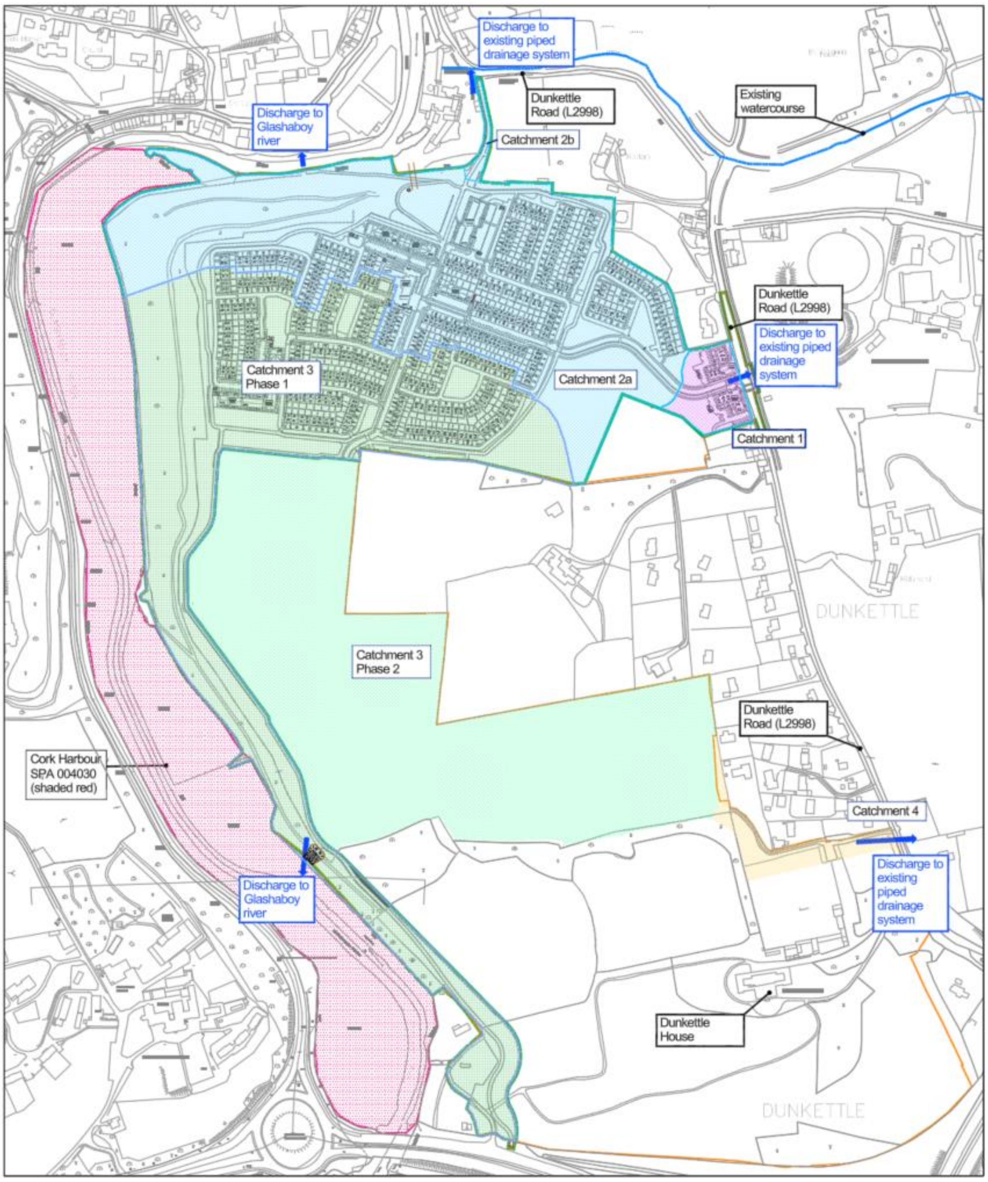

Figure 2-4 Proposed Surface Water Drainage Strategy

2.3.6.2 Wastewater

The wastewater discharged from the development will connect to the existing Uisce Éireann wastewater drainage network, which traverses the study area from north to south, to the Carrigrenan Wastewater Treatment Plant for treatment.

Uisce Éireann has issued a Confirmation of Feasibility in respect of the capacity of the existing wastewater drainage network to accept wastewater discharge from the proposed development.

A diversion of the existing Uisce Eireann wastewater sewer within the Phase 1 development site will be required to accommodate the Phase 1 development. The LRD Phase 1 infrastructure has been suitably designed to accommodate future connections from the LRD Phase 2 lands without the need for further upgrades of the existing network or the network installed during the Phase 1 works.

Therefore there will be no disruption to the LRD Phase 1 site development wastewater network as a result of the Phase 2 development works.

The system will be completely segregated from the surface water drainage network.

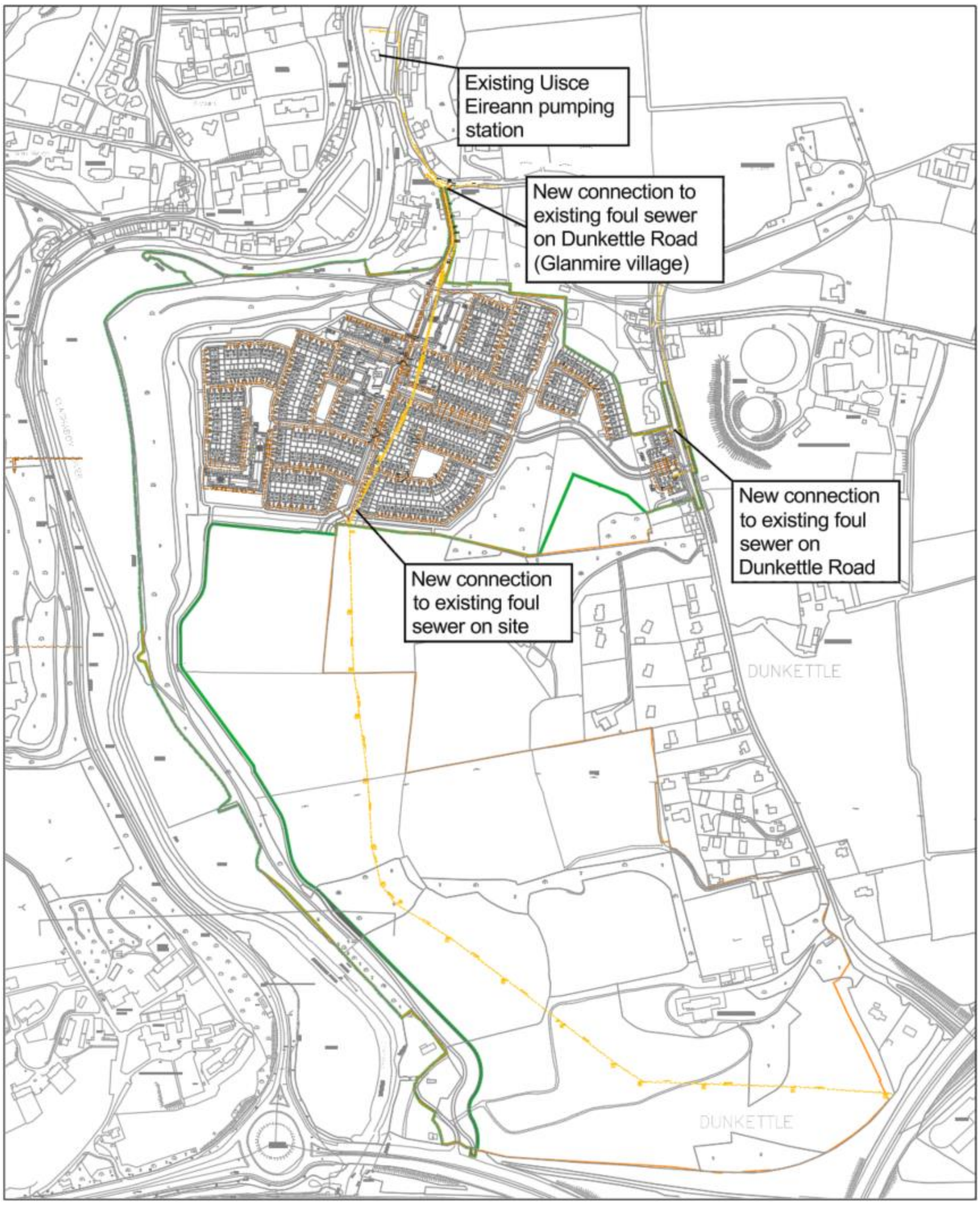

Figure 2-5 Phase 1 wastewater drainage network and connections to existing infrastructure

2.3.6.3 Water Supply

Uisce Éireann has issued a Confirmation of Feasibility in respect of the capacity of the existing water supply network to supply water to the proposed development.

At the time of writing of this document Uisce Éireann is in the process of upgrading the existing water supply infrastructure in the locality to provide for development in the study area.

The proposed water supply network consists of conventional water supply pipework and associated infrastructure laid in roads and common areas, with a connection to the existing water supply network on Dunkettle Road.

The proposed water supply network for LRD Phase 1 has been designed to accommodate an extension to the site network for the LRD Phase 2 development without a need for upgrading of the Phase 1 water supply network. Therefore there will be no significant disruption to the Phase 1 site development water supply network as a result of the Phase 2 development works.

2.3.7 Services

2.3.7.1 Electrical Supply

The existing ESB infrastructure within this area is adequate to support the proposed development.

It is envisaged that the complete electrical distribution system within the development will be underground with the requirement for sub stations, transformers, mini pillars and micro pillars located overground in positions to be agreed with ESB Networks.

An existing 38kv overhead line currently traversing the site will be undergrounded as part of the development.

2.3.7.2 Telecommunications

The existing Eir telecommunications infrastructure within this area is adequate to support the proposed development. It is envisaged that the complete telecommunications distribution system within the development will be underground with the requirement for distribution kiosks located overground in positions to be agreed with Eir.

With the availability of high speed broadband in the area it is envisaged that telephone, broadband and digital television services will distribute through this network.

2.4 Changes to the Proposed Development

This development was arrived at following detailed design and has evolved as an iterative process within the Design and Environment Team and in response to feedback from the Local Authority through the LRD process. The alternative designs proposed leading us to the preferred design described above are outlined in Chapter 3 of this EIAR.

2.5 Demolition & Construction Phase

An **Outline Construction Environmental Management Plan** (OCEMP) and a **Resources and Waste Management Plan** have been prepared by JODA Engineering Consultants for the proposed LRD Phase 1 development which is the subject of the current planning application. Both reports should be read in conjunction with this chapter. The principles of these reports will apply to the LRD Phase 2 development also**.**

2.5.1 Construction Programme

The construction phase of the proposed development (i.e. including LRD 1 and 2) is expected to take approximately 120 months. This equates to a 10 year construction programme for the overall development, with construction in some areas overlapping.

It is envisaged that c.125 dwellings will be constructed annually.

The current indicative phasing suggests that development will commence with the LRD Phase 1, as per the zones in the Figure below.

LRD Phase 1:

- Stage A – 152 residential units
- Stage B – 213 residential units, creche, commercial units
- Stage C – 185 residential units

The applicant envisages development will subsequently move to the LRD Phase 2 lands. There is no timeline for the potential future development at Dunkettle House. As outlined above, the owners are embarking on a feasibility study to identify potential future uses including the sympathetic re-use of the eighteenth- and nineteenth-century buildings, but for the purposes of the EIAR, worst case, it can be assumed that this would overlap with LRD Phase 2.

The sequence of phases may vary and will be subject to market demand, planning permission, funding, etc.

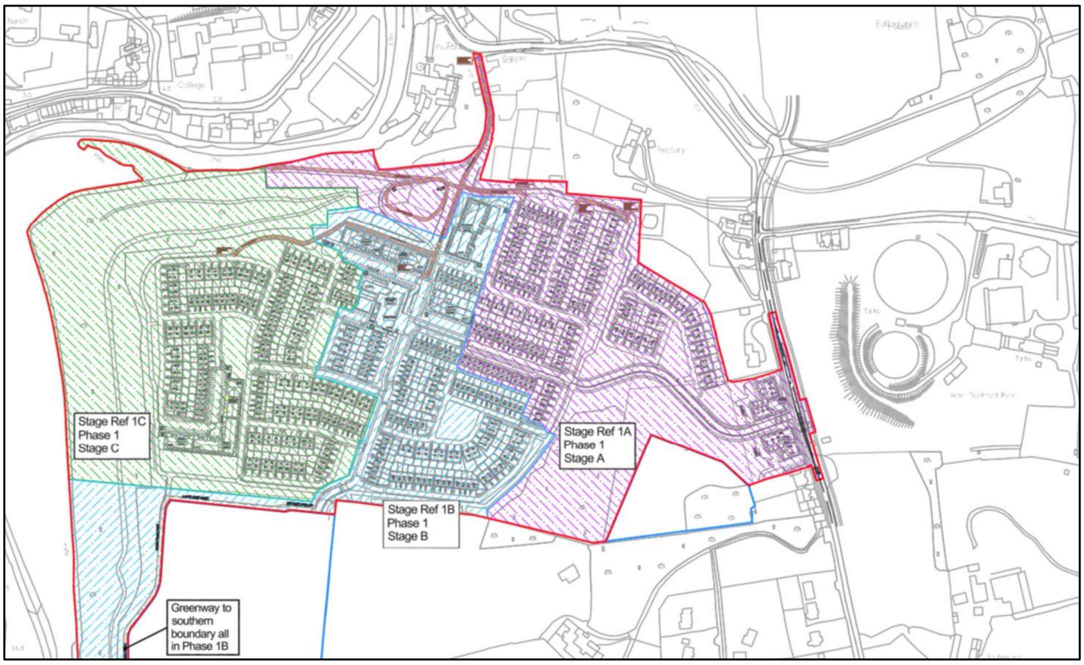

Figure 2-6 Construction Phasing Plan – LRD Phase 1

2.5.2 Construction Activities

Stage 1A consists of the following:

- Initial site setup.
- Construction of 152 residential units in a mix of types.
- Associated site infrastructure and connections to existing infrastructure.
- New road junction with existing public road (Dunkettle Road – North).
- New active travel facility junction with existing public footpath (Dunkettle Road – Glanmire Village).

Stage 1B consists of the following:

- Construction of 213 residential units in a mix of types, a creche and 3no. commercial units.
- Associated site infrastructure.

Stage 1C consists of the following:

- Construction of 185 residential units in a mix of types.
- Associated site infrastructure.

For each of the development stages set out above, the main stages of construction will be progressed based on the following:

i. Complete any necessary pre-connection surveys.
ii. Implement all recommended environmental mitigation measures arising from the preconstruction surveys;
iii. Confirm utility locations and divert utilities;
iv. Establish contractor's site compound and erection of site hoarding;
v. Site clearance and topsoil stripping;
vi. Cut and fill to level and re-grading works within site to formation level;
vii. Installation of services (drainage networks, water supply, electricity, etc.);
viii. Construction of roads, footpaths & hard/ soft landscaping;
ix. Installation of foundations/ footings for buildings and retaining walls;
x. Construction of new buildings (houses, duplex units and creche, commercial units);
xi. Connection to public services;
xii. Installation of electrical substations;
xiii. Provision of proposed road finishes;
xiv. Provision of landscaping finishes;
xv. Complete all site finishes;
xvi. Completion of any required testing and commission services within the development.

2.5.3 Site Facilities

Site facilities will be provided within the extent of the proposed development along with vehicular access routes from the public road. The on-site accommodation will consist of:

- Contractor's office space.
- Meeting room/H&S Room.
- First aid room.
- Separate male and female toilet facilities with a minimum ratio of 1 to 20.

- Drying room.
- Site canteen with drinking water, hot water, seating, plus facilities to heat and refrigerate food.
- Storage containers and bicycle storage.
- Materials storage areas and drop off.

All facilities shall have adequate heat and lighting and shall be cleaned regularly.

Temporary water supply, electricity supply and foul drainage will be required for the new facilities. Connections to electricity & water are available at the site boundary or will be extended temporarily as required from the site boundary. A temporary potable water supply will be provided. Foul drainage will be routed to the existing Uisce Éireann wastewater sewer within the development in accordance with prior agreement of Uisce Éireann.

Adequate fire protection and means of escape will be in place. It will be the responsibility of the contractor to provide and maintain the required standard throughout the project and the contractor will inform all operatives of the welfare arrangements for the contract during site inductions.

Initially it is proposed to provide facilities on site at a location adjacent to Dunkettle Road as shown in Figure below, with site access from Dunkettle Road. This is the same location previously used as a construction compound for the Part VIII works on Dunkettle Road.

Proposed site facilities and site access is also shown on JODA drawing ref. 3442-01-00-DR-C-9002 included with the planning application documents.

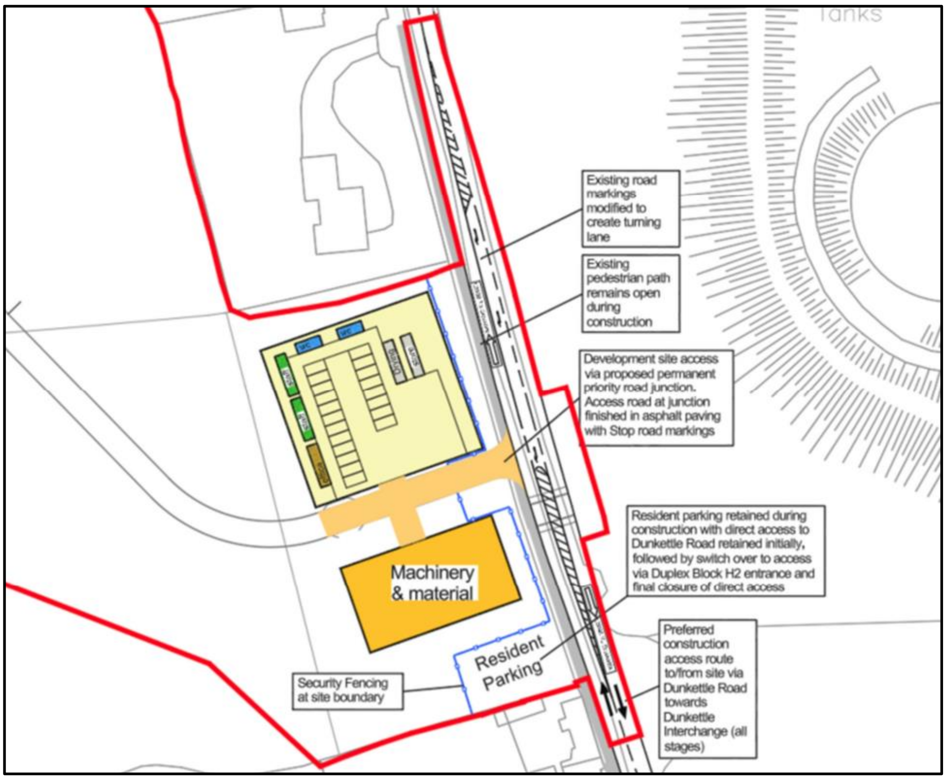

Figure 2-7 Site Facilities and access, early site development (Source: OCEMP)

Figure 2-8 Site Facilities and access, general site development process (Source: OCEMP)

2.5.4 Construction Hours

It is proposed that standard construction working hours will apply, i.e.:

- 7am to 6pm Monday to Friday,
- 8am to 2pm on Saturdays.

Any works proposed outside of these periods shall be strictly by agreement with the Local Authority in advance.

In order to mitigate any impact of construction activities, the following measures are proposed:

- Coordination of deliveries to site within working hours,
- Scheduling of noisier activities early in the working day,
- Noise and vibration mitigation measures will be implemented in line with Chapter 12.
- The delivery of materials to the site during the construction phase shall be organised so that deliveries are minimised and do not cause traffic hazards.
- Deliveries are not permitted at peak traffic times (8:00am to 9:00am and 5:00pm to 6:00pm) and
- all construction vehicles are parked within the site.

2.5.5 Site Access and Access Routes

The site clearance, and general construction activities will generate a level of vehicle movement to and from the site as well as internally within the subject site. Appropriate measures will be put in place to ensure safe access to/from the site. Measures will also be implemented on-site to ensure that safe movements can be performed within the construction site. A construction site car park will be located within the site boundary, with a dedicated pedestrian route to the site accommodation.

Site access to the Contractor compound area will be via the marked routes shown on Figures above.

Vehicular movements to and from site shall be co-ordinated so that vehicles movements through Glanmire village do not occur in the first instance. Vehicles travelling to the site shall approach the site travelling northwards along Dunkettle Road and vehicles exiting the site shall leave the site and turn southwards towards Dunkettle.

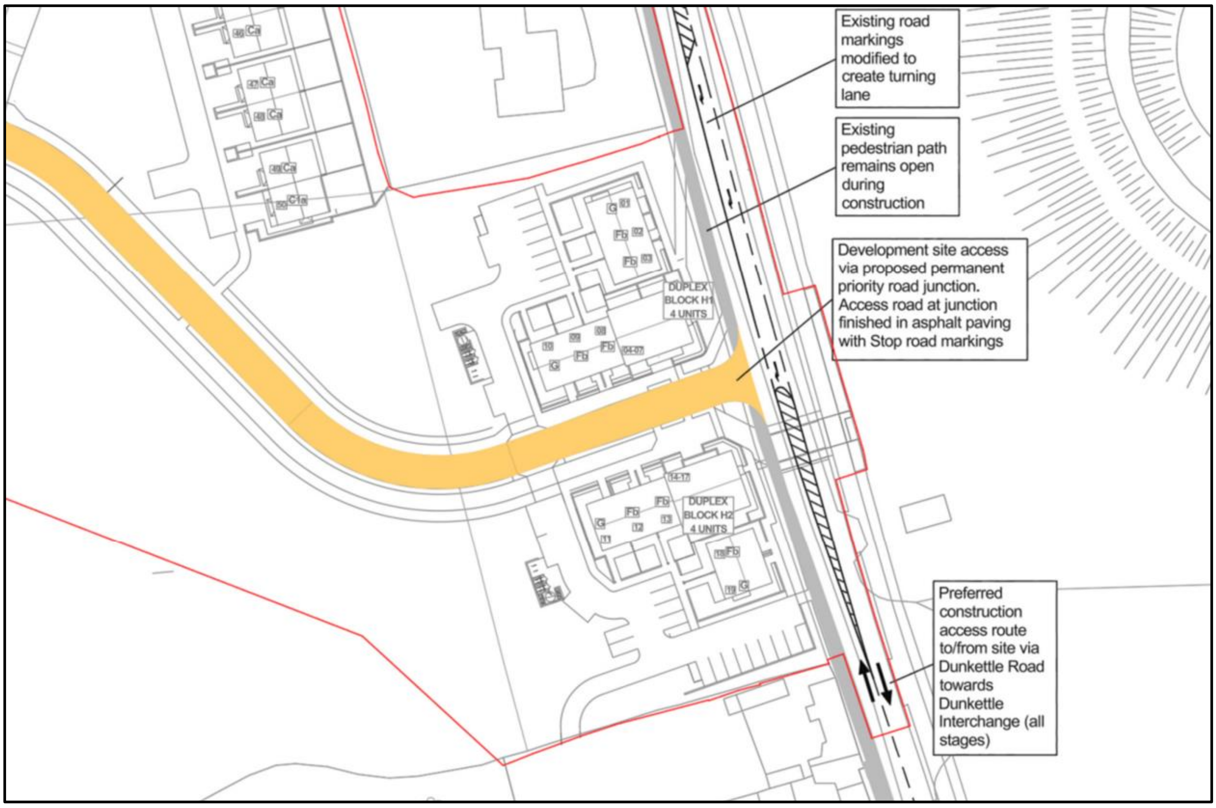

Figure 2-9 Site Access on Dunkettle Road (Source: JODA)

The existing roadside pedestrian path on Dunkettle Road shall remain open to the public throughout the development process. With an unobstructed pedestrian path on Dunkettle Road, the visibility splay at the vehicular access point to Dunkettle Road shall achieve the equivalent of that of a normal road junction, with 50m sight distance along the major arm at a distance back from the road edge of 2.4m.

The site will be fenced and sealed with access gates secured at all times to prevent unauthorised access. A wheel washing operation (located close to the exit from the construction area to minimize the spread of mud and dust) and road sweeping facilities shall be provided to ensure that internal site routes and public roads are kept in good condition.

Further details of the proposed site access are available under the **Construction Environmental Management Plan** prepared by JODA Engineering Consultants.

2.5.6 Anticipated Construction Traffic

The typical construction trips generated during site clearance and construction comprise:

- Construction Personnel arriving and leaving work.
- Deliveries and removal of machinery.

- Delivery and removal of materials.

Additional detail of the anticipated construction traffic is available within the **Construction Environmental Management Plan** prepared by JODA.

2.5.6.1 Construction Personnel and Parking

Construction site staff travelling to the site typically arrive early in the morning and leave in the evening. Generally, workers travel by private vehicle and van. It is expected that there will be a typical average of approximately 120 no. construction employees on site during the development works.

With an allowance for vehicle sharing and other modes of transport an average of 90 vehicle movements to and from site per day is expected during the majority of the development period.

Car parking spaces will be provided on site for use by the construction employees and visitors to the site.

2.5.6.2 Deliveries and Removal of Machinery and Materials

Over the course of the construction programme the number of heavy vehicle movements is estimated as follows:

- **Building material delivery** – 7 vehicles per day during the house building phase.
- **Excavated soil removal (peak)** – 70 vehicle roundtrips per day during earthworks phase.
- **Waste removal** – 1 vehicle per day.
- **Machinery delivery/removal** – 1 vehicle per day expected during certain site activities (especially earthworks).

Parking of site vehicles shall be managed to ensure that there is no parking on the public road. There will be designated areas on site for loading/unloading and a specified storage area for materials and machinery. A waste and recycling area will be established within the construction site boundary, close to the construction access, to prevent unnecessary trips through the site for collection.

2.5.7 Construction Traffic Management

A **Construction Stage Traffic Management Plan** will be prepared and agreed with Cork City Council Transportation Department & An Garda Siochána by the Main Contractor(s) prior to the commencement of development.

The Construction Stage Traffic Management Plan will build on the principles outlined in the CEMP submitted with the Phase 1 LRD application and provide for the following:

1. Making good any damage to existing roads or footpaths caused by vehicular movements to and from the site.
2. Keeping roads, footpaths free of excavated materials, debris, rubbish, provide vehicle wheel wash and thoroughly clean all wheels and arches of all vehicles as they leave the site.
3. Confinement of development activities to within the active site area, i.e. the areas occupied by the works and the builders’ compound during any particular phase of the development.
4. Haul routes to and from the site will be defined and agreed with the Local Authority.

5. Properly designed and designated entrance an egress point to the construction site for construction traffic will be used to minimise impact on external traffic.
6. Where traffic signals are not in place, flagman must be used to control the exit of construction vehicles from the site onto a public road.
7. Existing fire hydrants are to remain accessible for the duration of the works, except by prior agreement with Cork City Council and Uisce Éireann

Vehicle movements shall be minimised through:

- Consolidation of delivery loads to/from the site and scheduling of large deliveries to site to occur outside of peak periods.
- Use of precast/prefabricated materials where possible.
- Re-use of 'Cut' material generated by construction works on-site where possible;
- Provision of adequate storage space on-site;
- Promotion of car sharing to site staff;
- Distribution of an information leaflet to all staff as part of their induction on site highlighting the location of the public transport services in the vicinity of the construction site.

The **Construction Stage Traffic Management Plan** will be a live document and will be updated as development progresses, including LRD Phase 2 and at Dunkettle House, where relevant.

2.5.8 Demolition

The existing ruins/structures (including a former dwelling on the northern part of the site) will be removed as part of the works.

Existing stonework from the walls of the house and ruins shall be recovered and reused in the landscaping/development works in accordance with the Architect's specifications.

2.5.9 Construction Waste

A project-specific **Resource & Waste Management Plan** (RWMP) has been prepared by JODA for the LRD Phase 1 application. The principles of this RWMP can be applied to future development on the LRD Phase 2 lands, and Dunkettle House where relevant, with an updated plan being prepared to accompany future planning applications as required.

The RWMP will be adhered to during the construction phase of the proposed development.

It is the developer's intention to conform to the waste hierarchy (Figure below) whereby waste prevention is the most preferred strategy. Where waste generation is unavoidable, re-use is the most preferred fate, followed by recycling and then energy recovery, with disposal (e.g. to landfill) being the least preferred fate.

Figure 2-10 The Waste Hierarchy (Source: JODA).

The predicted construction waste breakdown is provided in Table below.

Table 2-2 Predicted Construction Waste (Refer to Table 5 of RWMP by JODA).

LoW Code	Description	Waste Composition (%)	Generated Quantity (tonnes)	Reuse Rate (%)	Reused Quantity (tonnes)	Recycling Rate (%)	Recycled Quantity (tonnes)	Recovery Rate (%)	Recovered Quantity (tonnes)	Disposed Quantity (tonnes)
17 01 01	Concrete	40	1,478	55	813	40	591	0		74
17 01 02	Brick									
17 01 03	Tiles & Ceramics									
17 02 01	Wood	4	148	0		80	118	18	27	3
17 02 02	Glass									
17 02 03	Plastic									
17 03 02	Bituminous Material	10	369	40	148	60	222	0		0
17 04 07	Mixed Metals	15	554	0		100	554	0		
17 05 04	Soils and Stone		651,174		163,637					487,537
17 09 04	Mixed C&D Waste	30	1,108	30	332	40	443	20	222	111
20 01 08	Biodegradable Canteen Waste	0.25	9	0		0		0		9
20 03 01	Mixed Municipal Waste	0.75	28	0		0		0		28

2.5.10 Earthworks

The proposed development will involve excavation, stripping of topsoil and removal of material from site for platform installations and regrading of the site profile to suit the developed site layout.

The development as proposed has been designed to work with the natural constraints of the site in as much as is practically feasible and consistent with the general site development requirement to achieve an accessible, integrated, permeable site layout and design.

There will be bulk earthworks cut and fill required throughout the site in order to facilitate the finished levels of the developed site. Cut and fill depths will generally be limited to less than 2m with the exception of certain specific parts of the site where substantially deeper excavation depths will be required. An earthworks cut and fill profile drawing (JODA drawing ref 3442-JODA-01-00-DR-C-9021) is included in the engineering drawing pack that accompanies the planning application and earthworks quantities are included in a separate Construction Waste Management Plan report.

Existing topsoil and subsoil onsite is uncontaminated and naturally occurring and so in accordance with the regulatory regime for by-products as enshrined in Article 5 of the Waste Framework Directive and as transposed into Irish legislation by Article 27 of the European Communities (Waste Directive) Regulations 2011 and are considered suitable for re-use in the development.

Excavated topsoil and subsoils required for re-use on site will be temporarily stored on site for re-use otherwise it will be exported. Rock excavated on site will be crushed and re-used on site for filling where suited. Topsoil will be stored in an appropriate manner on site for the duration of the construction works.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill.

Excavated materials in excess of those required for the site development works will be treated as a by-product (production residue) and exported off-site to be re-used at another suitable site in the first instance in accordance with the Waste Framework Directive (2008/98/EC, as amended by Directive (EU)2018/851) and as transposed in Ireland by the European Union (Waste Directive) Regulations 2011-2020. These regulations provide for uncontaminated excavated soil and stone and other naturally occurring materials (used on sites other than the one from which there were excavated) to be considered in accordance with the definition of waste and the provisions on by-products and on end-of-waste status. The Directive and Article 27of those Regulations sets out the requirements and conditions for a material to be regarded as a by-product and not as a waste. The conditions for a material to be a by-product are:

(a) Further use of the substance or object is certain; (b) The substance or object can be used directly without any further processing other than normal industrial practice; (c) The substance or object is produced as an integral part of the production process; and, (d) Further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

During the demolition and construction phase, excavations and exposed sub-soils in open cuts will be blinded and protected with clean broken stone as soon as possible after exposing the subsoil to prevent erosion by surface water runoff.

Excavated earthworks quantities are provided by JODA Engineering Consultants in the Resource and Waste Management Plan, submitted under separate cover. For the Phase 1 LRD development, the following quantities are estimated.

Table 2-3 Estimated Earthworks Quantities

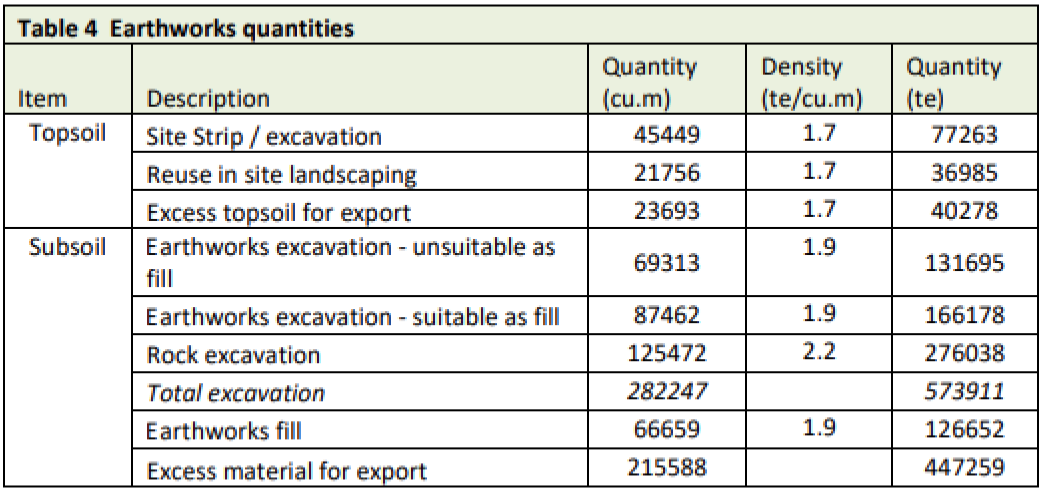

Table 4 Earthworks quantities

Item	Description	Quantity (cu.m)	Density (te/cu.m)	Quantity (te)
Topsoil	Site Strip / excavation	45449	1.7	77263
	Reuse in site landscaping	21756	1.7	36985
	Excess topsoil for export	23693	1.7	40278
Subsoil	Earthworks excavation - unsuitable as fill	69313	1.9	131695
	Earthworks excavation - suitable as fill	87462	1.9	166178
	Rock excavation	125472	2.2	276038
	Total excavation	*282247*		*573911*
	Earthworks fill	66659	1.9	126652
	Excess material for export	215588		447259

2.5.10.1 Ground Conditions

A geotechnical site investigation was performed by Priority Geotechnical Limited (PGL) to determine existing ground conditions. The investigation consisted of the formation of a series of trial holes on site with associated sampling and laboratory geotechnical and environmental testing. The trial hole depths were in the range 1.0m to 3.5m and generally terminated at a rock stratum.

Ground overburden conditions encountered are generally as follows:

- Topsoil 0.2m to 0.3 in depth, underlain by a mix of brown sandy gravelly SILT and silty GRAVEL to a depth of 1.0m to 3.5, underlain by rock.

No groundwater was encountered in the trial holes during the excavation period (March 2021).

Laboratory environmental tests were performed on a set of topsoil samples and subsoil samples to determine the acceptability of the soil material at recovery facilities in accordance with the EPA document “Guidance on waste acceptance criteria at authorised soil recovery facilities”, 2020.

A summary of the results of the environmental testing is shown in Table below.

Table 2-4 Results of soil environmental sampling (Table 2-1 of OCEMP)

Sample Location	Sample depth (m)	Type	Suitable as Inert Waste landfill	pH	Cumulative Sulphates 10:1 mg/l
TP02	0.1	Topsoil	Y	8.0	24
TP02	0.3	Sandy Gravelly Silt	Y	8.0	10
TP03	0.1	Topsoil	Y	7.4	30
TP03	0.3	Sandy Gravelly Silt	Y	8.0	10
TP08	0.1	Topsoil	Y	7.2	18
TP08	0.3	Sandy Gravelly Silt	Y	7.5	46
TPIO	0.2	Topsoil	Y	7.2	25
TPIO	0.5	Sandy Gravelly Silt	Y	7.5	19

Sample Location	Sample depth (m)	Type	Suitable as Inert Waste landfill	pH	Cumulative Sulphates 10:1 mg/l
TP21	0.1	Topsoil	Y	8.0	20
TP21	0.5	Sandy Gravelly Silt	Y	8.0	10
TP24	0.2	Topsoil	Y	7.8	30
TP24	0.6	Sandy Gravelly Silt	Y	7.8	43
TP25	0.1	Topsoil	Y	6.9	30
TP25	0.5	Sandy Gravelly Silt	Y	7.0	25

No significant environmental contaminants were detected in the tested samples and the soils are deemed to be classified as Inert Waste Landfill.

Under Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27), uncontaminated soil and stone free from anthropogenic contamination which is excavated during the Construction Phase of a development can be considered a by-product and not a waste, if (a) further beneficial use of the material is certain, (b) it can be used directly without any further processing, (c) it is produced as an integral part of the development works and (d) the use is lawful and will not have any adverse environmental or human health impacts (EPA, 2019).

For Article 27 to apply, the beneficial use mentioned in point (a) above must be identified for the entirety of the excavated soil from the proposed development prior to its production, with that use taking place within a definite timeframe, for it to be regarded as certain.

2.5.10.2 Invasive Species

As outlined in the Biodiversity chapter and other material submitted with the LRD Phase 1 application, just one of regulated invasive species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, namely, Rhododendron (*Rhododendron ponticum*) was recorded within the overall EIAR study area, south of the Phase 1 LRD area, with a further six invasive species (also the Phase 1 LRD area) categorized as Low-High impact species by National Biodiversity Data Centre (NBDC) (NBDC, 2024) in the Site.

- Cherry laurel (*Prunus laurocerasus*) (High-impact species)
- Sycamore (*Acer pseudoplatanus*) (Medium-impact species)
- Traveller’s joy (*Clematis vitalba*) (Medium-impact species
- Butterfly-bush (*Buddleja davidii*) (Medium-impact species)
- Fuchsia (*Fuchsia magellanica*) (Low-impact species)
- Montbretia (*Crocosmia* x *crocosmiiflora*) (Low-impact species)

Within the area of Phase 1 LRD area, just sycamore and traveller’s joy were the only invasive species recorded.

During the construction stage, an IAS Specialist will be contracted to treat and eradicate the invasive plants on site per TII Technical Guidance on *‘Management of Invasive Plant Species on National Roads’* published in December 2020. Other measures to control the spread of invasive plant species shall include:

- Restriction of vehicle movements to avoid areas susceptible to the spread of invasive species.
- Pressure-washing of all vehicles and vehicles carrying IAS off site in specially created areas with self-contained surface water control measures.
- All materials imported to site to be certified as free from invasive materials.

2.5.10.3 Waste

A *Resources and Waste Management Plan* has been prepared by JODA for the proposed development and is submitted under separate cover. An inventory has been presented in the RWMP (JODA Engineering Consultants, 2024) and is detailed in the Table below. This inventory provides a post-design resource and waste inventory of all residual resources listing the following:

- Description of each residual resource stream predicted;
- The List of Waste (LoW) Code for each stream;
- The predicted quantity of material generated (in tonnes); and
- The identified resource management route options for prevention, reuse, recycling, recovery and disposal for each material.

Table 2-5 Resource Waste Inventory Table (extracted from RWMP - JODA)

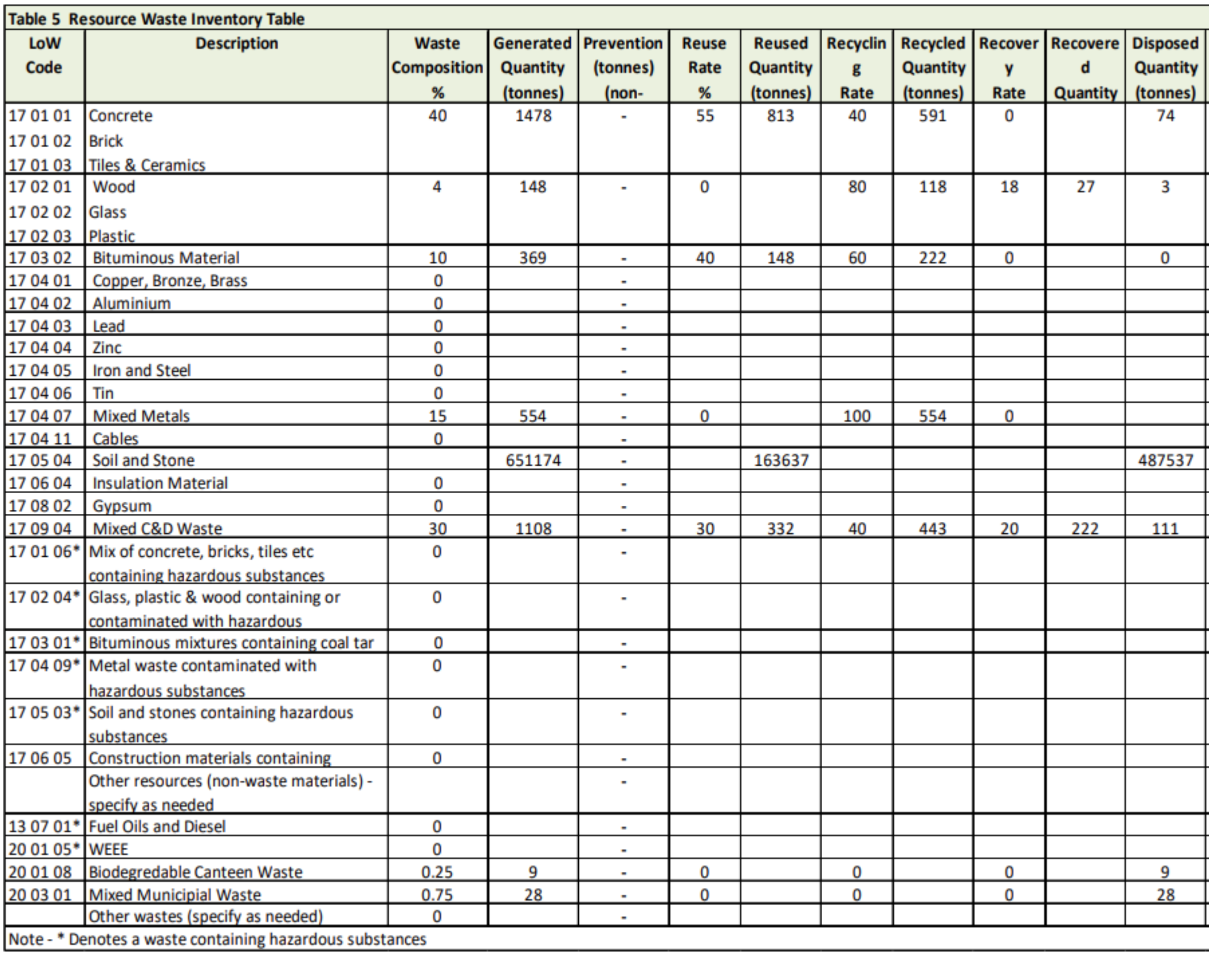

Table 5 Resource Waste Inventory Table

LoW Code	Description	Waste Composition %	Generated Quantity (tonnes)	Prevention (tonnes) (non-	Reuse Rate %	Reused Quantity (tonnes)	Recycling Rate	Recycled Quantity (tonnes)	Recovery Rate	Recovered Quantity	Disposed Quantity (tonnes)
17 01 01 17 01 02 17 01 03	Concrete Brick Tiles & Ceramics	40	1478	-	55	813	40	591	0		74
17 02 01 17 02 02 17 02 03	Wood Glass Plastic	4	148	-	0		80	118	18	27	3
17 03 02	Bituminous Material	10	369	-	40	148	60	222	0		0
17 04 01	Copper, Bronze, Brass	0		-							
17 04 02	Aluminium	0		-							
17 04 03	Lead	0		-							
17 04 04	Zinc	0		-							
17 04 05	Iron and Steel	0		-							
17 04 06	Tin	0		-							
17 04 07	Mixed Metals	15	554	-	0		100	554	0		
17 04 11	Cables	0		-							
17 05 04	Soil and Stone		651174	-		163637					487537
17 06 04	Insulation Material	0		-							
17 08 02	Gypsum	0		-							
17 09 04	Mixed C&D Waste	30	1108	-	30	332	40	443	20	222	111
17 01 06*	Mix of concrete, bricks, tiles etc containing hazardous substances	0		-							
17 02 04*	Glass, plastic & wood containing or contaminated with hazardous	0		-							
17 03 01*	Bituminous mixtures containing coal tar	0		-							
17 04 09*	Metal waste contaminated with hazardous substances	0		-							
17 05 03*	Soil and stones containing hazardous substances	0		-							
17 06 05	Construction materials containing	0		-							
	Other resources (non-waste materials) - specify as needed			-							
13 07 01*	Fuel Oils and Diesel	0		-							
20 01 05*	WEEE	0		-							
20 01 08	Biodegredable Canteen Waste	0.25	9	-	0		0		0		9
20 03 01	Mixed Municipial Waste	0.75	28	-	0		0		0		28
	Other wastes (specify as needed)	0		-							

Note - * Denotes a waste containing hazardous substances

2.5.10.4 Excavations, Foundations and Services

There will be excavation associated with the pouring of foundations and the establishment of trenches for site services.

Excavation of rock will occur particularly at the eastern and western sides of the site where deeper excavations are required. The rock is typically red sandstone with mudstone and siltstone and is mostly excavatable using tracked excavators with toothed buckets.

Isolated hard strata can occur in this rock type. It is estimated that approximately 1% of the overall rock excavation may be of sufficient hardness to require pneumatic hammering to loosen prior to excavation, requiring approximately 120 hours of rock hammering activity during the course of the works. Rock excavated on site will be crushed and re-used on site for filling where suited, e.g. as a sub-base to footpath and cycle path areas.

Existing topsoil and subsoil materials are uncontaminated and naturally occurring and so in accordance with the regulatory regime for by-products as enshrined in Article 5 of the Waste Framework Directive and as transposed into Irish legislation by Article 27 of the European Communities (Waste Directive) Regulations 2011 are considered suitable for re-use in the development.

Laboratory environmental tests were performed on a set of topsoil samples and subsoil samples to determine the acceptability of the soil material at recovery facilities in accordance with the EPA document "Guidance on waste acceptance criteria at authorised soil recovery facilities", 2020. No significant environmental contaminants were detected in the tested samples and the soils are deemed to be classified as Inert Waste Landfill.

2.6 Health and Safety

2.6.1 Construction Phase

Project supervisors for the construction phase will be appointed in accordance with the Health, Safety and Welfare at Work (Construction Regulations) 2013, and a Preliminary Health and Safety Plan will be formulated during the detailed design stage which will address health and safety issues from the design stages, through to the completion of the construction phases. This Health and Safety Plan will be developed further for the construction stage of the project.

2.7 Monitoring

2.7.1 CEMP

A CEMP is included with the Phase 1 LRD planning application. The CEMP will be updated by the Main Contractor(s) following a grant of permission, to address any changes required by planning conditions and will be agreed with the planning authority prior to the commencement of development.

The CEMP demonstrates the applicant's commitment to implement the proposed development so as to avoid or minimise the potential environmental effects resulting from construction activities.

Aspects addressed within the CEMP include but are not limited to; working hours, noise and vibration; dust and air quality; traffic and vehicle management; pollution incident control; and protection of vegetation and fauna.

The appointed contractor will be required to implement this CEMP throughout the course of the construction phase. All personnel will be required to understand and implement the requirements of the plan.

The CEMP will be a live document and will be updated to include the Phase 2 LRD development, and its associated environmental requirements, following a grant of permission for same. The same principles will apply as outlined in the CEMP submitted with this planning application.

The CEMP addresses, inter alia, commitments made in this EIAR in relation to construction noise and dust, air quality, management of waste, stormwater management etc.

2.7.2 Community Liaison

The contractor will appoint a Liaison Officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the Contractor(s) CEMP.

2.7.3 Integrated Pest Management

The Main Contractor will take all necessary steps to ensure that pests - rodents, birds, insects and plants are controlled at all times.

Control measures will be undertaken prior to commencement of any works on the site. Poison where used, will comply with any relevant Health and Safety requirements and which eliminate any danger to children, household pets and other wildlife. Old and dis-used service pipes and voids will be removed or filled to avoid the potential pest to infest the site.

2.7.4 Environmental

The monitoring proposed in Chapters 4 to 16 of this EIAR will be carried out during the demolition, construction and operational phases, as outlined. This monitoring is integrated to ensure that there will be no likely significant effects during development of the site.

A bespoke site Construction Environmental Management Plan (CEMP) will be prepared by the appointed Main contractor(s) prior to work commencing on site. The main purpose of a CEMP is to provide a mechanism for implementation of the various mitigation and monitoring measures which are described in the EIAR, and will incorporate any additional measures attached to a grant of permission.

The CEMP demonstrates the applicant's commitment to implementing the proposed development in such a way as to avoid or minimise the potential environmental effects resulting from construction activities. All personnel will be required to understand and implement the requirements of the plan.

Aspects that will be addressed within the CEMP will include but are not limited to, waste and materials management; noise and vibration; dust and air quality; traffic and vehicle management; pollution incident control; and protection of vegetation and fauna. A summary of the mitigation measures to be incorporated into the CEMP is provided in Chapter 17 of the EIAR.

2.8 Commissioning

The testing and commissioning of services (drainage, watermain, gas, electricity) will be completed in accordance with relevant codes of practice as set out in Chapter 7 of the EIAR.

2.9 Property Management

A property management company would be appointed to manage the scheme and common areas to ensure that the scheme is well managed, and the development is maintained to an extremely high level. They will be responsible for inter alia cleaning, landscaping, refuse management, insurance, maintenance of mechanical/electrical lifts/ life safety systems, security etc.

2.10 Decommissioning

The design life of the scheme is greater than 60 years. Thus, for the EIA process, the development is considered permanent, and a decommissioning phase is not considered in this report.

2.11 Conclusion

This chapter sets out the development parameters for the proposed development including an overview of the Architectural, Landscape and Engineering strategy. An overview of the phasing for construction has also been provided, and further information can be found in the **Construction Environmental Management Plan** and **Resource & Waste Management Plan** prepared by JODA Engineering Consultants.

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 3

Alternatives

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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3 Alternatives

This chapter was prepared by Louise O'Leary, Associate Director at McCutcheon Halley Chartered Planning Consultants. Louise has a Masters in Regional and Urban Planning (BA MRUP Hons), obtained in 2005, and a Diploma in EIA Management, obtained in 2014, both from University College Dublin. Louise is also a Corporate Member of the Irish Planning Institute.

With over 18 years' experience in planning and development projects, Louise has directed and contributed to the preparation of environmental impact assessments for a variety of projects including residential, mixed use and infrastructural developments.

3.1 Introduction

The requirement to consider alternatives within an Environmental Impact Assessment Report (EIAR) is set out in Annex IV (2) of the EIA Directive (2014/52/EU) and in Schedule 6 of Planning and Development Regulations 2001 (as inserted by article 97 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which state (at paragraph 1(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 requirement is elaborated at paragraph 2(b), which makes clear that reasonable alternatives may include project design proposals, location, size and scale, which are relevant to the proposed development and its specific characteristics. The Regulations require that an indication of the main reasons for selecting the preferred option, including a comparison of the environmental effects be presented in the EIAR.

The Environmental Protection Agency *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2022 states:

> *"The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*
>
> (Section 3.4.1)

The Guidelines also state that the range of alternatives considered may include the 'do-nothing' alternative.

Accordingly, this chapter of the EIAR provides an outline of the main alternatives examined during the design phase. It sets out the main reasons for choosing the development as proposed, taking into account and providing a comparison on the environmental effects. The assessment of alternatives is considered under the following headings:

i. Do Nothing Alternative
ii. Alternative Use
iii. Alternative Locations
iv. Alternative Project Design (3 no. alternative scenarios)
v. Alternative Processes

Notwithstanding the above, pursuant to Section 3.4.1 of the 2022 EPA Guidelines, the consideration of alternatives also needs to be cognisant of the fact that *"in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…"* The Guidelines are also instructive in stating: *"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'"*.

3.2 Consideration of Alternatives

3.2.1 Do Nothing

3.2.1.1 Actual Do Nothing

The 'Do-nothing' alternative is a general description of the evolution of the key environmental factors of the site and environs if the proposed project did not proceed. Each Chapter of this EIAR includes a description of the 'Do Nothing' alternative and should be referenced in conjunction with this Chapter.

In general, If the proposed development is not realised, it is anticipated that the proposed development site will remain in its current condition in the short to medium term and will remain in agricultural use.

However, in the absence of the proposed development progressing, it is likely that another residential proposal would be progressed on the site having regard to the location of the proposed development site within the existing built-up area of Cork City and Suburbs, its residential zoning and the critical need for housing.

3.2.2 Alternative Locations

The location of the proposed development has been determined by the policy framework set out in the *Cork City Development Plan 2023-2029.* As outlined in Chapter 1,

> *"The vision for Cork City over the period of this Development Plan and beyond is to be a successfully, sustainable regional capital and to achieve a high quality of life for its citizens and a robust local economy, by balancing the relationship between community, economic development and environmental quality. It will have a diverse innovative economy, will maintain its distinctive character and culture, will have a*

> *network of attractive neighbourhoods serviced by good quality transport and amenities and will be a place where people want to live, work, visit and invest in.”*

In the CDP, Glanmire is identified as one of the four ‘Urban Towns’ where the Role is defined as follows:

> *“**Phased delivery of strategic sites** by **targeting growth** proportionate to the existing population **within the four urban towns**. All development shall focus on prioritising walking, cycling and public transport use. Apply a mixed-use approach to regenerating key underutilised locations. Use a range of designs and densities that reflect and enhance the individual character of each town.”*

The site also forms part of the South Glanmire Urban Expansion Area, where Objective 10.69 (South Glanmire Expansion Area) supports the compact and strategic expansion of the area:

> *“To support the **compact growth and development of South Glanmire Expansion** Area as a **strategic City consolidation and expansion area**, as identified in the Core Strategy. All development shall be designed, planned and delivered in a co-ordinated and phased manner, using a layout and mix of uses that form part of an emerging neighbourhood integrated with the wider area.”*

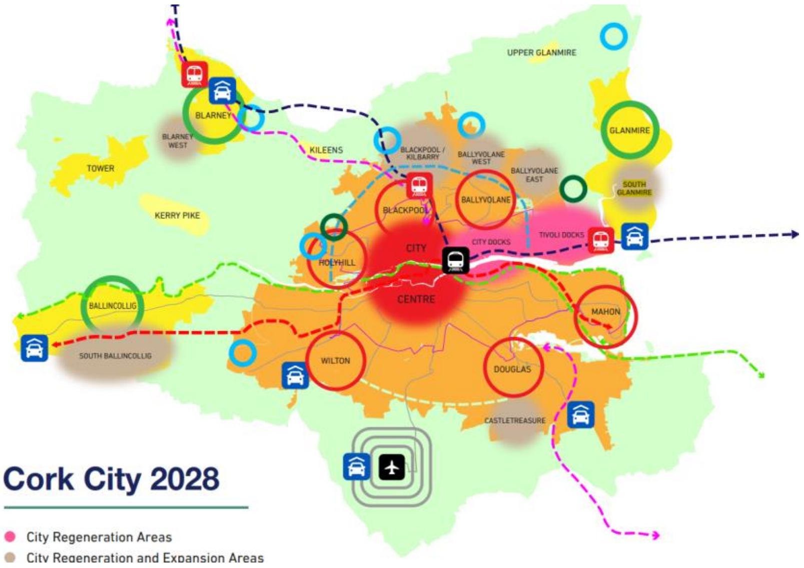

Figure 3-1 Extract from the 2022 Cork CDP - Core Strategy Map 2022-2028 (Figure 2.20).

The lands are zoned for *ZO 02 New Residential Neighbourhood* where the following objective applies:

> *“To provide for new residential development in tandem with the provision of the necessary social and physical infrastructure.”*

The lands at Dunkettle House and along the western and northern extent of the site, above the Glashaboy River, are zoned *ZO 17 Landscape Preservation Zone* where the following objective applies:

> *“To preserve and enhance the special landscape and visual character of landscape Preservation Zones.”*

See Figure 1-6, in Chapter 1 of the EIAR.

As the development of this site for the proposed land uses has been identified at a local and national scale in the City Development Plan, in line with the National Planning Framework, no alternative sites were considered in this EIAR.

3.2.3 Alternative Uses

3.2.3.1 Relevant Development Plan

The primary determinant of suitable uses is established in the site's zoning. The proposed development site for the new housing and associated commercial (neighbourhood) uses is zoned *ZO 2 New Residential Neighbourhood*, with the greenway and some infrastructure to serve the development proposed within the *ZO 17 Landscape Preservation Zone.*

The CDP identifies the primary uses for residential zoned lands to include residential, creche, schools, home based economic activity, open space and places of public worship. The proposed development is in accordance with the permissible uses and open to consideration uses attached to these zonings.

In principle, an application for any combination of the uses listed above could be progressed on the site subject to compliance with other policies and objectives in the CDP.

The proposed greenway through the ZO 17 lands complies with the objective of ZO 17 zoning, but no alternative uses are proposed for these sites.

3.2.4 Alternative Design (including layout, size & scale)

3.2.4.1 Introduction

This development was arrived at following detailed design and has evolved as an iterative process within the Design and Environment Team and in response to feedback from the Local Authority through the LRD process. The main alternatives considered in terms of design are outlined below, with input from the project architects – DMNA and the main reasons for not progressing with the options are outlined. The preferred design is described in Chapter 2 of this EIAR.

3.2.4.2 Alternative Design No. 1

This alternative is a design submitted previously for this site. This development consisted of a total of 527 units and a creche within the overall landholding. The development also included commercial and retail development in and around the existing Dunkettle House.

This development was deemed to no longer be viable as it does not meet new requirements with regard to density which was too low and therefore did not form the basis of a sustainable development maximising the use of development land. The development also fails to meet current policy at both local development plan level with regard to housing mix. Furthermore, the house types designs would not match the current Government guidelines with regard to room sizes and areas.

This design also fails to meet the new local development plan policies and zoning which have been amended since this design was developed.

The lack of commercial development around the proposed housing and poor connectivity to current and proposed public transport infrastructure in the area also made this scheme unsuitable within the current regulatory regime. The requirements for designs to meet the guidance contained in the Design Manual for Urban Roads and Streets would also not be achieved with this design. Therefore, this design alternative was not a suitable option to proceed with in this application.

Figure 3-2 Alternative Design Layout No.1

3.2.4.3 Alternative Design No. 2

This proposal included for a single housing development on the entire portion of the applicant's lands that were zoned for residential development, a total of c. 41.5 ha, with a total development of approximately 1,050 units. The lands zoned landscape protection around Dunkettle House were excluded.

The development proposed a mix of dwellings with duplexes located to address steep areas of the site. A pair of duplexes framed the pedestrian and cycle access to Glanmire village. A further 3 storey duplex was located at the main central node within the northern part of the site. A further node was located within the southern portion of the lands using 3 storey duplexes. Two 4 storey apartment buildings were located within the field to the southwest of the development.

Two buildings framed the northern entrance off the Dunkettle Road, consisting of a creche and a small commercial development.

Urban blocks were proposed with housing facing out towards an edge amenity space along the western woodland and with small pocket parks internally within each urban block, generally surrounded by pedestrian priority homezones to maximise the accessibility of these spaces to residents. Roads serving houses were generally looped where possible but where cul de sacs were used these were designed to be short and facilitate access to the edge amenity cycleway and pedestrian routes.

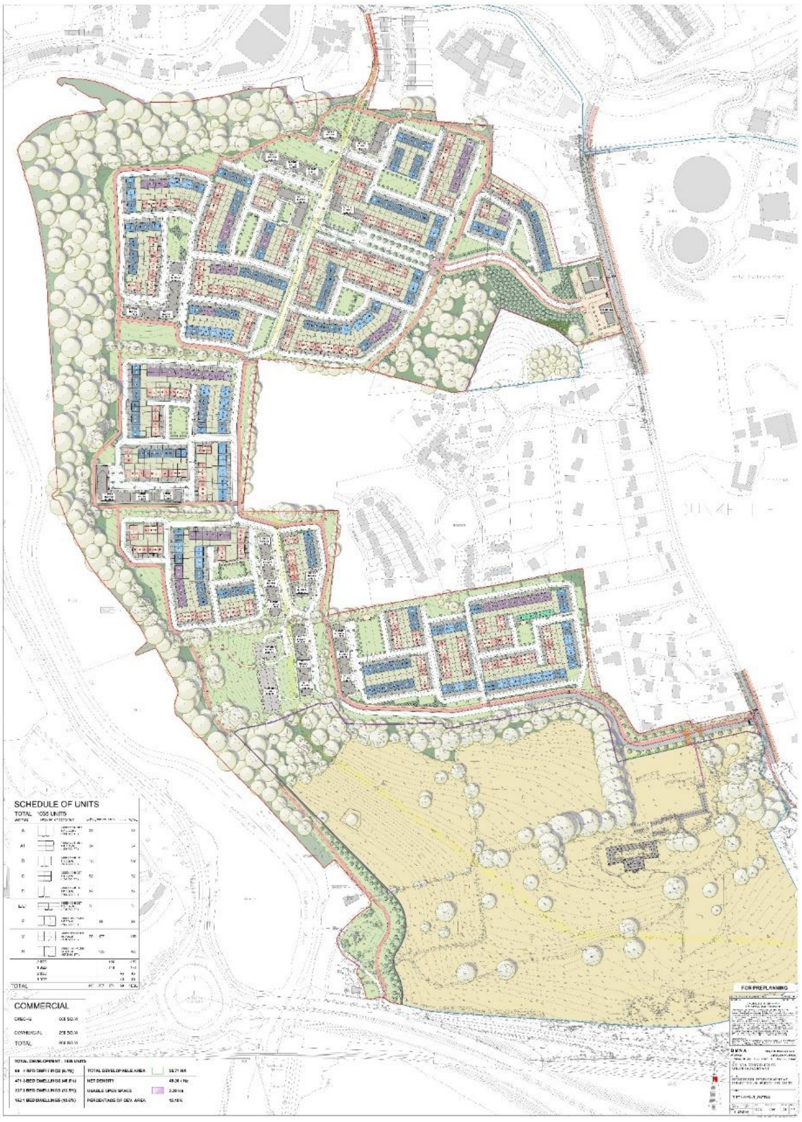

Figure 3-3 Alternative Design Layout No.2

The development included a through road linking through the site with two connections to Dunkettle Road. Cycleway connections to the wider network were proposed in four locations, with the creation of a greenway along the western edge of the site connecting from the Interurban Cycleway to the south to the village of Glanmire to the north. Two connections to Dunkettle Road Cycleway to the east along the proposed through road were also proposed.

A total of five character areas were proposed within the overall site development. The first two character areas were in the northern section of the site and follow the split of the main north south corridor through this part of the development. Further south within the lands the existing treelines which were to be retained were used to create different character areas within each existing field.

The approach to landscape design was to conserve as much of the existing treelines and woodlands as possible and to add further planting to rejuvenate and enrich what is already present to expand the existing biodiversity of the wider area. The pNHA Dunkettle Shore Wood and the Glanmire Wood areas were to be reserved for flora and fauna and closed off to the public.

3.2.4.4 Alternative Design No. 3 — Changes made following Consultation with Local Authority

Following consultation with Cork City Council, alternative Design No. 2 described above, was split into two phases, with a first phase LRD application consisting of approximately 550 houses to the northern fields, the design of which was further developed.

The design of the LRD Phase 2 lands did not evolve further in this alternative layout.

An integrated neighbourhood centre was included as part of the first phase of the overall development and this was moved to a central location within the development to be directly connected to a new main cycleway which runs centrally through the scheme. This consists of a centrally located block including a large creche and a commercial development of 3 units (comprising a shop, cafe and medical/general practice facility) designed around a new public space within the development.

Further nodes were created at the entrance off the Dunkettle Road, using duplex blocks framing the entrance and at the northern boundary where a new apartment building creates a gateway from the proposed cycleway connection to Glanmire.

The cycle network within the overall development and in particular the LRD phase 1 application area was amended. In addition to the proposed high-quality greenway along the western edge of the site a new cycleway linking through the central spine of the site was added. This gives direct access to the now proposed neighbourhood centre with its creche and commercial development as well as the new public space around this. A further additional cycleway link was added to the immediate north of the field boundary with the Woodville site which connects this new central spine to the eastern portion of the site and also creates an attractive loop amenity route which is entirely off road around the LRD Phase 1 development. Finally, a cycleway link connection was proposed along the main access road to connect from the cycleway off the Dunkettle Road access to the neighbourhood centre in the middle of the proposed development. A new alternative route was added to the north of the cycleway connection to Glanmire. This looped route runs around the proposed pond and amenity area at a shallower slope to facilitate easier access to the development from Glanmire.

Densities in the northern portion of LRD Phase 1 sub area were increased through the addition of an apartment building (Block J1) consisting of 53 units. This has direct access to the proposed cycleway link to the proposed future bus services to the north of the site. A second block (J2) consisting of a commercial and creche development to the ground floor along with 15 apartments above has also added to this part of the site. The net density for this LRD Phase 1 sub area increased to c.42 units per Hectare. Parallel roads were removed along the main access route with houses now accessing directly on this road.

A new amenity space including a pond was added to the northern steep area of the site. The newly proposed apartment building and redesigned duplex blocks H4 and H5 enclosed and overlooked this space.

Figure 3-4 Alternative Design Layout No. 3

3.2.5 Alternative Processes

This is an urban residential development and therefore the consideration of alternative processes to be considered relates to the methods of construction to be used in the development. The Alternatives have been considered and the Construction Environmental Management Plan (prepared by JODA

Engineering Consultants) details the construction processes likely to be employed and which have been assumed for the purposes of this EIAR.

3.3 Difficulties Encountered

Each Chapter of this EIAR includes a section on Difficulties Encountered and a description of same where encountered.

3.4 Conclusion

On the basis of the foregoing, it is considered that all reasonable alternatives to the project are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

Having considered all alternatives, the final design chosen by the developer i.e. the project as presented is deemed to be the most suitable project for the site.

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 4

Population and Human Health

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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4 Population & Human Health

4.1 Introduction

According to the European Commission's Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report (2017), human health is; *"a very broad factor that would be highly project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."*

The Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022) advise that "*in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc.*"

This chapter addresses the likely significant environmental impacts of the proposed development on population and human health. It is noted that other chapters of the EIAR also deal with likely significant environmental effects on population and human health arising from traffic and transportation, air quality, climate, noise and vibration, landscape and visual, utilities and the risk of major accidents and/or disasters and those chapters should be referenced in conjunction with this chapter of the EIAR.

4.2 Expertise and Qualifications

This chapter was prepared by Louise O'Leary, Associate Director at McCutcheon Halley Chartered Planning Consultants. Louise has a Masters in Regional and Urban Planning (BA MRUP Hons), obtained in 2005, and a Diploma in EIA Management, obtained in 2014, both from University College Dublin. Louise is also a Corporate Member of the Irish Planning Institute.

With over 18 years of experience in planning and development projects, Louise has directed and contributed to the preparation of environmental impact assessments for a variety of projects including residential, mixed use and infrastructural developments.

4.3 Proposed Development

A full description of the proposed development is provided in **Chapter 2** of this EIAR. The following is a summary of aspects of the proposed development which are relevant to this chapter:

- 1,036 housing units comprising a mix of 1, 2, 3 and 4 bed semi-detached, townhouse/terraced units and apartment/duplex units, ranging in height from 2 to 6 storeys.
- 1 no. creche.
- 3 no. commercial units comprising a shop, cafe and medical/general practice facility.
- New vehicular access, new pedestrian access, a traffic signal controlled Toucan pedestrian crossing and upgrades to the road markings on the L2998 Road to the east
- new greenway through the development connecting to the L2998 to the north and to the existing (Dunkettle to Carrigtwohill) Greenway to the south,
- The demolition/removal of existing ruins/structures (including a former dwelling on the northern part of the site).
- undergrounding of the existing overhead electricity lines currently traversing the site.

4.4 Methodology

Publications and other data sources consulted include:

- National Planning Framework, Ireland 2040 – Our Plan (Government of Ireland, 2018)
- Draft First Revision to the National Planning Framework
- Southern Regional Spatial and Economic Strategy 2019-2031
- Cork City Development Plan 2022-2028
- Cork County Development Plan 2022-2028
- Cork Metropolitan Area Transport Strategy (CMATS) 2040
- Central Statistics Office (CSO) website (cso.ie)
- Department of Education (DE) website (education.ie)
- GeoDirectory-GeoFindIT App
- Pobal website (maps.pobal.ie)
- Health and Safety Authority website (hsa.ie)

Additionally, reports prepared by McCutcheon Halley Planning Consultants and included with the LRD Phase 1 application, submitted under separate cover, were consulted:

- Social Infrastructure Audit
- Childcare Demand Report
- School Demand Assessment Report
- Planning & Design Statement

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

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018)
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)

The impact assessment section of this chapter follows the terminology (where applicable) used in the EPA Guidelines as set out in **Chapter 1** of this EIAR.

4.5 Baseline Environment

4.5.1 Study Area

The proposed site is located to the south of the defined settlement boundary of Glanmire within the townland of Dunkettle, on the southwestern edge of Glanmire village. The subject site is approximately 5 kilometres to the east of Cork City Centre. See Figure 4-1.

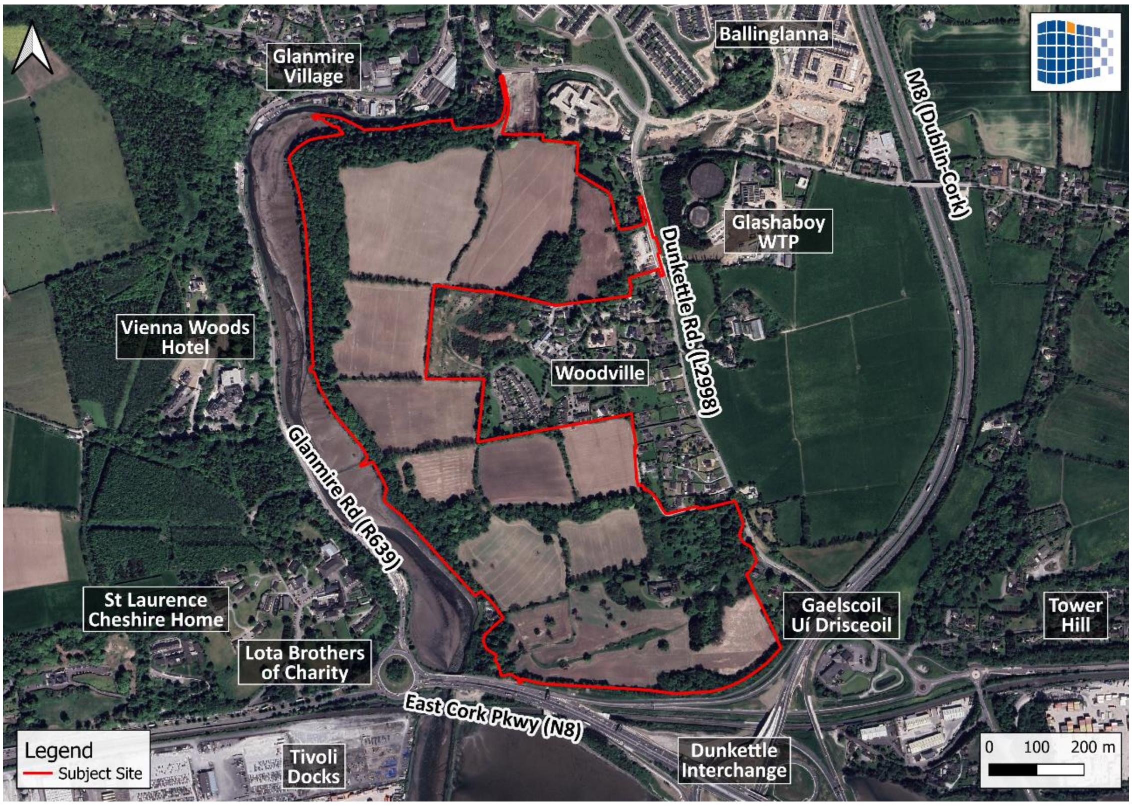

Figure 4-1 Study Area and Surrounding Context (Source: MHP GIS Team)

The irregular shaped site is largely utilised for agricultural purposes. Dunkettle House is located in the southern part of the site. This house, its associated outbuildings and attendant grounds are in private residential use. Part of the study area adjoining Dunkettle Road, adjacent to Woodlands Cottage, is in use as a construction compound for the ongoing works on Dunkettle Road.

Within the site there are a number of areas of mature woodland. Two notable areas located within the LRD Phase 1 sub area, located north of The Avenue housing estate and along the northwest and western site boundaries. Trails / tracks are found within the woodland, with many areas overgrown and inaccessible.

This woodland continues south along the ridge line above the Glashaboy, connecting to a third cluster east of Dunkettle House. Mature trees are also located in the attendant grounds of Dunkettle House also. These tree stands are evident in the aerial image below, including the hedgerows / trees of the field boundaries.

4.5.2 Land Use Zoning

The subject site is zoned under the *Cork City Development Plan 2023-2029.* See Figure below. The lands which relate to the LRD Phase 1 and LRD Phase 2 areas generally are zoned ZO 2, *"New Residential Neighbourhoods"*. The objective of ZO 2 zoning is:

> *"To provide for new residential development in tandem with the provision of the necessary social and physical infrastructure."*

There is a small area of land within the overall study area, at the south west and south east corners zoned ZO 1 *"Sustainable Residential Neighbourhoods"*, with the objective:

> *"To protect and provide for residential uses and amenities, local services and community, institutional, educational and civic uses."*

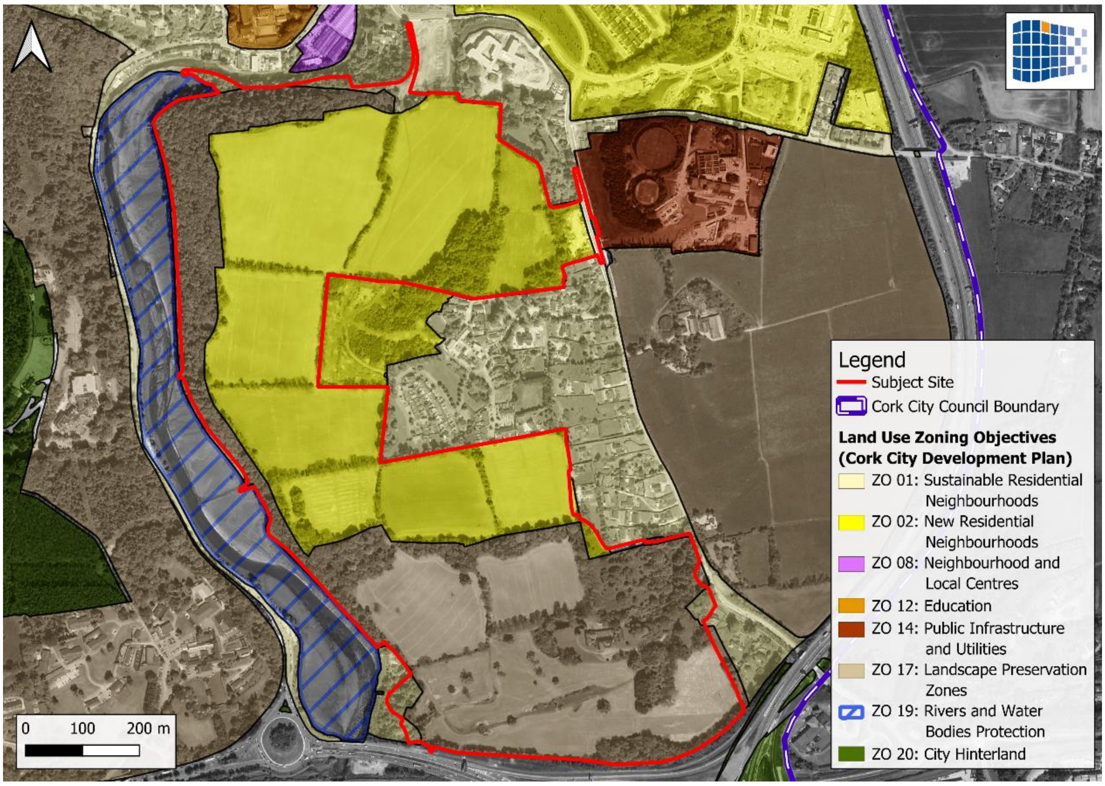

Figure 4-2 Land Use Zoning from the CDP (Source: MHP GIS Team)

The lands to the south, including and surrounding Dunkettle House and its curtilage, and the lands along the western and north west extent of the site, following the Glashaboy River are zoned ZO 17, *"Landscape Preservation Zones"*. The objective of ZO 17 zoning is:

> *"To preserve and enhance the special landscape and visual character of Landscape Preservation Zones."*

The subject site is also affected by Objective 6.12 of the CDP (Landscape Preservation Zones), as follows:

> *"To preserve and enhance the character and visual amenity of Landscape Preservation Zones through the careful management of development. Development will be considered only where it safeguards the value and sensitivity of the particular landscape and achieves the respective site-specific objectives, as set out in Tables 6.6 – 6.10."*

4.5.3 Surrounding Land Uses

The site is bounded to the east by residential including various housing estates at Woodville Estate, and a number of individual detached dwellings built along Dunkettle Road (L2998). Lands to the east of Dunkettle Road are largely agricultural, with the Glashaboy Waterworks to the northeast and Ballinglanna estate north and northeast.

The site is bound to the north and west by mature woodland with the Glashaboy River below. North and west of Glashaboy river is Glanmire Village and Glanmire Road respectively, with the latter providing access to Vienna Woods hotel.

The area has a number of local services located within proximity of the site including schools, creches and both a primary and secondary school. A number of convenience stores are located with a kilometre radius of the site

4.5.4 Transport and Accessibility

4.5.4.1 Pedestrian and Cycle Network

In total, four access points are proposed to the subject site. Two pedestrian and cyclist only entrances are proposed to the subject site. The northernmost entrance is proposed to connect to the Dunkettle Road (L2998) c.130m south of Glanmire Bridge, which carries the L2998 over the Glashaboy River. From this entrance, there is full footpath connectivity onwards to Glanmire Village Centre.

The southernmost entrance is proposed to connect to the newly constructed Carrigtwohill to Midleton Inter-urban Cycle Route along the East Cork Parkway (N8), c.200m east of the Dunkettle Roundabout, which connects the site to Glounthaune and Carrigtohill. From this entrance, there is full footpath connectivity onwards to Cork City Centre.

Two Part 8 schemes being undertaken by Cork City Council are relevant to the proposed development. The Glanmire Roads Improvement Scheme comprises a suite of projects to improve the accessibility, sustainability, capacity and safety of the transport network in the Glanmire, Riverstown and Sallybrook areas. Projects 1, 3 and 9A (upgrading Church Hill Junction, Glanmire Bridge and Village, and the Dunkettle Road north of Woodville, respectively) commenced in February 2022, with some works currently continuing. Project 9B (Dunkettle Road South – Woodville to Dunkettle) is currently at detailed design stage.

The Glanmire to City Centre Cycle Route comprises dedicated cycle tracks and improved pedestrian footpaths between Glanmire and the city centre. Work on Phase 1A (along the Glashaboy River, from

Glanmire village to the Dunkettle / Tivoli Roundabout) commenced in January 2024, and is scheduled to be completed by Q4 2024.

4.5.4.2 Road Network

Two vehicular, pedestrian and cyclist entrances are proposed from the Dunkettle Road (L2998). Both of these entrances are proposed to be located along the eastern boundary of the site, to the north and south of the existing "Woodville" development. The northern vehicular entrance will be newly constructed as part of LRD Phase 1. From this entrance, there is full footpath connectivity northwards toward Glanmire Village.

The southern vehicular entrance will utilise and upgrade an existing access serving the applicants lands and a number of private dwellings. Options for this second access are currently being developed in consultation with Cork City Council officials. At the time of writing the EIAR, detailed design proposals are not available but for the purposes of assessment, the concept of the second access is included in the EIA.

The Dunkettle Interchange is a c.1.1km (2 min) drive from southern vehicular entrance or a c.1.7km (2 min) drive from northern vehicular entrance. From this point, residents will have access to Cork City and Limerick via the N8 National Road; Dublin via the M8 Motorway; West Cork, Cork Airport and Ringaskiddy via the N40 National Road (the Jack Lynch Tunnel); Cobh, Waterford, Wexford and Rosslare via the N25 National Road, and Little Island via the R623 Regional Road.

4.5.4.3 Public Transportation – Rail

At present, the nearest railway station to the subject site is Little Island station (c.2.8km west as crow flies). Train services from Little Island are as follows:

- To Cobh via Glounthaune every 30 minutes.
- To Middleton via Glounthaune every 30 minutes.
- To Cork Kent every 15 minutes. Onward train services are available towards Dublin and Tralee.

The *Cork Metropolitan Area Transport Strategy (CMATS) 2040*, prepared by the National Transportation Authority (NTA) in collaboration with Cork County Council and Cork City Council, was published in 2020. A key element of CMATS is the expansion of the existing heavy rail network through the Cork Area Commuter Rail (CACR) Programme. See Figure below.

The CACR programme includes infrastructure works to electrify and increase frequencies on the existing commuter rail system and eight additional stations. Initial projects to increase frequencies are currently underway.

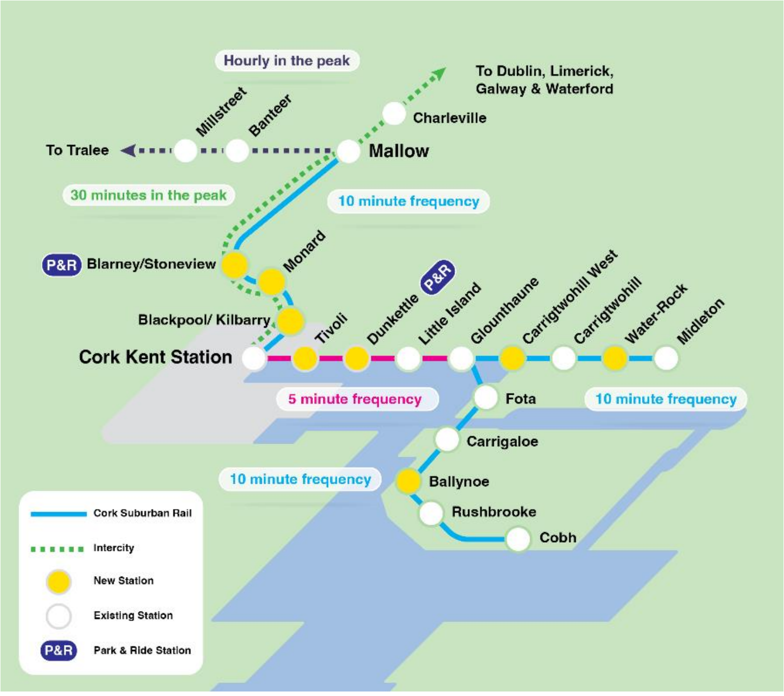

Figure 4-3 Proposed Cork Area Commuter Rail Network (Source: Irish Rail)

While the precise location and design of additional stations are currently still in development, a new station at Tivoli and a park & ride station at Dunkettle are proposed. The subject site will be served by at least one commuter rail station with 5-minute frequencies when the CACR programme is completed.

4.5.4.4 Public Transportation – Bus

The nearest bus stops to the subject site are:

- Glanmire (Stop No. 237801), a c. 220m (3 min) walk from the proposed northern pedestrian/cyclist entrance.
- North Esk Business Park (Stops No. 248611/248601), a c. 750m (10 min) walk from the proposed southern vehicular entrance, or a c. 1.3km (17 min) walk from the proposed northern vehicular entrance.

Glanmire is served by route 245 (Cork - Fermoy - Mitchelstown - Clonmel) once an hour, and with a half-hourly frequencies at peak times.

North Esk Business Park is served by routes 240 (Cork - Cloyne - Ballycotton), 241 (Cork - Midelton - Whitegate), 260 (Cork - Youghal - Ardmore), and 261 (Cork - Midelton - Ballincurra). This stop sees a typical half-hourly combined service.

Another key element of CMATS is the expansion of the existing urban bus network through the Cork BusConnects Programme. The Cork Network Redesign, a project under this programme, will introduce new high-frequency bus connections from the city centre to Glanmire and Tivoli, in addition the existing intercity bus routes identified above.

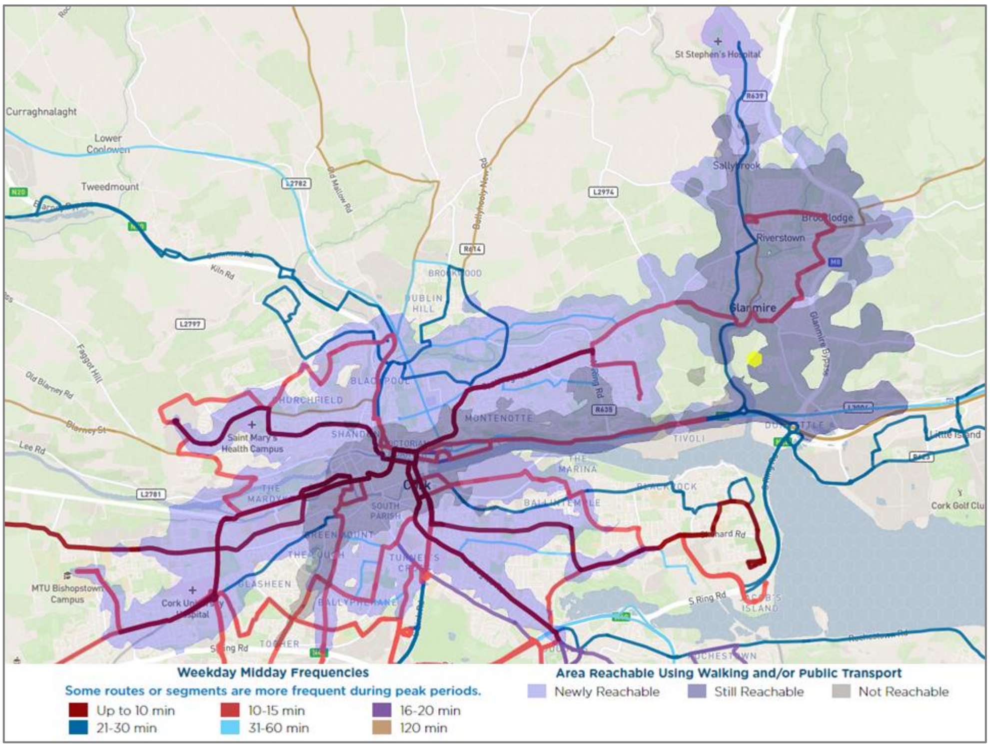

Figure 4-4 60-Minute Accessibility from Subject Site Under New Cork Bus Network (Source: NTA)

Under the proposed new network, it is projected that the number of jobs reachable within 60 minutes from the subject site could increase by 27,000. See Figure above.

The Cork BusConnects Programme also includes Sustainable Transport Corridors, consisting of bus priority measures, new protected cycling infrastructure, and public realm improvements. Two corridors, A and B, will run from the city centre to Tivoli and Mayfield, respectively, further improving travel times into the city from the subject site.

4.5.4.5 Sustainable Travel – Modal Shift

Chapter 6 of this EIAR, Material Assets: Traffic and Transport identifies that the current modal shift, determined using the 2022 Census online small area population (SAP) data in this area is 7%. This is significantly lower than the Cork Metropolitan Area Transport Strategy (CMATS) Active Travel Mode Share of 33.3%.

4.5.5 Population & Demographic Profile

This section reviews the demographic characteristics, population, and age structure of the surrounding area. For this assessment, a primary study area based on CSO Small Areas[1] has been analysed. See Figure below.

There are no guidelines that stipulate the zone of influence (ZoI) of the study area. Professional judgement is used and the rationale for the selection of this radius is based on the need to understand

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[1] As defined for the 2022 Census.

the capacity of the existing housing and employment profile in the local area and the existing social infrastructure available within a c.30-minute walk time, which represents a reasonable distance for people to access services. The total area of the Small Area study area is c. 864.9 Ha.

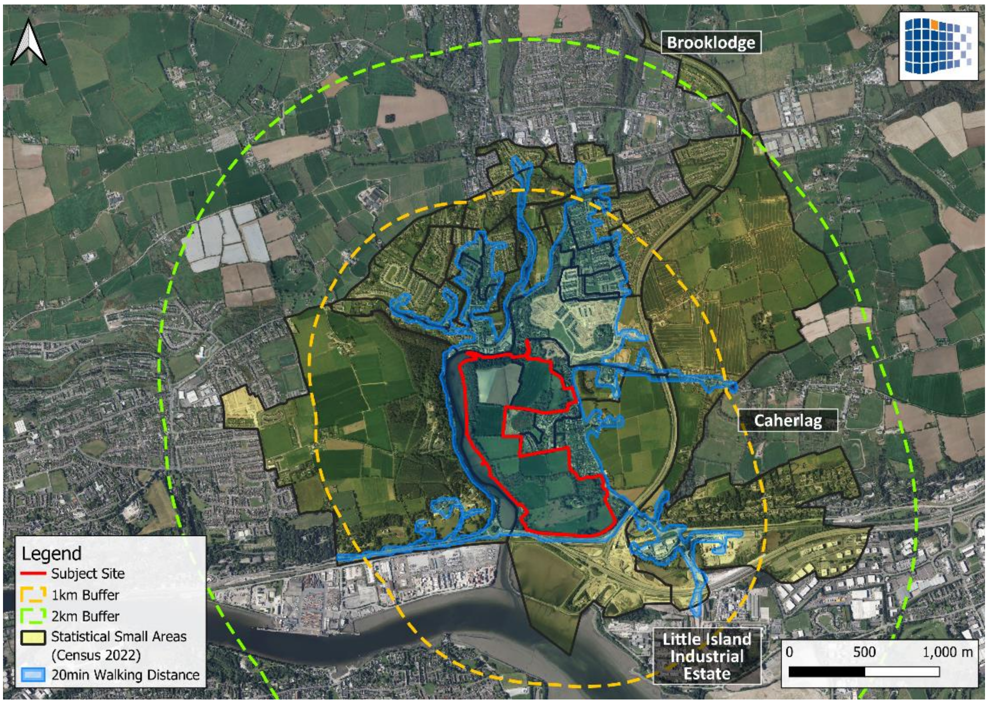

Figure 4-5 Census 2022 Small Area Study Area (Source: MHP GIS Team)

For statistical comparison, a similar process was undertaken to generate a study area using Census 2016 and Census 2011 Small Areas. While the 2011 and 2016 study areas are approximately equivalent, minor discrepancies exist between these study areas and the Census 2022 study area, most notably regarding Small Area ID 047064008/ 047064001) at Brooklodge. See Figure below.

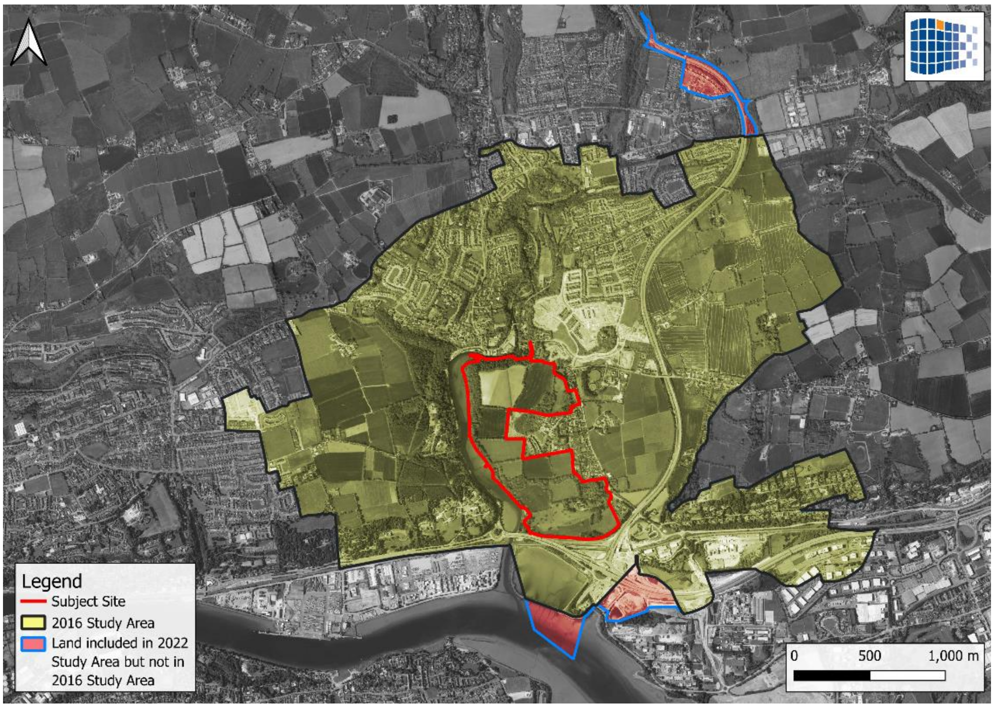

Figure 4-6 Census 2022 SA and Census 2016 SA Study Area Comparison (Source: MHP GIS Team)

Using the Small Area study area, a secondary study area was defined based on Electoral Divisions (EDs)[2]. The six included EDs are Rathcooney (Cork City Council and Cork County Council), Riverstown (Cork City Council and Cork County Council), and Caherlag (Cork City Council and Cork County Council). The total area of the ED study area is c. 9,200.0 Ha. See Figure below.

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[2] As defined for the 2022 Census.

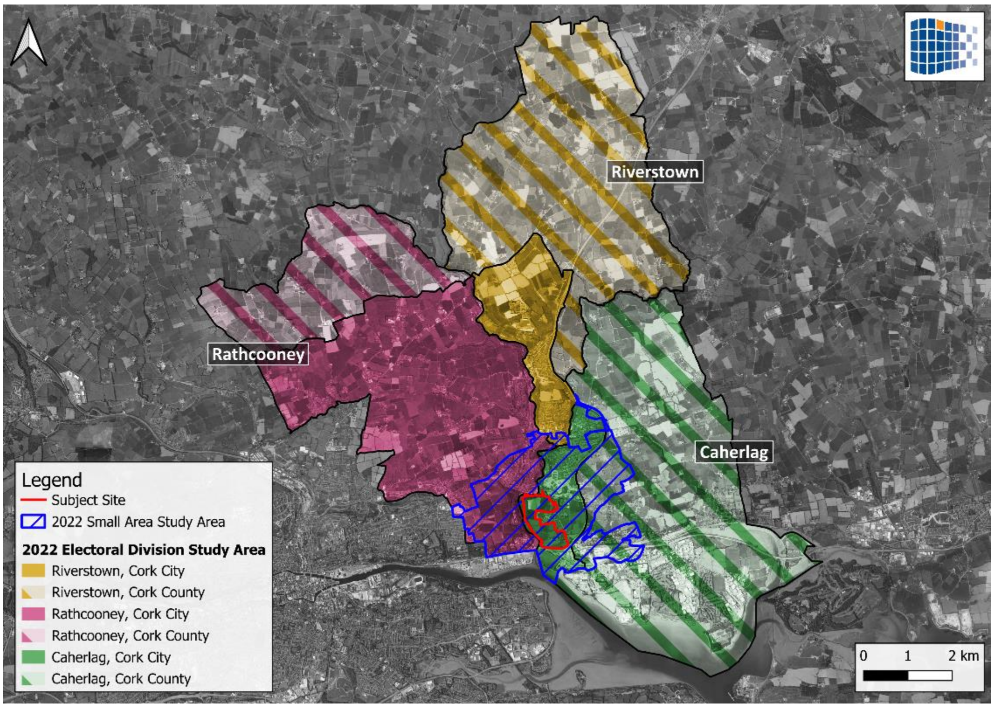

Figure 4-7 Census 2022 ED Study Area. (Source: MHP GIS Team)

The CSO data shows that the population of the Small Area study area was 6,423 in 2022. This represents an increase of 896 (approx. 16.2%) from the 2016 Census. This increase is roughly twice that of Ireland, and two and a half that of the larger ED study area for the same period.

At the 2022 Census, CSO data shows that the population of the Small Area study area was 6,423, while the population of the ED study area was 21,931. Between the 2016 Census and 2022 Census, the population of the Small Area study area increased by 896 persons (approx. 16.2%), while the population of the ED study area increased by 1,380 persons (approx. 6.7%).

The population increase across the Small Area study area was also significantly above that of Ireland (c. 8.1%) and Cork City and County (c. 7.6%). Notably, while the area of the Small Area study area is c. 9% of that of the ED study area, the population growth within the Small Area study area was c.65% of the larger study area over the 2016-2022 period.

Comparisons to the population of Cork City Council are not revealing, as these data have been distorted by the recent revisions to the Local Authority administrative boundary. As such, Cork City and County figures have been included where relevant. Population growth within both the ED study area Cork City and County was c.21% between Census 2006 and Census 2022. For each inter-census period between 2006 and 2022 less than a 1 percentage point difference was recorded in the population growth rates of the ED study area and of the Cork City and County area.

See Tables below.

Table 4-1 Population at 2011, 2016 & 2022 Census (Source: CSO)

Census	2011	2016	2022	6-Year Change
Ireland	4,588,252	4,761,865	5,149,139	8.1%

Cork City and County	519,032	542,868	584,156	7.6%
Cork City	119,230	125,657	224,004	78.3%[3]
ED Study Area	19,704	20,551	21,931	6.7%
SA Study Area	5,061	5,527	6,423	16.2%

Table 4-2 ED, SA Study Area and Local Authority Population, Census 1996-2022 (Source: CSO)

Census	1996	2002	2006	2011	2016	2022
Cork City and County	420,510	447,829	481,295	519,032	542,868	584,156
% Change	-	6.5%	7.5%	7.8%	4.6%	7.6%
Cork City	127,187	123,062	119,418	119,230	125,657	224,004
% Change	-	-3.2%	-3.0%	-0.2%	5.4%	78.3%[4]
ED Study Area	-	16,148	18,124	19,704	20,551	21,931
% Change	-	-	12.2%	8.7%	4.3%	6.7%
SA Study Area	-	-	-	5,061	5,527	6,423
% Change	-	-	-	-	9.2%	16.2%

With regard to the age profile of the area, the Census 2022 data shows that Cork City has a stable ageing profile. The average age of those residing in Cork City was 39.1 in 2022, which remains the same as the Census 2016.

The Census 2022 shows that the pre-school, primary and post-primary school age category (0-19 years old) accounted for c. 29% of the population in the ED study area, and c.30% of the population in the SA study area. Additionally, the population over 65 years of age within the SA study area was c.9%, in contrast with c.15% of Cork City as a whole. See Table below.

Table 4-3 Breakdown of the Population by Age Cohort (Source: CSO)

Census	ED Study Area		SA Study Area		Cork City		Ireland	
	Population	%	Population	%	Population	%	Population	%
0-4 years	1,357	6.2%	455	7.1%	11,410	5%	295,415	6%
5-9 years	1,555	7.1%	459	7.1%	12,555	6%	342,670	7%
10-14 years	1,790	8.2%	550	8.6%	13,100	6%	374,202	7%
15-19 years	1,617	7.4%	468	7.3%	13,472	6%	337,628	7%

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[3] The significant change in population for Cork City Council between Census 2016 and Census 2022 is largely a result to the modification of the Local Authority's administrative boundary on the 31st of May 2019.

[4] The significant change in population for Cork City Council between Census 2016 and Census 2022 is largely a result to the modification of the Local Authority's administrative boundary on the 31st of May 2019.

Census	ED Study Area		SA Study Area		Cork City		Ireland	
	Population	%	Population	%	Population	%	Population	%
20-24 years	1,322	6.0%	351	5.5%	17,653	8%	307,143	6%
25-29 years	1,049	4.8%	354	5.5%	17,291	8%	295,808	6%
30-34 years	1,222	5.6%	430	6.7%	17,330	8%	332,223	6%
35-39 years	1,561	7.1%	539	8.4%	17,603	8%	382,869	7%
40-44 years	1,897	8.6%	616	9.6%	17,015	8%	411,524	8%
45-49 years	1,847	8.4%	580	9.0%	14,735	7%	373,504	7%
50-54 years	1,704	7.8%	437	6.8%	13,517	6%	340,003	7%
55-59 years	1,325	6.0%	345	5.4%	13,142	6%	307,165	6%
60-64 years	982	4.5%	243	3.8%	11,909	5%	272,670	5%
65-69 years	858	3.9%	180	2.8%	9,714	4%	238,144	5%
70-74 years	724	3.3%	150	2.3%	8,404	4%	202,884	4%
75-79 years	587	2.7%	129	2.0%	6,698	3%	154,260	3%
80-84 years	322	1.5%	87	1.4%	4,603	2%	96,586	2%
85+ years	212	1.0%	50	0.8%	3,853	2%	84,441	2%
Total	21,931	100.0%	6,423	100.0%	**224,004**	**100%**	**5,149,139**	**100%**

4.5.6 Deprivation Index

The updated Pobal HP Deprivation Index for the 2022 Census indicates that both the ED and SA study areas have an above-average score (i.e., are less disadvantaged).

All 6 Electoral Divisions included in the ED study area were classified as having affluency that was “Marginally Above Average”. See Table below. This is identical to the classification of the 3 EDs under Census 2016 data, prior to the modification of the Cork City Council administrative boundary which divided each ED in two.

Table 4-4 Pobal HP Index by Small Area, Census 2022 Data (Source: Pobal)

ED	Local Authority	2022 Description	2022 Index
Caherlag	Cork City	Marginally above average	8.36
Caherlag	Cork County	Marginally above average	6.50
Riverstown	Cork City	Marginally above average	8.52
Riverstown	Cork County	Marginally above average	8.04
Rathcooney	Cork City	Marginally above average	3.01
Rathcooney	Cork County	Marginally above average	4.80

Of the 20 total Small Areas included in the SA study area, the 2022 Deprivation Index classified 2 classed as “Very Affluent”, 4 were “Affluent” and 13 were “Marginally Above Average”. Only 1 Small Area was classed as “Marginally Below Average”. See Figure below.

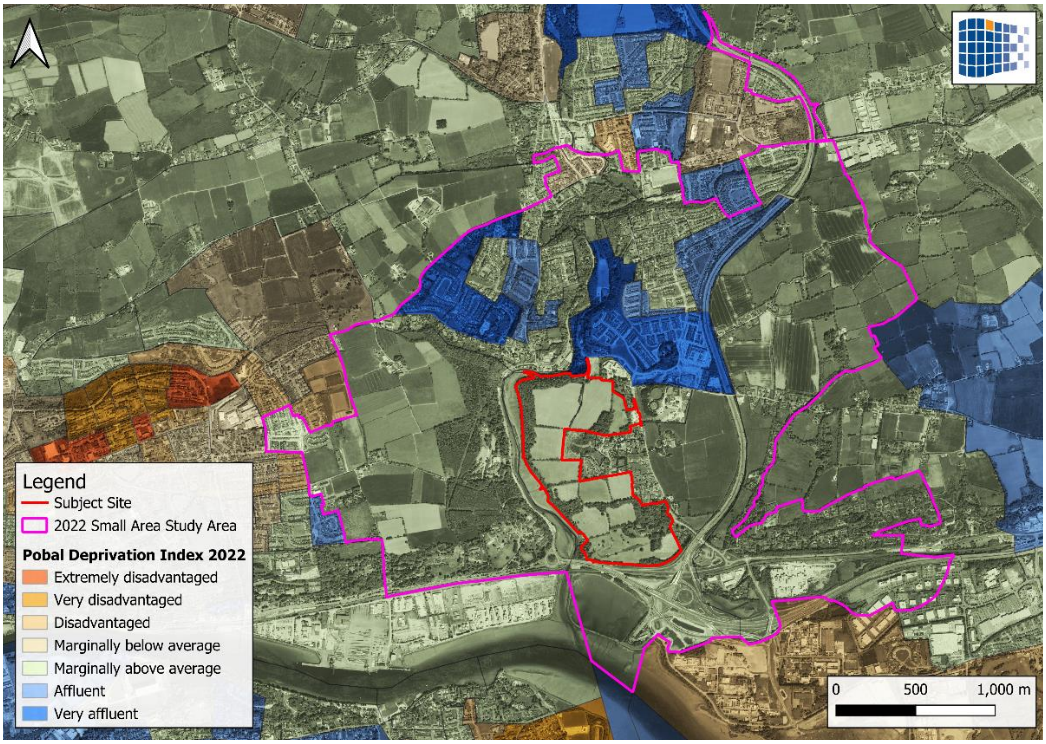

Figure 4-8 Deprivation Index (Source: MHP GIS Team)

4.5.7 Households

The total number of private households for both the SA and ED study areas by the number of persons in the household at Census 2022 are provided in Table 4-5. In total, in 2022 there were 2,127 and 7,263 private households within the SA and ED study areas, respectively. Overall, there was a higher proportion of 3-, 4-, and 5-person households, and a lower proportion of 1- and 2-person households, for both study areas when compared to the figures for both Cork City and Ireland. In 2022, the proportion of households containing 1 or 2 people within both study areas was c.13 percentage points lower than that of Cork City, and C.10 percentage points lower than that of the State.

Table 4-5 Private Households by Size, Census 2022 (Source: CSO).

	SA Study Area		ED Study Area		Cork City	State
	Households	%	**Households**	%	**% of Households**	**% of Households**
1-person household	309	14.5%	1,108	15.3%	24.4%	23.1%
2-person household	594	27.9%	1,956	26.9%	30.6%	29.0%
3-person household	413	19.4%	1,410	19.4%	18.6%	17.9%
4-person household	499	23.5%	1,652	22.7%	15.7%	16.9%
5-person household	238	11.2%	865	11.9%	7.4%	8.9%
6-person household	61	2.9%	218	3.0%	2.3%	3.0%
7-person household	8	0.4%	36	0.5%	0.6%	0.8%
>7-person household	5	0.2%	18	0.2%	0.3%	0.4%
Total households	2,127	100.0%	7,263	100.0%	100.0%	100.0%

4.5.8 Housing Delivery

The National Planning Framework – Project Ireland 2040 (NPF) was prepared and published by the Department of Housing and Local Government on behalf of the Government. The National Planning Framework, most commonly known as the NPF was established in tandem with Project Ireland 2040 in order to establish a policy and planning framework for the development of Ireland socially, economically and culturally.

One of the ultimate objectives of the NPF is to guide the future development of Ireland, considering a projected 1 million increase in the Country's population, the need to create 660,000 additional jobs to achieve full employment and a need for approx. 500,000 more homes by 2040.

The NPF requires delivery of a baseline of 25,000 homes annually to 2020, followed by a likely level of an average of 33,000 homes annually up to 2027. Within this output, 112,000 households are expected to have their housing needs met by social housing over the next decade. To achieve the objective of compact growth, 40% of future housing delivery is to be delivered within and close to the existing footprint of built-up areas.

Notwithstanding the above, it is acknowledged that the Census 2022 population data has indicated that there is more significant growth than the projections of the NPF anticipated and the first revision of the NPF is currently being undertaken to reflect the actual growth and upcoming needs.

The revised NPF has sets out new draft national objectives in relation to housing targets with Draft National Policy Objective 43 stating its plan to target the supply of housing to accommodate approximately 50,000 additional households per annum to 2040.

The Housing for All[5] - a New Housing Plan for Ireland (2021) is the government's housing plan to deliver an average of 33,000 new homes annually by 2030. According to the CSO, New Dwelling Completions Reports[6], 6,884 new dwellings have been completed over Quarter 2 (Q2) 2024, a fall of 5.4% in the same three months of 2023. Overall, 32,695 new dwellings were constructed in 2023 which is just below the annual target of 33,000. In addition, there were 29,851 new dwelling completions in 2022, which is approx. 9.54% below the Housing for All's annual target.

At the 2022 Census, there were 2,282 residential units recorded within the SA study area and 7,687 residential units recorded within the ED study area, including both occupied and unoccupied dwellings (see Table 4-6). This represents an increase in the total housing stock over the preceding 6-year period of 16.7% and 7.8%, respectively. The proportional increase in housing stock exceeded the proportional increase in population for both study areas; in contrast, the rate of housing stock delivery lagged behind that of both Cork City and the State.

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[5] Housing for All - a New Housing Plan for Ireland (Department of Housing, Local Government and Heritage,2021)

[6] Accessible via https://www.cso.ie/en/statistics/buildingandconstruction/newdwellingcompletions/

Table 4-6 Change in Population and Housing, Census 2016 and 2022 (Source: CSO)

	SA Study Area		ED Study Area		Cork City	State
	2022	**6-Year Change**	**2022**	**6-Year Change**	**6-Year Change**	**6-Year Change**
Population	6,423	16.2%	21,931	6.7%	78.3%	8.1%
Housing Stock	2,282	16.7%	7,687	7.8%	63.4%	5.4%

4.5.9 Typology and Tenure

At the 2022 Census, the vast majority of private households within both the SA and ED study areas lived in a house or bungalow (c.91.3% and 96.1%, respectively). The proportion of permanent households occupying flats or apartments was significantly less than the proportion occupying flats or apartments for Cork City as a whole. See Table 4-7.

Table 4-7 Private Households by Housing Typology, Census 2022 (Source: CSO)

	SA Study Area	ED Study Area	Cork City	State
House/Bungalow	91.3%	96.1%	83.1%	86.7%
Flat/Apartment	8.6%	3.7%	16.8%	13.0%
Bed-Sit	0.0%	0.0%	0.0%	0.1%
Caravan/Mobile home	0.0%	0.1%	0.1%	0.2%
Not stated	0.0%	0.0%	0.0%	0.0%

At the 2022 Census, 74% of all private households in the SA study area owned their home, while 22% of households rented from a private landlord, local authority, or housing body. In contrast, only 56% of all private households in Cork City owned their own home in 2022, while almost 40% of private households rent. See Table 4-8.

Table 4-8 Private Households by Housing Tenure, Census 2022 (Source: CSO)

	SA Study Area	ED Study Area	Cork City	State
Owned with mortgage or loan	46.8%	42.1%	23.7%	28.9%
Owned outright	27.6%	35.3%	32.6%	37.0%
Owned (Subtotal)	**74.4%**	**77.4%**	**56.3%**	**65.9%**
Rented from private landlord	15.2%	11.7%	23.6%	18.0%
Rented from Local Authority	5.0%	6.0%	12.5%	8.3%
Rented from voluntary/co-operative housing body	2.0%	1.2%	1.9%	1.6%
Rented (Subtotal)	**22.2%**	**18.8%**	**38.1%**	**28.0%**
Occupied free of rent	1.0%	1.1%	1.2%	1.7%
Not stated	2.4%	2.7%	4.5%	4.4%

4.5.10 Employment

The seasonally adjusted unemployment rate for August 2024 was 4.3%, down from 4.7% in July 2024 and 4.5% in August 2023.

At present, the CSO produces a supplementary measure of unemployment in parallel with the routine Monthly Unemployment Estimate. The methodology for the Monthly Unemployment Estimates involves forecasting the number of unemployed persons using the trend in the recipient Live Register series. The Department of Social Protection provides Working Age Income support to people arriving in Ireland from Ukraine under the Temporary Protection Directive. The Live Register series includes recipients of these supports who have met the relevant criteria. This has impacted the numbers of unemployed, primarily females, in these monthly estimates. The CSO statistical release on monthly figures issued in September 2024 in respect of August 2023 stated the following:

> *"The seasonally adjusted unemployment rate for August 2024 (for all people aged 15-74 years) was 4.3%, down from 4.7% recorded in July 2024 and unchanged from the August 2023 rate. In August 2024, the unemployment rate for both males and females was 4.3%. The seasonally adjusted number of people unemployed was 124,600 in August 2024, compared with 134,400 in July 2024. There was an increase of 3,600 in the seasonally adjusted number of people unemployed in August 2024 when compared with a year earlier. The seasonally adjusted number of unemployed males fell to 65,500 in August 2024, compared with 70,200 in July 2024. The seasonally adjusted number of unemployed females in August 2024 fell to 59,100 from 64,200 in July 2024."*

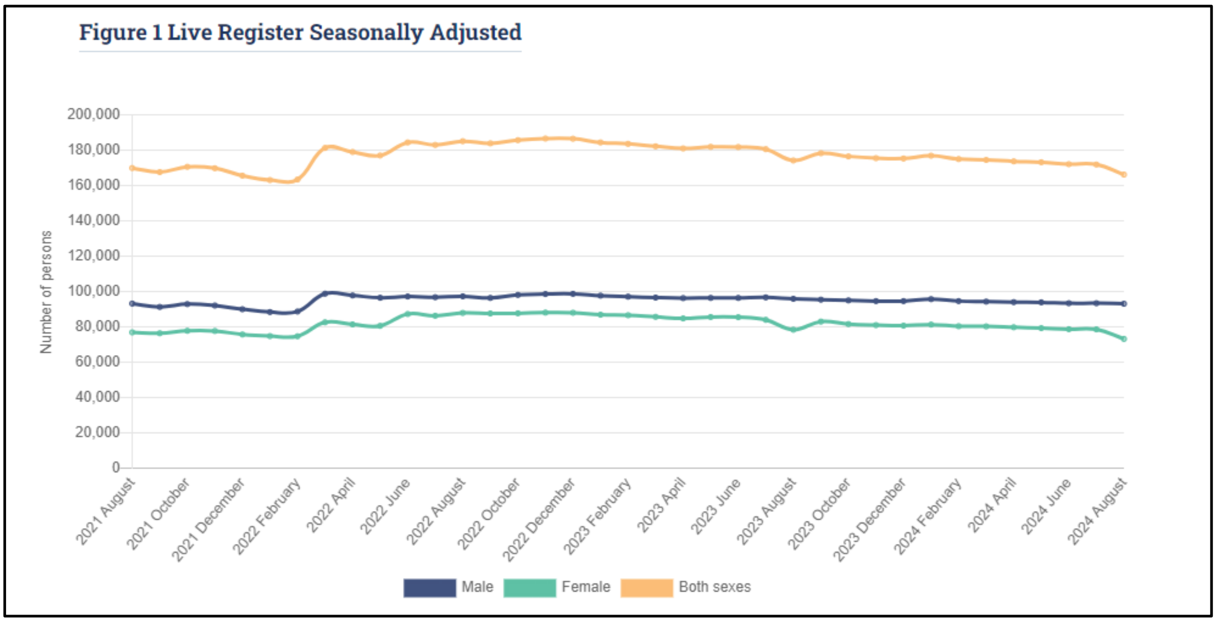

Figure 4-9 Live Register Seasonally Adjusted Figures. (Source: CSO)

The latest CSO'S Live Register statistical release[7] (September 2024) shows that 17,313 persons were benefitting from the EU's Temporary Protection Directive included in the Live Register figures of

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[7] https://www.cso.ie/en/releasesandpublications/ep/p-lr/liveregisteraugust2024/

August 2024, a decrease of 726 persons from the previous month. Overall, the total number of persons on the Seasonally Adjusted Live Register decreased by 5,700, or 3.3%, over the month from July 2024 to August 2024, see Figure above.

The CSO's live register data sets are available only at a county level, not at a Local Authority level. The latest Live Register data for County Cork[8] (September 2024) shows that the total number of persons on the Live Register was 14,568, a decrease of 1,197, or 7.6%, over the month from July 2024 to August 2024; this represents a decrease of 689, or 4.5%, over the year from August 2023 to August 2024.

The CSO's monthly unemployment data sets are available only at a national level, which precludes detailed analysis of the unemployment rate in the study area.

The industries in which people are engaged within the study areas are illustrated in Table 4-9. The majority of persons at work within the SA study area are occupied in Transport and Communications (25.0%), Commerce and Trade (24.1%), and Public Administration (21.7%).

Table 4-9 Persons at Work by Industry, Census 2022 (Source: CSO)

Industry	SA Study Area	ED Study Area	Cork City	State
Agriculture forestry and fishing	0.3%	1.1%	0.4%	3.5%
Building and construction	3.9%	5.1%	4.5%	5.8%
Public administration	21.7%	20.6%	17.0%	11.8%
Transport and communications	25.0%	24.6%	22.0%	23.8%
Other	9.4%	8.7%	9.0%	9.2%
Manufacturing industries	5.5%	5.3%	4.5%	5.7%
Commerce and trade	24.1%	23.5%	26.1%	24.5%
Professional services	10.1%	11.2%	16.4%	15.8%

Table 4-10 Change in Persons at Work by Industry, Census 2016 and 2022 (Source: CSO)

Industry	SA Study Area			ED Study Area		
	People	**People (%)**	**6-Year Change (%)**	**People**	**People (%)**	**6-Year Change (%)**
Agriculture forestry and fishing	8	0.3%	-33.3%	115	1.1%	-21.8%
Building and construction	123	3.9%	41.4%	525	5.1%	27.1%
Public administration	676	21.7%	40.0%	2,114	20.6%	30.7%
Transport and communications	781	25.0%	11.7%	2,528	24.6%	9.1%
Other	292	9.4%	23.7%	898	8.7%	12.7%
Manufacturing industries	172	5.5%	21.1%	541	5.3%	17.6%
Commerce and trade	753	24.1%	28.5%	2,413	23.5%	13.5%
Professional services	316	10.1%	-10.2%	1,148	11.2%	-10.5%
Total	**3,121**	**100.0%**	–	**10,282**	**100.0%**	–

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[8] https://data.cso.ie/table/LRM15

4.5.11 Social Infrastructure

A *School Demand Assessment, a Childcare Demand Report, and a Social Infrastructure Audit* accompany the proposed LRD Phase 1 application, prepared by McCutcheon Halley Chartered Planning Consultants. These reports assess the available infrastructure/facilities within a defined catchment area around the entire EIAR study area.

4.5.11.1 Education

The School Demand Assessment establishes separate catchment areas for primary and post-primary schools using the average journey time and typical modal shares of school-aged commuters within Cork City Council at the 2022 Census.

A primary school catchment of 3.29km and a post-primary school catchment of 4.52km are used by the School Demand Assessment, as shown in Figures below In total, fifteen primary schools and eleven post-primary schools are identified within their respective catchment areas. See Table 4-11 and Table 4-12.

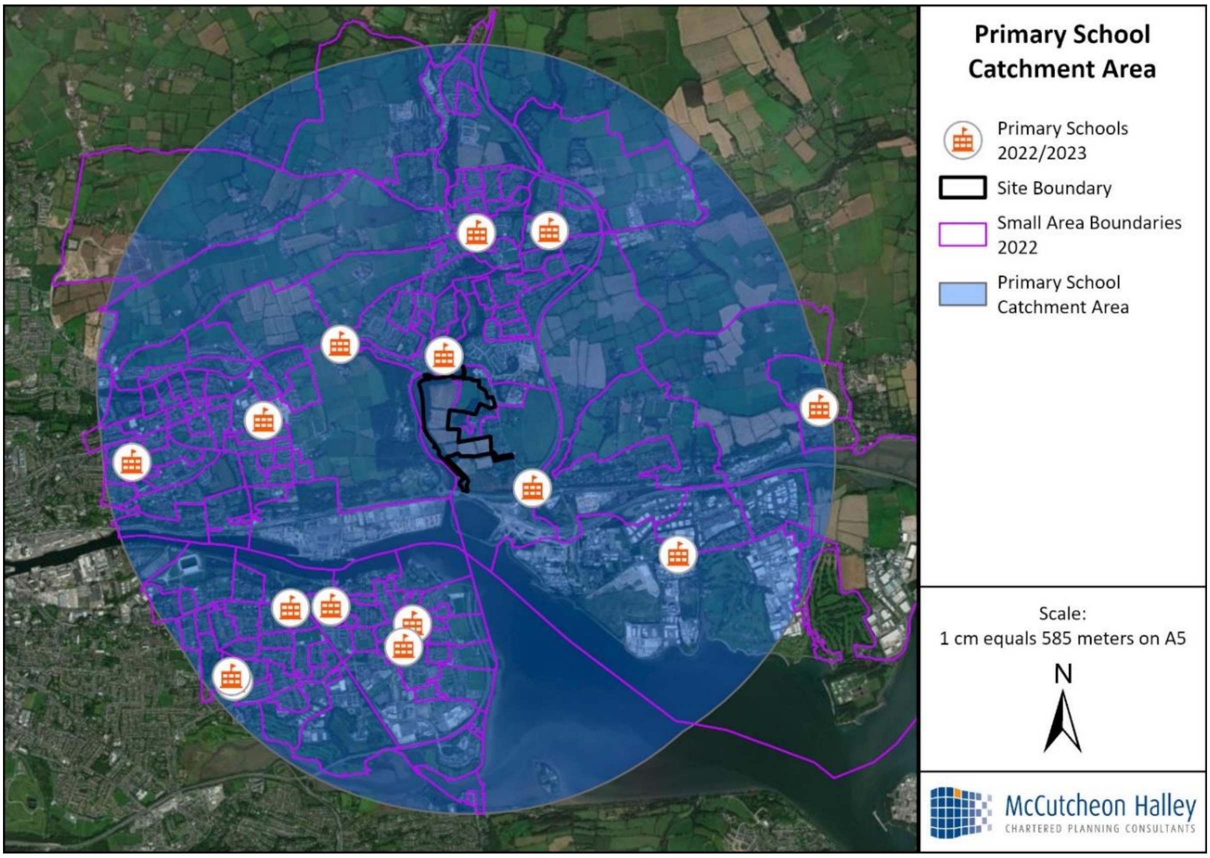

Figure 4-10 Primary Schools in Catchment Area (Source: MHP GIS Team)

Table 4-11 Primary Schools in Study Area

No.	Roll Number	Educational Establishment	Student Enrolment 2021/2022
1	05940D	Scoil Ursula	179
2	13663W	Lower Glanmire N S	147
3	13747F	Riverstown N S	660
4	15484J	Glounthaune Mixed N.S.	431
5	17024I	Scoil Na Croise Naofa	159
6	17505B	S N Cill Ruadhain	348
7	18388F	Scoil Naomh Micheal	92
8	18422C	Scoil Na Nog	58
9	18497K	Little Island NS	151
10	19231A	S N Barra Naofa Bhuach	294
11	19232C	S N Barra Naofa Cailini	279
12	19908K	Gaelscoil Mhachan	157
13	19993E	Gaelscoil An Ghoirt Alainn	387
14	20239A	Gaelscoil Ui Drisceoil	391
15	20497W	Scoil Mhuire Agus Eoin	251

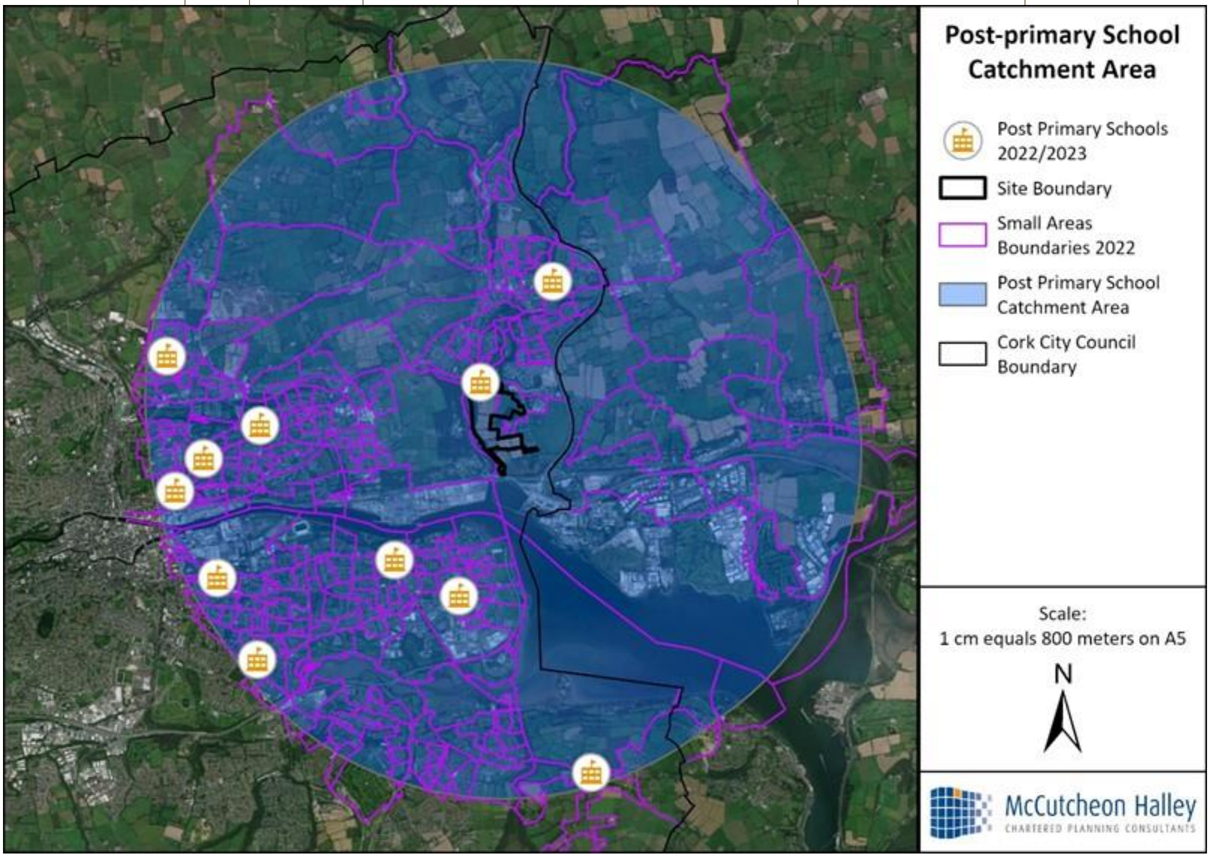

Figure 4-11 Post-primary Schools in Catchment Area (Source: MHP GIS Team)

Table 4-12 Secondary Schools in Study Area

No.	Roll Number	Educational Establishment	Student Enrolment 2021/2022
16	62301N	Colaiste An Phiarsaigh	552
17	62460K	St Francis Capuchin College	798
18	62650P	Ursuline Secondary School	305
19	62691G	Regina Mundi College	569
20	62730N	St Patricks College	212
21	68263P	Cork Educate Together Secondary School	385
22	71101G	St Aidan's Community College	381
23	71110H	Nagle Community College	246
24	76064F	Glanmire Community College	1,154
25	81008W	Ashton School	544
26	91400F	Mayfield Community School	315

The School Demand Assessment estimates the total maximum capacity of the identified existing primary and post-primary to be 4,472 and 5,897 pupils, respectively. Given the current total enrolment figures of 3,984 within identified primary schools and 5,461 pupils within identified post-primary schools, this implies a total available capacity of 488 primary school pupils and 73 post-primary schools.

4.5.11.2 Childcare

The *Childcare Demand Report* establishes a catchment areas for childcare facilities using the average journey time and typical modal shares of preschool-aged commuters within Cork City Council at the 2022 Census.

The Childcare Demand Report utilises a catchment of 3.7km. In total, 33 existing childcare providers were identified within this area, with one in six of the 33 early years providers located within a kilometre of the site boundary. See Table 4-13.

Table 4-13 Childcare Facilities in Study Area

No.	TUSLA Number	Name
1	TU2021CC004	Naíonra Toddle Inn and Afterschool
2	TU2015CC116	Crawford Childcare
3	TU2015CC441	Toddle Inn Montessori
4	TU2022CC002	Toddle Inn Childcare
5	TU2015CC341	Réaltaí Cúram Leanaí Teoranta
6	TU2015CC346	Réiltín Beag Montessori
7	TU2015CC259	Martina's Playschool
8	TU2015CC249	Lotamore FRC Pre-School
9	TU2015CC022	Angel Guardian Community Pre-School Ltd.
10	TU2015CC412	The Early Years Centre
12	TU2015CC253	Mahon CDP Community Creche

No.	TUSLA Number	Name
11	TU2015CC056	Beginnings Creche
13	TU2015CC165	Glanmire Childcare
14	TU2015CC289	Naíonra Cró na nÓg
15	TU2015CC357	Scoil Ursula Creche
16	TU2015CC358	Scoil Ursula Pre-School
17	TU2015CC154	First Steps Creche
18	TU2015CC074	Brooklodge Community Playschool Limited
19	TU2015CC291	Naíonra Ghleann Maghair Teo
20	TU2015CC162	Gate Childcare Ltd
21	TU2015CC307	Newbury House Family Centre CLG
22	TU2015CC032	Newbury House Family Centre CLG
23	TU2015CC340	Ready Steady Play
24	TU2015CC388	Step One Pre-School (Cailini)
25	TU2015CC426	Time of Wonder Montessori School
26	TU2015CC406	The Bessborough Centre Creche
27	TU2016CC032	Karen's Playschool
28	TU2015CC264	Mayfield Community Pre-School Ltd.
29	TU2015CC471	Naionra Naomh Sheosamh
30	TU2016CC008	The Village Montessori School
31	TU2015CC246	Little Wonders Daycare
32	TU2015CC390	Stepping Stones Pre-School
33	TU2018CC506	New Generation Preschool

Using childcare provider data provided by TUSLA, the total capacity was identified as 1,253 places. Using data from Census 2022, the total number of children aged 0-4 in childcare within the defined catchment area was estimated to be 1,080, giving a total available capacity of 173 childcare spaces.

4.5.11.3 Health Services

The *Social Infrastructure Audit* (SIA) establishes its catchment area as all areas within a 15-minute cycle from the proposed site access points.

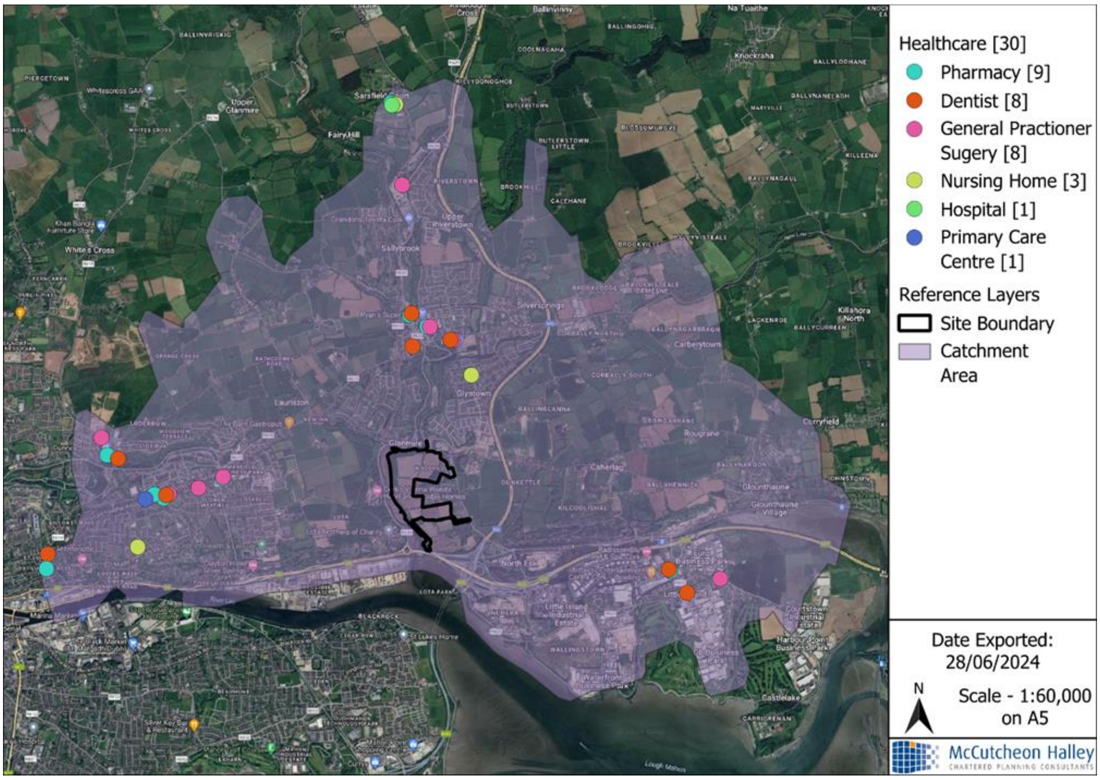

Figure 4-12 Healthcare Facilities in Study Area

In total, 9 pharmacies, 8 dentists, 8 general practitioners, 3 nursing homes, 1 hospital, and 1 primary care centre were identified within the SIA catchment area. See Table 4-14.

These healthcare services are clustered within three areas: Cork City, Glanmire, and Little Island. Therefore, it is within reason to conclude that the subject site has various healthcare options to avail of in future.

In addition to the above essential and primary healthcare facilities, three specialist care and healthcare services are located in a cluster to the west of the subject site on the Lower Glanmire Road (N8). Lota Brothers of Charity, which provides adult residential services and adult and children support services for persons with intellectual disabilities, is located c.350m west of the site. St. Laurence Cheshire Home, which provides assisted living for persons with physical disabilities, is located c.600m west of the site. Finally, Waterstone Fertility Clinic, which operates out of Lotamore House, is located c.900m west of the site.

Table 4-14 Health Services in Study Area

No.	Facility	Service	Distance from SIA Subject Site (m)
1	H.S.E. Pharmacy	Pharmacy	4,548
2	Saint Lukes Dental	Dentist	4,440
3	Bourke's Pharmacy	Pharmacy	3,054
4	Hickey's Pharmacy	Pharmacy	3,161
5	Irwin's Pharmacy Mayfield	Pharmacy	2,384
6	Little Island CarePlus Pharmacy	Pharmacy	2,913

No.	Facility	Service	Distance from SIA Subject Site (m)
7	Pharmacy First Plus Glanmire	Pharmacy	2,092
8	Phelan's Pharmacy	Pharmacy	1,948
9	Wallace's Pharmacy	Pharmacy	3,733
10	Glanmire Medical Centre	General Practioner Sugery	1,948
11	Mayfield Family Practice	General Practioner Sugery	2,380
12	Meadow Park Surgery	General Practioner Sugery	3,831
13	The Surgery	General Practioner Sugery	3,491
14	Dr O'Brien	General Practioner Sugery	2,654
15	Riverstown Family Practice	General Practioner Sugery	1,817
16	Knight's Hill Medical Centre	General Practioner Sugery	2,992
17	Woodview Family Doctors	General Practioner Sugery	3,594
18	Carechoice Montenotte	Nursing Home	3,404
19	Glyntown Care Centre	Nursing Home	1,475
20	St. Stephens Unit 1	Nursing Home	4,523
21	Dr. Pat Hartnett	Dentist	3,025
22	Hazelwood Dental Practice	Dentist	2,112
23	WinningSmile Dental, Orthodontics & Cosmetics	Dentist	1,734
24	Glanmire Dental Practice	Dentist	1,815
25	Denture Repair Service	Dentist	3,604
26	Mayfield Health Centre	Primary Care Centres	3,265
27	Little Island Dental Surgery	Dentist	3,177
28	Smiles And More Dental	Dentist	2,892
29	St. Luke's Pharmacy	Pharmacy	4,484
30	St. Stephens Psychiatric Hospital	Hospital - Mental Health	4,521

4.5.11.4 Community and Sport Facilities

The SIA establishes its catchment area as all areas within a 15-minute cycle from the proposed site access points.

In total, 57 pitches, 17 parks, 8 football clubs, 6 gyms, 4 children's play areas, 4 GAA clubs, and 5 other recreational facilities were identified within the SIA catchment area. These sport and recreational facilities services are clustered within three areas: Cork City, Glanmire, and Little Island.

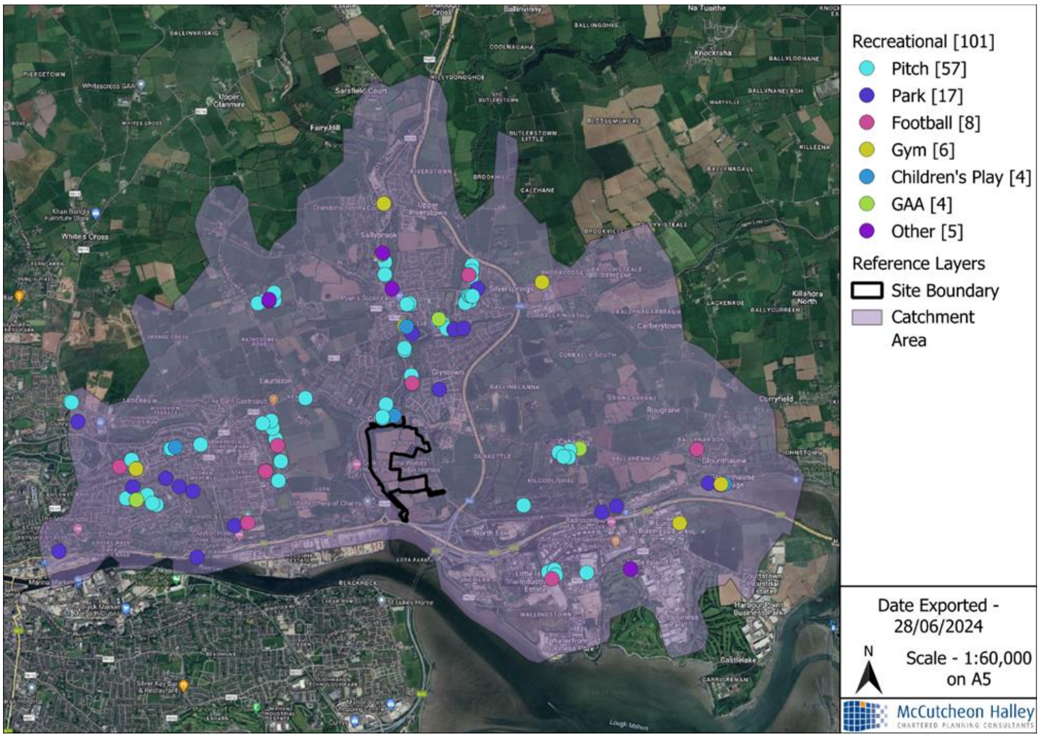

Figure 4-13 Sports and Recreational Facilities in SIA Study Area

With regard to community facilities, 20 post boxes, 6 community centres, 6 post offices, 2 gardai stations, 2 libraries, and 1 scout hall were identified within the SIA catchment area. The identified community facilities are clustered toward the centre of Cork City, with a small cluster within Glanmire.

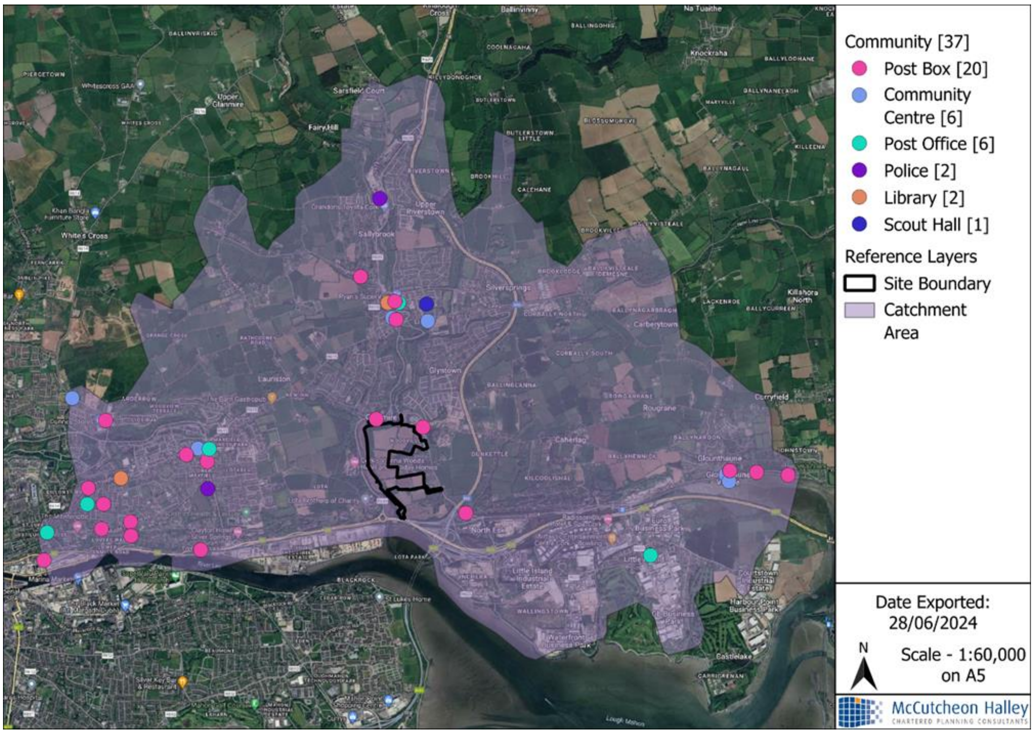

Figure 4-14 Community Facilities in SIA Study Area

4.5.12 Sensitive Receptors

For the purpose of this chapter, the primary sensitive receptors are defined below:

A. Current occupants of existing residential dwellings in the vicinity of the LRD Phase 1 development site, including dwellings along Dunkettle Road and north in Glanmire Village (mixed-use). Residents to east of Dunkettle Road are included.
B. Future occupants of 30-unit residential development at Glanmire Lodge (Reg. Ref. No. 20/39719) and the 608-unit residential development "Ballinglanna" (ABP Ref. SHD ABP-300543-18, Reg. Ref. No.'s 20/39179 and 23/42154).
C. Future occupants of nursing home to north of subject site (Reg. Ref. No.'s 19/38900 and 21/40423).
D. Current occupants of existing residential dwellings in the vicinity of the LRD Phase 2 development site. Residents to east of Dunkettle Road are included.
E. Existing hospitality business in vicinity of subject site (Vienna Woods Hotel and Holiday Homes).
F. Existing specialised medical and care facilities in vicinity of subject site (Lota Brothers of Charity, St. Laurence Cheshire Home and Lotamore House).
G. Current occupants of Dunkettle House (a protected structure) and existing residential dwellings to south east, including properties to east of Dunkettle Road

The primary sensitive receptors are identified on the map below.

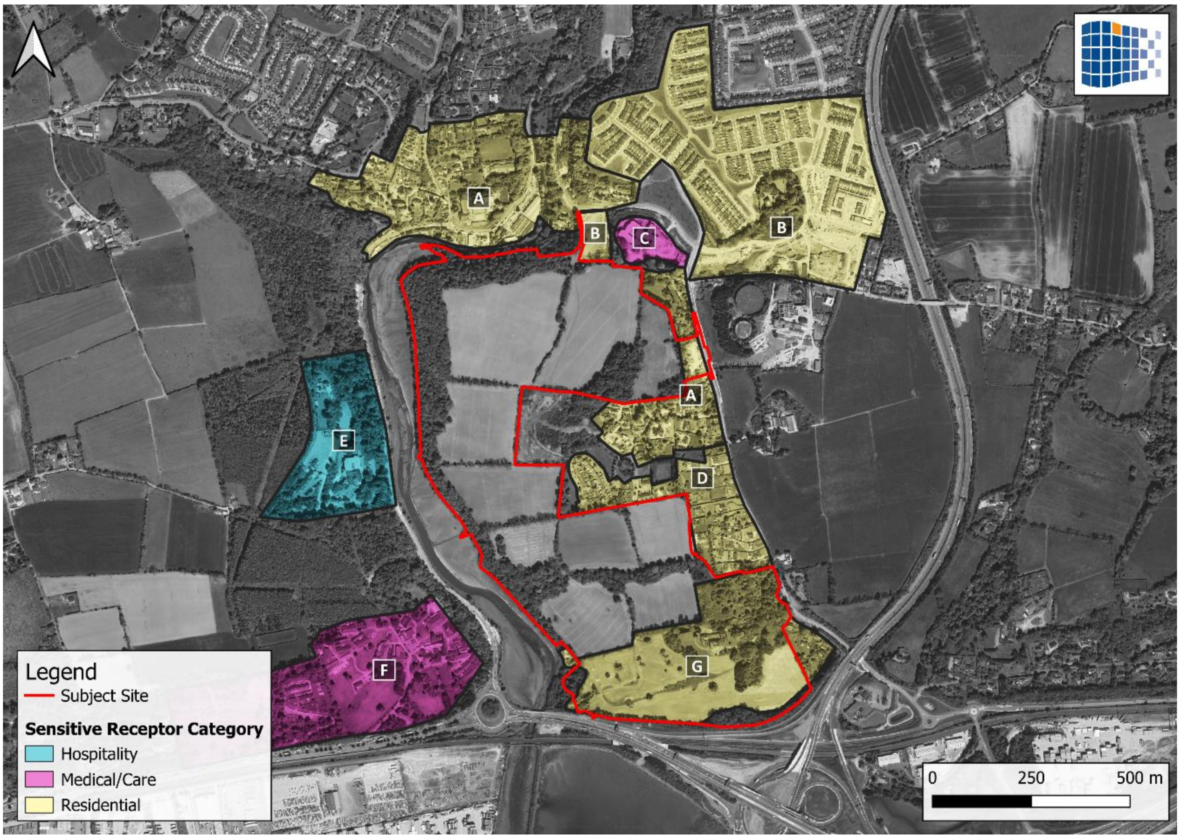

Figure 4-15 Indicative Map of Sensitive Receptors

4.6 The ‘Do Nothing’ Scenario

If the proposed development is not realised, it is anticipated that the proposed development site will remain in its current condition in the short to medium term and will remain in agricultural use.

In the absence of this proposal, having regard to the location of the proposed development site within the existing built-up area of Cork City and Suburbs, it is likely that another residential proposal would be progressed on the site. This is in accordance with national strategic outcomes - NSO 1 – (NPF) to deliver a greater proportion of residential development within the existing footprint of built-up areas and to make better use of under-utilised land serviced by existing facilities and public transport.

The effect of the construction of another residential scheme at this location would likely be similar to the effects of the proposed development, as outlined in this chapter.

In the absence of any development of the site, the impact is determined to be negative, with a significant effect on the delivery of homes within the existing built-up footprint of the Cork City and Suburbs. If the compact development of residentially zoned greenfield lands close to proposed high-quality public transport does not occur, the existing unsustainable pattern of urban sprawl is likely to continue. This would result in the expansion of the physical footprint of Cork City and Suburbs and other urban areas, as well as continued housing affordability issues.

In terms of Population and Human Health, a ‘do nothing’ scenario (i.e., not developing the proposed development site) would represent a lost opportunity to develop lands for residential use within the established built-up area of Cork City and Suburbs. As such, the proposed development site would remain underutilised, and it would not contribute to increasing the provision of housing in this area.

4.7 Difficulties Encountered

There were no difficulties encountered in preparing this chapter.

4.8 Consultation

The proposed development has been the subject of detailed discussions with Cork City Council during the Section 247 and LRD pre-planning process. In this context the issues and opinions raised were taken into account and included in the design process.

4.9 Impact Assessment

This section describes the environmental effects that are likely to arise during the construction and operation of the proposed development. Section 4.10 sets out the mitigation measures required to alleviate identified effects.

Potential Impacts are considered under the following headings, where relevant, in line with the Guidelines:

- Land use
- Population

- Employment and Economics
- Health
- Residential Amenity
- Local Amenity

Specific effects with respect to matters such as visual impact, noise, air quality and traffic are dealt with in the respective chapters of this EIAR (e.g., Landscape & Visual, Noise & Vibration, Air Quality, or Traffic & Transport).

4.9.1 Demolition and Construction Phase

The potential effects of the proposal during the construction phase of the development are outlined below. In general, it is noted that a potential effect on a sensitive receptor will diminish with increasing distance from the source of the impact.

4.9.1.1 Land Use

The lands are largely agricultural lands, with some wooded areas. These lands, and Dunkettle House and grounds, are privately owned and not open to the public. Lands within the study area which are under construction, being utilised for construction activities including compounds and storage, will be hoarded off to the public. As such, the proposed development will a neutral effect on the use of the lands by the public.

The development will cause a permanent significant change in land use for the agricultural lands. This is a positive change in line with the land use zoning and national policy to increase housing supply.

There will be no change in land use for Dunkettle House and its attendant grounds during the construction phase.

4.9.1.2 Population

During peak construction, it is anticipated that there will be up to 120 staff required on site. Some temporary increase in local population may occur although due to the location of the proposed development it is expected employees will travel to the development site from their existing place of residence. As far as practicable, local labour will be employed.

As such, the likely effects on the local population during the construction phase are neutral, short term and not significant.

4.9.1.3 Employment & Economics

The construction of the proposed development has the potential to impact employment and the economy due to its capital value through the purchase of Irish-sourced goods and services.

The construction phase (approximately 120 months) will generate direct employment within the local construction sector, with c.120 staff anticipated to be on-site during peak construction. The staff will comprise managerial, technical, skilled and unskilled workers. As far as practicable, local labour will be employed.

In addition to direct employment, there will be substantial off-site employment and economic activity associated with the supply of construction materials and the provision of services (i.e., financial, architectural, engineering and legal services) to the project.

The presence of construction workers will also generate positive spin-offs for the local economy with construction workers spending in local shops and other local retail services. Workers may also stay overnight in local hotels / guesthouses etc.

As such, likely effects on the local economy and employment during the construction phase are positive, short-medium term, and significant.

4.9.1.4 Health

Construction sites pose direct potential risks to the health and safety of construction workers, due to workplace accidents. Construction sites may also pose direct potential risks to the health and safety of the public; however, such access by the public would be considered trespassing on private property.

In the absence of any mitigation measures, likely effects on the health of construction workers during the construction phase could be negative and such an effect may have a significance ranging from slight to profound, depending on the magnitude of the incident. Subject to adherence to best practice construction measures, such impacts are not considered to be likely.

In the absence of any mitigation measures to prevent access by the public, likely effects on the health of the local population during the construction phase would be similar.

Additionally, construction sites pose an indirect potential risk to the health and safety of the public. In the absence of standard construction mitigation measures, impacts to health and safety may occur due to construction traffic, noise, dust or visual effects.

It is noted that the EIAR addresses such potential effects on local health and safety during the construction phase under the more specific topics of the environmental media by which they might be caused, such as Landscape & Visual, Noise & Vibration, Air Quality, or Traffic & Transport.

4.9.1.5 Residential Amenity

The construction phase of the project will cause a certain amount of loss of amenity, disruption, nuisance and inconvenience to the local community including the residents closest to the project. The level of effect is predicted to be commensurate with the normal disturbance associated with construction activities where a site is efficiently and properly managed in accordance with best practice.

Due to the size of the study area and development lands, the level of significance and duration of the effect will vary for receptors during the course of the construction phase with those closest to a particular phase or activity being effected more than receptors at a distance i.e. works in LRD Phase 1 are unlikely to have any significant effects on the receptors identified at The Cottages, Woodlane, Richmond and Dunkettle House.

The negative effects will be short term and cumulatively significant.

The construction of the proposed development has the potential to impact local residential amenity through increased construction traffic movements on the local road network, noise, dust and visual impact arising from plant (e.g. cranes). It is noted that the EIAR addresses such potential effects on local residential amenity during the construction phase under the more specific topics of the environmental factor by which they might be caused, such as Landscape & Visual, Noise & Vibration, Air Quality, or Traffic & Transport, in their relevant chapters.

4.9.2 Operational Phase

The potential effects of the proposal during the operational phase of the development are outlined below. In general, it is noted that a potential effect on a sensitive receptor will diminish with increasing distance from the source of the impact.

4.9.2.1 Land Use

The proposed scheme will urbanise the agricultural lands, delivering housing on residentially zoned lands within the built-up area of Cork City and Suburbs. This scheme is part of a mixed-use development proximate to planned high-frequency public transportation with good links. Development of the subject site in this manner would deliver a critical mass of population through compact growth, which would contribute to the sustainable growth of Cork City and permit more efficient provision of high-quality public services. As such, the likely effects on land use are positive, permanent, and significant.

Additionally, the proposed scheme will provide additional housing supply within the Cork Metropolitan Area. As identified in the Baseline Environment, the rate of housing delivery in Cork City (and in Ireland as a whole) between 2016 and 2022 was notably lower than the corresponding rate of population growth. The proposed scheme would contribute toward meeting the existing and future housing demand of the second-largest city in Ireland. As such, likely effects on housing supply are positive, permanent and significant.

There will be no change in land use for Dunkettle House and its attendant grounds. Proposals for a second access off Dunkettle Road near Woodlane are being considered for a future application and any effects on the land use arising from same will be considered at that time.

4.9.2.2 Population

During the operational phase, the residential population of the proposed housing units in LRD Phase 1 and LRD Phase 2 will be approximately 2,400 persons[9].

The proposed scheme will increase the population of the local area. As identified in the Baseline Environment, the rate of population growth within the Electoral Division study area remained in line with that of the Cork City and County between 2006 and 2022. However, between 2016 and 2022, the

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[9] Estimated future population based on the number of units proposed by number of bedrooms, and the average number of persons per household by number of bedrooms for Cork City.

more urbanised Small Area study area has experienced a population growth rate over half that of the ED study area.

New residential units will provide for existing and future housing demand. The housing will contribute to the critical mass of population growth within the immediate local area, and support a wide range of additional local businesses, services, transport infrastructure, and employment opportunities.

The proposed scheme would contribute toward the continued growth and urbanisation of the local area. As such, the likely effects on the local population are positive, long-term and moderate.

4.9.2.3 Employment & Economics

The proposed scheme is predominantly residential in nature and, as such, will result in limited employment opportunities. Notwithstanding this, employment will be generated from the proposed commercial floorspace (for use as a shop, café, and GP/medical service) and childcare facility. Additionally, some employment will be created in the servicing, maintenance and upkeep of the proposed apartment buildings and landscaped areas.

As such, the likely direct effects on local employment during the operational phase are positive, permanent and not-significant.

Additionally, the new residential population will generate additional spending within the centres of Glanmire, Little Island, and Cork City. It is therefore anticipated that this additional population will contribute to local economic activity and employment, generated through the multiplier effect.

As such, the likely direct effects on the local economy during the operational phase are positive, permanent and slight.

4.9.2.4 Health

During the operational phase, the proposed scheme will result in improvements to human health through increased physical activity and reduced car dependency through the connectivity to sustainable travel modes and access to the adjacent greenway.

Insufficient physical activity has been identified by the World Health Organisation (WHO) as the fourth leading risk factor for global mortality. Urban air pollution and traffic injuries are also responsible for a further 2.6 million deaths annually. The health benefits of active transport (walking and cycling, combined with public transport) can prevent many deaths from physical inactivity.

The proposed greenway will be a contributing factor to this, with same being a significant positive permanent effect on health through physical activity. Where a modal shift occurs, there will also be a consequential positive effect on air quality due to the reduction in traffic numbers – this is addressed in Chapters 6 and 13 of this EIAR.

The proposed scheme will contribute to the compact development of Cork City and Suburbs, and will be connected to a high-quality active travel network. The layout provides for the segregation of pedestrians and traffic and incorporates the principles of universal access and the requirements of Part M of the Building Regulations so that the development will be readily accessible to all, regardless of age, ability or disability.

The energy efficiency measures integrated into the design of the proposed scheme will provide for healthier living standards for future occupants and a reduced dependence on fossil fuels for energy generation. Overall, the proposed development is expected to result in significant CO_2 savings and improved air quality through reduced energy consumption and a modal shift away from private motor vehicles.

As such, the likely effects on the health of future residents during the operational phase are positive, permanent and significant**.**

The main impacts on human health, associated with air quality, noise, traffic and transport, water, waste and landscape are considered elsewhere in this EIAR, in their respective chapters. Subject to the implementation of mitigation measures, the cumulative negative effects are typical of any urban development and are considered to be slight or moderate.

4.9.2.5 Residential Amenity

During the operational phase, the high-quality living environment of the proposed scheme will result in positive impacts on amenity for future residents. While detailed designs are not yet available for LRD Phase 2 or Dunkettle House, it is intended that a similarly high standards of design will be implemented in these later phases.

The floor plans in LRD Phase 1 meet or exceed all minimum requirements, as detailed in the *Housing Quality Audit (HQA)* prepared by DMNA which accompanies the planning application for the Phase 1 LRD development.

Of the 550 proposed dwelling units in LRD Phase 1, 156 units will be apartments or duplexes. The proposed design is intended to maximise the number of dual-aspect units. Dual-aspect apartments provide greater daylight, an increased chance of direct sunlight for longer periods, natural cross-ventilation, a greater capacity to address overheating, a choice of views, and greater flexibility and adaptability in the use of rooms.

To provide private amenity space for future residents, each apartment benefits from access to ground-floor terraces or balconies, while each dwellinghouse unit benefits from a private garden. The positions of these private amenity spaces have been carefully considered to avoid overlooking.

The development has been designed with due consideration for sunlight and daylight and meets the recommendations as set out in the BRE Guide – BR 209 "Site Layout Planning for Daylight and Sunlight, A guide to good practice (2022)". A *Daylight & Sunlight Report* has been prepared by BPC Engineers for the LRD Phase 1 application and this report should be referenced in conjunction with this chapter. This report states that, within the proposed development, all rooms but 1 exceed the BRE recommendations for internal daylight.

Given the above, the likely effects on the residential amenity of future residents during the operational phase are positive, permanent, and significant. While detailed designs are not yet available for the remainder of the study area, it is intended that a similarly high standards of design will be implemented in these proposals.

During the operational phase, the proposed development will have little impact on existing residential amenity. The proposed development will have negligible impact on surrounding buildings with respect to daylight, with neighbouring buildings enjoying a similar level of daylight/skylight. This is due to the topography of the site, the wooded areas and mature boundaries being retained, the undeveloped lands to the south (where suitable separation distances can be achieved to the LRD Phase 2 scheme) and appropriate setbacks from existing residential properties where natural screening is insufficient.

Further, the subject site is naturally screened and buffered by the existing topography, mature trees and vegetation, and the Glashaboy River. Given this, no visual amenity or privacy impacts are anticipated for existing residents, as demonstrated by the *Verified View Photomontages* prepared by G-NET which accompanies the proposed development and the Landscape & Visual Chapter of this EIAR.

As such, the likely effects on the residential amenity of existing residents in the locality during the operational phase are neutral, permanent and slight.

4.9.2.6 Local Amenity

During the operational phase, the proposed development will have an overall positive impact on local amenities.

As detailed in the *School Demand Assessment, Childcare Demand Report and Social Infrastructure Audit* reports by McCutcheon Halley Chartered Planning Consultants, which accompany the LRD Phase 1 application, adequate capacity exists for existing social infrastructure within the locality such that it is not anticipated that proposed development will have a negative impact on access for existing residents. Furthermore, LRD Phase 1 includes a large childcare facility and 3 commercial units, which will improve the variety and accessibility of the social infrastructure offerings in the area.

The proposed LRD Phase 1 development includes a total Public Open Space (POS) provision of 2.48 Ha, of which 1.81 Ha is considered usable (c.14% of net developable area of subject site). The *Daylight & Sunlight Report* prepared by BPC Engineers (which accompany the LRD Phase 1 application) states that the proposed POS provision will exceed the BRE’s recommendation for sunlight and should appear adequately sunlit throughout the year.

The proposed development will also include a new greenway route to the west of the subject site, linking Glanmire Village to the Carrigtwohill to Midleton Inter-urban Cycle Route and the Glanmire to City Centre Cycle Route. This will provide recreational (and commuting) opportunities for both existing and future residents.

As such, the likely direct effects on local amenity during the operational phase are positive, permanent, and significant.

4.9.3 Cumulative Effects

The cumulative effects of projects in the vicinity of the study area have been considered with reference to the projects outlined in Chapter 1 of this EIAR.

This includes the housing under construction by the applicant at “Ballinglanna”, the development at Glanmire Lodge, directly north of the subject site, and the nursing home and childcare facility at the former Glanmire Rectory, directly north of the subject site (construction currently on hold).

During the construction phase, it is noted that the final phase of the “Ballinglanna” development is currently being constructed by the applicant, with the development to be completed or close to completion before works commence on the proposed project. It is therefore anticipated that no significant cumulative effects will occur between these projects. Further, the likely cumulative effects with other identified projects are neutral, temporary to short-term, and not significant, as the reduction in construction activities on the “Ballinglanna” development is balanced by the commencement of construction on the proposed development.

During the operational phase, the proposed development and these developments will deliver a significant quantity of housing (and nursing home beds) within the existing Cork City and Suburbs built-up area and will be served by high-frequency transportation under the Cork BusConnects and CARCR programmes.

As such, the likely cumulative effects in terms of land use and population growth are positive, permanent and significant; with the cumulative effects on housing supply being positive, permanent and significant.

The provision of the proposed childcare facility as well as the new facility at the former Glanmire Rectory will have a positive, permanent, significant effect on childcare provision in the area.

The design of the proposed development seeks to encourage a modal shift away from private motor vehicles and towards sustainable transportation, leading to increased physical activity and reduced car dependency. The Glanmire Roads Improvement Scheme and Glanmire to City Centre Cycle Route will improve pedestrian and cyclist access and safety in the vicinity of the subject site and is anticipated to encourage a similar modal shift towards sustainable transportation. The delivery of these projects, and other projects with similar impacts such as the Cork BusConnects Programme and Cork Area Commuter Rail Programme, is guided by the Cork Metropolitan Area Transport Strategy 2040. The positive effects of such sustainable transportation interventions and the compact development of urban areas is synergistic in nature, as sustainable transportation allows for more compact forms of development, while compact development itself provides a critical population mass to make such interventions viable.

As such, during the operational phase, the likely cumulative effects on health are positive, permanent in duration, and very significant.

4.10 Mitigation Measures

4.10.1 Incorporated Design

The proposed development complies with the Building Regulations, which provide for the safety and welfare of people in and around buildings. The Building Regulations cover matters such as structure, fire safety, sound, ventilation, conservation of fuel and energy, and access, all of which safeguard users of the buildings and the health of occupants.

The proposed development complies with the requirements of Part M of the Building Regulations and incorporates the principles of universal design so that the development will be readily accessible to all, regardless of age, ability, or disability.

The proposed design provides for a highly accessible layout across the scheme including segregated pedestrian and cyclist entrances strategically located proximate to Glanmire Village in the north and the Glanmire to City Centre Cycle Route and Carrigtwohill to Midleton Inter-urban Cycle Route to the south, via the new greenway through the site. This will encourage sustainable modes of outdoor access for a wide age group.

The integration of energy efficient measures into the design will provide for healthier living standards for future occupants, less dependence on fossil fuels and associated improved air quality.

The preservation and management of the woodland areas, and the availability of on-the-doorstep public open spaces and amenity areas will provide a high quality environment for the residents and will encourage sustainable modes of outdoor access for a wide age group.

4.10.2 Construction Phase Mitigation

A *Construction Environmental Management Plan (CEMP)* and a *Resource and Waste Management Plan (RWMP)* for the LRD Phase 1 development have been prepared by JODA for the current planning application and are included in the application documentation.

- The appointed contractor(s) will update the CEMP submitted with the application after development consent is received, incorporating the environmental mitigation and monitoring measures included in this EIAR and relevant measures attached to a grant of permission.
    - The CEMP will comply with all appropriate legal and best practice guidance for construction sites.
    - The purpose of a CEMP is to provide a mechanism for the implementation of the various mitigation measures which are described in this EIAR and to incorporate relevant conditions attached to a grant of permission. The CEMP requires that these measures will be checked, maintained to ensure adequate environmental protection. The CEMP also requires that records will be kept and reviewed as required to by the project team and that the records will be available on site for review by the planning authority.
    - All mitigation and monitoring measures included in the Summary of Mitigation and Monitoring Measures in Chapter 17 of this EIAR will be included in the CEMP and adhered to.
    - The CEMP will be submitted to the Planning Authority prior to the commencement of development.

- The Resource Waste Management Plan (RWMP) will be updated by the Main contractor(s) and implemented after development consent is received, incorporating the environmental mitigation and monitoring measures included in this EIAR and relevant measures attached to a grant of permission.

- All construction personnel will be required to understand and implement the requirements of the CEMP and RWMP and shall be required to comply with all legal requirements and best practice guidance for construction sites.

- Project supervisors for the construction phase will be appointed in accordance with the Health, Safety and Welfare at Work (Construction) Regulations 2021 (as amended), and a Preliminary Health and Safety Plan will be formulated during the detailed design stage which will address health and safety issues from the design stages, through to the completion of the construction phases.

- The *Construction Environmental Management Plan (CEMP)* and a *Resource and Waste Management Plan (RWMP)* will be live documents and will be updated in future for the LRD Phase 2 development, and Dunkettle House if relevant, and will accompany a future application for those lands. The same principles will apply.

- The contractor will appoint a community liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the contractor's CEMP.

- Construction Working Hours will generally be limited to the hours 7am – 6pm Monday to Friday and 8am to 2pm on Saturday. Works proposed outside of these periods will be agreed with the Local Authority in advance. In order to mitigate any impact of construction activities, the following measures are proposed:
    - Coordination of deliveries to site within working hours,
    - Scheduling of noisier activities early in the working day,
    - Noise and vibration mitigation measures will be implemented in line with Chapter 12.
    - The delivery of materials to the site during the construction phase shall be organised so that deliveries are minimised and do not cause traffic hazards.
    - Deliveries are not permitted at peak traffic times (8:00am to 9:00am and 5:00pm to 6:00pm) and
    - all construction vehicles are parked within the site.
- Mitigation measures relating to those factors under human health which are relevant under other environmental factors, are included in the relevant chapters of this EIAR.

4.10.3 Operational Phase Mitigation

The proposed development is of a high-quality design that incorporates generously sized dwellings with integrated energy efficiency measures and an abundance of open space. The impact assessment section did not identify likely significant negative environmental impacts on population and human health arising from the operational phase of the proposed development. Accordingly, mitigation measures are not proposed.

Mitigation measures relating to those factors under human health which are relevant under other environmental factors, are included in the relevant chapters of this EIAR.

4.11 Residual Impact Assessment

This section assesses the anticipated residual impacts of the proposal, given the implementation of the mitigation measures described in Section 4.9.

4.11.1 Construction Phase

The residual impacts of the proposal during the construction phase of the development are outlined below.

4.11.1.1 Land Use

The development will have a permanent significant positive effect in line with the land use zoning and national policy to increase housing supply. There will be no change in land use for Dunkettle House and its attendant grounds.

4.11.1.2 Population

The likely residual effects on the local population during the construction phase are neutral, short term and not significant.

4.11.1.3 Employment & Economics

The likely residual effects on the local economy and employment during the construction phase are positive, short-medium term, and significant.

4.11.1.4 Health

Subject to adherence to the construction phase mitigation measures and best practice construction measures, impacts to construction workers and the public during the construction phase are not considered to be likely or significant.

The likely residual indirect effects on human health of the local population during the construction phase is addressed under the more specific topics of the environmental factor by which they might be caused, such as Landscape & Visual, Noise & Vibration, Air Quality, or Traffic & Transport.

4.11.1.5 Residential Amenity

The likely residual effects on residential amenity during the construction phase will be negative with the duration and significance varying depending on proximity to the current area of development – the significance will vary from slight to moderate, with duration ranging from brief to short term.

4.11.2 Operational Phase

The residual impacts of the proposal during the operational phase of the development are outlined below.

4.11.2.1 Land Use

The likely residual effects on land use and urbanisation during the operational phase are **positive permanent**, and **significant**.

4.11.2.2 Population

The likely residual effects on the local population during the operational phase are **positive, long-term** and of **moderate** significance.

4.11.2.3 Employment & Economics

The likely residual direct effects on local employment during the operational phase are **positive**, **permanent**, and **not-significant**.

The likely residual indirect effects on local economy during the operational phase are **positive**, **permanent**, and **slight**.

4.11.2.4 Health

The likely residual effects on health during the operational phase are **positive**, **permanent**, and **significant.**

The main impacts on human health, associated with air quality, noise, traffic and transport, water, waste and landscape are considered elsewhere in this EIAR, in their respective chapters

4.11.2.5 Residential Amenity

The likely residual effects on residential amenity during the operational phase (in terms of future residents) are **positive**, **permanent**, and **significant.**

The likely residual effects on residential amenity during the operational phase (in terms of the existing residents in the locality) are **neutral, permanent,** and **slight**.

4.11.2.6 Local Amenity

The likely residual effects on local amenity during the operational phase are **positive**, **permanent**, and **significant**.

4.11.3 Cumulative Effects

Any likely cumulative effects with other identified projects during the construction phase are **neutral**, **temporary to short-term,** and **not significant**.

The likely residual cumulative effects on the land use and population growth during the operational phase are positive, permanent and significant The likely residual cumulative effects on the local population during the operational phase in terms of housing supply are **positive**, **permanent** in duration, and **significant**. The same positive effect is considered likely for childcare provision.

The likely residual cumulative effects on health during the operational phase are **positive**, **permanent** in duration, and **very significant**.

4.12 Interactions

During the construction phase, the following interactions with Population and Human Health are noted: -

- **Landscape and Visual (Chapter 5):** Construction processes and plant such as cranes used during the construction phase may give rise to visual impacts.
- **Material Assets – Traffic and Transport (Chapter 6):** Increased construction traffic movements on the local road network during the construction phase may give rise to noise, dust, and road safety impacts.
- **Material Assets – Built Services (Chapter 7):** Excavation during the construction phase may give rise to risks to human health from contact with live electricity lines or damage to live gas pipelines.
- **Noise and Vibration (Chapter 12):** There is potential for effects on human health associated with noise during the construction phase which may impact upon amenity.

During the operational phase, the following interactions with Population and Human Health are noted: -

- **Landscape and Visual (Chapter 5):** The landscape plan will impact the quality of the private, communal and public open spaces, which could impact people's health and well-being.
- **Material Assets – Traffic and Transport (Chapter 6):** The proposed development's proximity to services, amenities, and high-quality public transport would interact with patterns of traffic and transport locally during the operational phase. Traffic flows within the site have the potential to create safety risks for pedestrians and cyclists.
- **Air Quality (Chapter 13):** Energy efficient design within the proposed development may give rise to reduced electricity consumption by future residents, potentially decreasing dependence on fossil fuels for energy generation, resulting in improved air quality. There is potential for impact on human health from a deterioration in air quality associated with emissions from vehicles.
- **Climate (Chapter 14):** Energy efficient design within the proposed development may give rise to reduced electricity consumption by future residents, potentially decreasing dependence on fossil fuels for energy generation, resulting in significant CO_2 savings.

The potential significant effects on population and human health arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative effects will occur.

4.13 Monitoring

Measures to avoid negative impacts on Population and Human Health are largely integrated into the design and layout of the proposed development. Compliance with the design and layout will be a condition of any permitted development.

No specific monitoring is proposed in relation to this section. Monitoring of standard construction mitigation measures as outlined in this EIAR will be undertaken by the appointed contractor.

4.14 Worst Case Scenario

The worst-case scenario on in terms of human health is considered to be the risk of an accident during the construction phase. According to the Health and Safety Authority[10] , in 2023 there were 11 fatal accidents recorded equivalent to 26% of the total fatal work-related incidents. In 2022, 7 fatal accidents occurred in construction equivalent to approx. 25% of the total fatal work-related incidents. This represents an increase from the number recorded the year previous.

The HSA has undertaken a range of activities in regulation, education, accreditation and enforcement to reduce incidents on construction sites. The appointed contractor is required to comply with all relevant Health and Safety legislation and the risk of a fatality is deemed unlikely.

This worst-case scenario is considered unlikely, and the significance of the effect is indeterminable.

In terms of population, the worst case scenario is considered to be if the development did not proceed and the site remained undeveloped, in agricultural use. This would not be in line with national housing policy or the residential zoning of the lands and would be a missed opportunity to provide new housing in line with national, regional and local policy. This worst-case scenario is considered unlikely, with the applicant actively promoting the development of the lands, but the quality and significance of the event occurring is negative and very significant.

4.15 Risk of Major Accidents or Disasters

No risk of major accidents and disasters has been identified. The project comprises a mixed-use development on a greenfield site. All possible risks relating to existing soil contamination, potential flooding and construction activities have been considered, and mitigation measures proposed where appropriate.

The proposed development will be located within 1 km of BASF (Little Island) and Calor Tivoli which are Upper Tier SEVESO sites, and within 1km of Chemical Bulk Storage Ltd. (Tivoli) which is a Lower Tier SEVESO site. The Cork City Development Plan 2022-2028 sets out buffer zones for all Seveso Sites within its boundaries; no such buffer zones overlap with the subject site. Equivalent information is not provided for Cork County Council; however, the subject site does overlap with an approximate 1,000m "notification zone" from the BASF (Little Island) Seveso Site.

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[10] Available via: https://www.hsa.ie/eng/topics/statistics/annual_review_of_workplace_injury_illness_and_fatality_statistics/annual-review-of-workplace-injuries-illnesses-and-fatalities-2021-2022.pdf; and https://www.hsa.ie/eng/news_events_media/news/press_releases_2024/health_and_safety_authority_reports_43_work-related_fatalities_in_2023.html

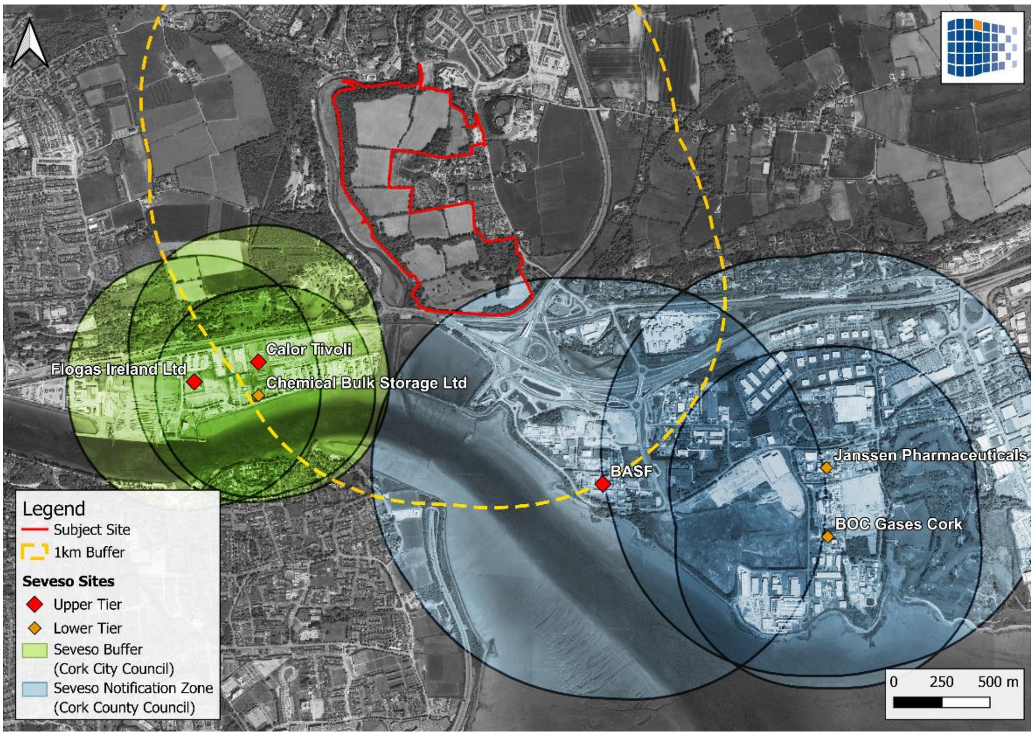

Figure 4-16 Seveso Sites in Proximity to Subject Site

These sites are regulated by The Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances or COMAH) Regulations 2015. The purpose of the COMAH Regulations is to lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistent and effective manner. As such, these sites are subject to strict regulatory and safety regimes operated by both the EPA and HSE and is subject to regular inspections.

A major accident or disaster is considered unlikely, and the significance of the effect is indeterminable.

4.16 Summary of Mitigation and Monitoring

The following Table summarises the construction phase mitigation measures in regard to Population and Human Health. No specific monitoring is proposed in relation to this section. Monitoring of standard construction mitigation measures as outlined in this EIAR will be undertaken by the appointed contractor.

No operational phase mitigation or monitoring measures are proposed in regard to Population and Human Health.

Table 4-15 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Residential Amenity	A Liaison Officer will be appointed by the Main Contractor(s) to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will	

Likely Significant Effect	Mitigation	Monitoring
	be included in the Contractor(s) CEMP prior to development commencing on site.	
Residential Amenity	Construction Working Hours – Generally construction working hours will be limited to 7am – 6pm Monday to Friday and 8am to 2pm on Saturday with no work on Sundays or Bank Holidays. Any works proposed outside of these periods shall be strictly by agreement with the Local Authority in advance. The delivery of materials shall be organised so that deliveries are not permitted at peak traffic (8:00am to 9:00am and 5:00pm to 6:00pm) and that all construction vehicles are parked within the site.	
Land Use, Residential Amenity, Human Health,	The submitted Outline Construction and Environmental Management Plan (CEMP) and *Resource and Waste Management Plan (RWMP)* for the LRD Phase 1 development have been prepared by JODA. These plans will be updated by the Main contractor(s) prior to development commencing on site. The CEMP will incorporate the environmental mitigation and monitoring measures included in this EIAR and relevant measures attached to a grant of permission. The CEMP will comply with appropriate legal and best practice guidance for construction sites . A further *Outline Construction Environmental Management Plan (CEMP)* and a *Resource and Waste Management Plan (RWMP)* will be prepared in the future for the LRD Phase 2 development, and Dunkettle House if relevant, and will accompany a future application for those lands. The same principles will apply.	
	All construction personnel will be required to understand and implement the requirements of the CEMP and RWMP. Personnel will attend induction and training classes, as required.	
	Project supervisors will be appointed in accordance with the Health, Safety and Welfare at Work (Construction) Regulations 2021 (as amended).	
	A Preliminary Health and Safety Plan will be formulated during the detailed design stage.	

4.17 Conclusion

A number of significant positive effects have been identified during the operational phase, most notably with respect to the provision of housing within an existing built-up area and a modal shift.

The residual effect of the proposed development for population and human health is determined to be **significantly positive** having regard to the delivery of much needed new homes in a location that has the carrying capacity in terms of both services and amenities to support the population generated by the scheme. The provision of the greenway and allowing people to live in close proximity to their daily living needs, with access to more than one mode of public transport (Train & Bus) is also a **significant positive** effect for population and human health and will result in a positive change to the current poor modal split.

There are no significant adverse effects with respect to socio-economic factors, land use, or the amenity value potential of the area.

Issues which may cause risks and hazards during the construction and operational phase of the development are given due consideration. All necessary mitigation measures will be put in place to ensure the health and safety of all site personnel and neighbouring properties. All other environmental aspects relating to the human environment which could have an adverse effect on the local population such as soils, geology & hydrogeology, water and ecology have been addressed in the relevant chapters of this EIAR.

4.18 References and Sources

- National Planning Framework, Ireland 2040 – Our Plan (Government of Ireland, 2018)
- Draft First Revision to the National Planning Framework
- Southern Regional Spatial and Economic Strategy 2019-2031
- Cork City Development Plan 2022-2028
- Cork County Development Plan 2022-2028
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)
- Central Statistics Office (CSO) website: www.cso.ie
- Department of Education website:
- Health and Safety Authority (HSA) website: www.hsa.ie

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 5

Landscape & Visual

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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5 Landscape & Visual

5.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development on landscape and visual impact.

It should be read in conjunction with the architectural, landscape architectural, sustainable drainage drawings and reports, verified photomontages by GNet-3D Consultants together with the Biodiversity and Cultural Heritage Chapters of the EIAR for references to features of natural blue / green infrastructure and to Cultural Heritage features on site and in its environs.

5.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Kieran McDonogh of DMNA Ltd., Architects & Landscape Architects.

Kieran McDonogh is qualified as an Architect specialising in Landscape Architecture within excess of 30 years experience. DMNA Ltd. have undertaken numerous architectural & landscape design projects both; Strategic Housing Developments (SHDs) and Large-Scale Residential Developments (LRDs). These have involved the preparation of both EIAR and EIA reports and been involved in the preparation of EIARs for the following projects:

- Ballinglanna SHD 2016, Glanmire, Co. Cork
- Ballinglanna LRD 2022, Glanmire, Cork
- Maglin LRD, Ballincollig, Cork
- Kilbarry SHD, Kilbarry, Cork
- Ballyvolane SHD, Ballyvolane, Cork

5.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

5.3.1 Aspects Relevant to this Assessment

This assessment is relevant to areas in the environs of the proposed development site that contribute to the amenity offered to city residents and visitors. These are sites and locations visited for recreational purposes and include blue, green and cultural heritage infrastructure.

5.4 Methodology

5.4.1 Relevant Legislation & Guidance

This Landscape and Visual Assessment takes cognisance of the sensitivity of the landscape and the degree to which it may absorb change. The methodology is founded on national and local policy guidance and best practice as detailed in the references as follows:

- A provisional inventory of ancient and long-established woodland in Ireland (2010); National Parks & Wildlife Service
- Cork City Landscape Study for Cork City Council (2008); Mitchell& Associates
- Cork City Development Plan 2022-2028; Cork City Council
- Cork Harbour Study Public Consultation Draft (2011); Cork County Council
- Environmental Impact Assessment of Projects: Guidelines on the Preparation of the Environmental Impact Assessment Report (EIAR) (2017); European Commission
- Guidelines on Landscape & Visual Assessment (2002); Irish Landscape Institute
- Guidelines for Landscape & Visual Impact Assessment, 3rd edition (2013), Landscape Institute
- Guidelines on Landscape & Landscape Assessment (2000); Department of the Environment, Community & Local Government
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022); Environmental Protection Agency
- Management Guidelines for Ireland’s Native Woodlands (2017); Cross & Collins
- National Landscape Strategy 2015-2025; Department of Arts, Heritage and the Gaeltacht
- National Biodiversity Action Plan 2023-2030; National Parks & Wildlife Service

Online mapping portals for heritage, biodiversity, planning and development together with aerial photographic resources were also consulted.

5.4.2 Site Surveys/Investigations

Since 2020 numerous site visits were undertaken both in summer and winter together with other members of the design team including the photomontage consultants. These site visits included a site assessment of existing onsite conditions, topography, land uses, heritage & biodiversity assets, physical constraints such as wayleaves and views to the surrounding environs from within the site.

Numerous visits were made to surrounding locations to verify views, initially identified from a desktop assessment of maps and aerial photographs from a range of locations external to the site and at varied distances and elevations.

5.4.3 Consultation

The viewpoint locations were decided in conjunction with Cork City Council Planning Department. The original series of viewpoint locations was agreed in Winter 2023. This was expanded in summer 2024 when additional viewpoint locations were added. The City Council were particularly concerned that the proposed development would not diminish the existing landscape settings of Cork Upper Harbour and the Lee River and the Landscape setting of Glanmire Village.

5.4.4 Impact Significance Criteria

5.4.4.1 Landscape Susceptibility

Landscape susceptibility examines the ability of the landscape within the Dunkettle lands and the general environs to accommodate the development proposal for the lands. Evaluation of Landscape Susceptibility is determined using the following three-point scale.

LANDSCAPE SUSCEPTIBILITY	CLASSIFICATION CRITERIA
High	Small scale, intimate or complex landscape considered to be intolerant of even minor change
Medium	Medium scale, more open or less complex landscape considered tolerant to some degree of change.
Low	Large scale, simple landscape considered tolerant of a large degree of change.

5.4.4.2 Landscape Sensitivity

Professional judgement in conjunction with site analysis is used to assess the landscape sensitivity to change. Landscape Sensitivity is determined using the following three-point scale.

LANDSCAPE SENSITIVITY	CLASSIFICATION CRITERIA
High	Landscape of particularly highly valued character and scenic quality considered very susceptible to minor changes.
Medium	Landscape of regional or local value, quality, or rarity, exhibiting some distinct features, considered tolerant of some degree of change
Low	Landscape of lower scenic quality, with few distinctive elements or valued characteristics and considered tolerant to a large degree of change.

5.4.4.3 Magnitude of Landscape Change

The magnitude of landscape change concerns the extent to which the proposed development at Dunkettle will alter the existing characteristics of the landscape. It uses judgement of the size or scale of effect, geographical extent of the area influenced together with duration and reversibility. The alteration to the landscape character can be direct and indirect. Direct change is the result of physical alterations on site or on adjoining lands. Indirect change to the landscape identifies changes occurring off-site due to the development. For instance, the development of a residential development at Dunkettle is now possible due to the completion of the Dunkettle Interchange and this is an indirect change occurring at a date post completion of the project.

MAGNITUDE	CLASSIFICATION CRITERIA
Negligible	No discernible change in any component
Low	Imperceptible change in landscape receptors
Moderate	Moderate change in localised areas
High	Notable change in landscape characteristics across an extensive area or intensive change within a more limited confine.

5.4.4.4 Visual Susceptibility

This relates to the importance of a view to person from a specific location and is informed by the type of viewer and the activity with which they are engaged. It considers the extent to which the viewer is focussed on the view or visual amenity. In the case of the Dunkettle lands there is likely to be little attention given to the lands from drivers navigating the Dunkettle Interchange. A pedestrian or cyclist travelling along the west side of the Glashaboy Estuary is far more focussed and aware of the Dunkettle lands along the east side of the estuary.

SUSCEPTIBILITY	CLASSIFICATION CRITERIA
High	Receptors for which the view is of primary importance and are likely to notice even minor change
Medium	Receptors for which the view is important but not the primary focus and are tolerant of some change
Low	Receptors for which the view is incidental or unimportant and is tolerant of a high degree of change

5.4.4.5 Visual Sensitivity

Visual sensitivity to change is based on a combination of professional judgement and analysis to identify landscape value and susceptibility again defined using a three-point scale.

LANDSCAPE SESITIVITY	CLASSIFICATION CRITERIA
High	Locations where viewers experience a highly valued, impressive, or well composed view, with no detracting features and where changes would be highly noticeable
Medium	Locations where viewers experience a valued view which represents a pleasing composition but may include some detracting elements and is tolerant of a degree of change
Low	Locations where the view is incidental but not important to the viewer and the nature of the view is of limited value or poorly composed with numerous detracting features and is tolerant of a large degree of change.

5.4.5 Definition of Visual Impacts

Visual effects are direct effects as the magnitude of change within an existing view will be determined by the extent of visibility of the proposed Dunkettle Development. The following four definitions are used to assess the level of change caused by visual effects.

MAGNITUDE	CLASSIFICATION CRITERIA
Negligible	The Dunkettle Development will cause a barely discernible change in the existing view
Low	The Dunkettle Development will cause minor changes to the existing view over a wide area or noticeable change over a limited area.
Moderate	The Dunkettle Development will cause minor changes to the existing view over a wide area or noticeable change over a limited area.
High	The Dunkettle Development will cause a considerable change in the existing view over a wide area or a notable change over a limited area.

DURATION	**DESCRIPTION**
Temporary	Visual impact has a duration of one year or less
Short Term	Visual impact has a duration of between one and seven years
Medium Term	Visual impact has a duration of between seven and fifteen years
Long Term	Visual impact has a duration of between fifteen and sixty years
Permanent	Visual impact has a duration of sixty years or more.

NATURE OF EFFECTS	**DESCRIPTION**
Neutral	This will neither enhance nor detract from the landscape character
Positive	This will improve or enhance the landscape character or view
Negative	This will have an adverse effect on the existing landscape character or view

SIGNIFICANCE OF EFFECTS		**SENSITIVITY TO CHANGE**		
		High	Medium	Low
SENSITIVITY TO CHANGE	High	Major	Moderate-Major	Moderate
	Moderate-High	Moderate-Major	Moderate	Minor-Moderate
	Moderate	Moderate	Moderate	Minor
	Low-Moderate	Moderate	Minor-Moderate	Miner-Negligible
	Low	Minor-Moderate	Minor	Negligible
	Low-Negligible	Minor-Moderate	Miner-Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible

5.4.6 Choice of Viewpoints

The viewpoints have been selected from a range of key locations to give an accurate presentation of the visual impact the proposed development on the Dunkettle lands may have from all directions. The views are from the public domain or locations soon to become part of the public domain (realigned Caherlag Road).

The views are shown where possible in winter and summer conditions, this is due to the significant amount of deciduous woodland located on site and how it changes seasonally.

The 20 viewpoints chosen are identified in the Figure below, with the verified views presented in a separate standalone booklet to this EIAR - *Verified View Photomontages* prepared by G-Net 3D.

Figure 5-1 Verified View - Viewpoint Map (G-Net 3D)

5.4.7 Photomontage Methodology

The methodology used to develop the photomontages is based on the 'Visual Representation of Development Proposals' guidance note by the Landscape Institute, 2019 and outlined in the *Verified View Photomontages* booklet, prepared by G-Net 3D, accompanying the planning application.

5.5 Difficulties Encountered

There were no difficulties encountered in preparing this Chapter.

The site visits were all undertaken during daylight hours. The R639 is artificially lit at night on the western shore of the Glashaboy Estuary, the eastern shoreline is a dark area and with the existing woodland it is not anticipated that the proposed development will produce any significant light pollution of the estuarine SPA area.

Except for dwellings in Church Green, Ballinglanna, private residences and gardens were not accessed during site visits. The selected viewpoints are all located in publicly accessible locations and are proximate to private residential properties within the environs of the proposed development.

The range of viewpoint locations is comprehensive from all directions, at varied distances, from sea level, hilltop and in between elevations.

5.6 Baseline Environment

5.6.1 Landscape Character

Cork City and Harbour are identified as City Harbour & Estuary character type in the established Landscape Character Types for Cork County. In relation to the Dunkettle Lands the key characteristics that assemble to create its unique character are the River Lee, the extensive natural Upper Harbour area of Lough Mahon, the presence of islands. The city suburbs of Mahon and Blackrock are on the south bank with the landmark Blackrock Castle perched on the coastline. There is industry located on Little Island to the southeast and extensive port facilities to the southwest. The south facing valley wall (of the Lee) Tivoli Ridge is occupied by a series of five elevated period dwellings with mature landscape gardens and parkland, giving an appearance of nestling into woodland. Dunkettle House and Parkland occupy a south facing slope on the east side of the estuary Dunkettle is for those arriving from the north and east the gateway to Cork City. The M8 and N25 meet at the Dunkettle Interchange where the first glimpse of the city and harbour may be had.

The Glashaboy River runs from north to south and has its confluence with the Lee at Dunkettle. The tributary valley has steep valley walls enclosing the narrow estuary and the river valley floor. The slopes are extensively wooded. The woodland and the sharp turn in the terrain where the river flows into the estuary is the picturesque location of the historic village of Glanmire.

5.6.2 Landscape Context

The Dunkettle Lands cover an area of c. 63 hectares. There is an existing period house at the southern end of the site set on a south facing hillside with a mature parkland context of specimen trees and open pasture. The parkland extends to the west as far as a band of deciduous woodland. In this area there is also an historic stone-built structure near an access laneway serving two existing waterfront dwellings (These dwellings, which are not owned by the applicant, adjoin the study area). The deciduous woodland extends north along the estuary shoreline and covers the sloped terrain along the west and much of the north sides of the property.

The demesne is accessed via a formal semi-circular entrance off the Dunkettle Road with wing walls and railings together with a currently ruinous Gate Lodge. A second access is via an existing laneway further north from the main gate. Between the two access points there is a field area enclosed with tree lines. The field space has become overgrown with self-seeded trees and shrubs. Directly north of the house there is a series of courtyard spaces which back on to a large walled garden. To the west of the walled garden there is a mature double tree line of Limes known as Lime Walk. West of the trees is an agricultural field area enclosed with mature trees. This portion of the former estate is identified in the Cork City Development Plan as NE15 with the zoning objective ZO17, Landscape Preservation.

The remainder of the site is composed of a series of ten agricultural field areas. The fields are sub-divided with sod and stone walls and mature tree lines. An area of woodland occupies a steep hillside north of Woodville Estate and the trees extend on to an area within that neighbouring residential estate.

Figure 5-2 Dunkettle House with the walled garden seen top right

Figure 5-3 Aerial photograph showing Dunkettle and environs

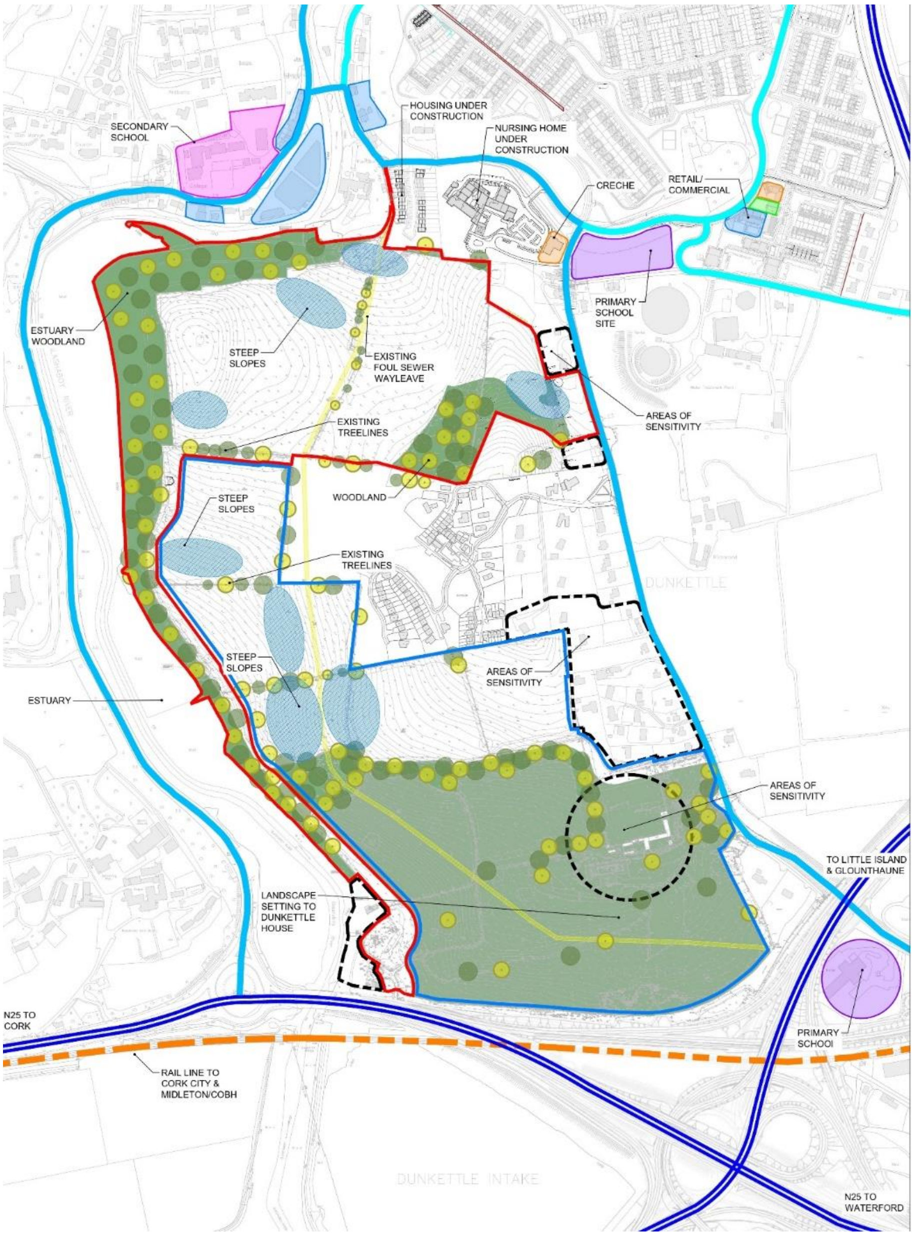

Figure 5-4 Dunkettle Application site outlined in red with Phase II and Parkland outlined in blue.

The lands rise from sea level on a slope which steepens as it extends upstream. the slope turns east at the northwest corner of the property. There is a high point in the northwestern field (55metres) and a high point (70metres) along the northern boundary of Woodville with a trough in between.

The hilltop adjoining the north side of the Woodville Estate is not included in the current application or the masterplan for the phase II application area. It is proposed to be developed later. There is a 100metre long road frontage to the Dunkettle Road on the eastern boundary. Due to the Dunkettle Road Upgrade project the sod and stone wall and the trees have been removed or degraded and the roadside field area has been converted to a construction compound.

The lands are all within the zoning objective ZO 02, for a New Residential Neighbourhood. this zoning also includes a portion of the Woodville property (adjoining the study are but not within the applicant's ownership) which remains undeveloped. There is an existing mains foul drain crossing the lands from north to south. This enters the property via a laneway access from the Dunkettle Road crosses the northwest section of the site, exits on to the Woodville lands and re-enters the Dunkettle lands on the south side of Woodville where it continues south crossing the parkland area. There is an overhead power line within the site running east west parallel to the southern boundary with Woodville. This has resulted in a break in the continuity of the estuary shoreline woodland.

Figure 5-5 Woodville aerial view from the west with subject lands to left and right. The walled garden for Dunkettle House is visible in the right background.

The site is located on the northern shore in the upper harbour of Cork. It is separated from the portion of the harbour called Lough Mahon which lies to the south by the recently completed Dunkettle Interchange, the Inter-Urban IU1, a 15.8kilometre segregated Cycleway and the pre-existing the Cork to Midleton railway line. There is a vehicular access to the southwest corner of the site serving two dwellings indenting the corner of the site. This access crosses the section of the existing Inter-Urban Cycleway connecting the Tivoli Roundabout to the Dunkettle Road. The Inter-Urban cycleway route has been constructed on a portion of land that was previously part of the Dunkettle House Demesne and runs along the base of a new cutting giving limited visibility of the demesne parkland. The lands taken were wooded and cleared but a treeline remains along the southern edge of the parkland maintaining screening between Dunkettle House and the transport infrastructure. There is significant traffic noise impacting a substantial portion of the site.

Dunkettle House and much of the associated parkland area are set at a higher elevation and overlook the River Lee to the southwest and Lough Mahon to the south. The shorelines in view run from the east end of the Marina Park to Ring Mahon Point. Hop Island and the ridge on the southern side of the valley are visible at a greater distance to the south.

Figure 5-6 Dunkettle in the context of the Upper Harbour with Lough Mahon, the Lee River and the Dunkettle Interchange in the foreground

The western side of the site runs along the eastern shore of the Glashaboy Estuary, an inter tidal mudflat. The site is well vegetated on sloped terrain with mixed broad-leaved woodland. The opposing valley wall is also sloped and well wooded. There is a hotel complex on the western side of the valley. Gaps in the woodland allow limited views toward the site from the hotel and its grounds. The R639 Glanmire Road runs north south along the western shore of the estuary, together with the Glanmire to City GL1 Primary Cycleway and amenity walkway running along the shoreline.

The Glashaboy River runs from north to south down a narrow valley with severe slopes with good woodland cover on either side. The historic Glanmire Village is on the northern shore of the estuary and extends up to Glanmire Bridge. The Fountains, a dwelling sits on the riverbank opposite the village with extensive wooded grounds on the north facing slope rising to and bounding with the Dunkettle lands. The woodland screens views between the village and the residentially zoned lands on site.

Figure 5-7 The Glashaboy Estuary as seen from the Dunkettle Roundabout

North of Glanmire Bridge the valley floor is under development as an amenity and recreation area. Greenway: GL-GW 1 is proposed to run three kilometres upriver from the bridge to connect with the existing town park and the settlement beyond. The L2998, Dunkettle Road runs southeast from Glanmire Bridge and rises in a trough. The GL U6 a 2.3km long, Primary Route Cycleway runs as a shared pedestrian/cycleway along the north side of this road. The site connects with the Dunkettle Road via a narrow laneway which slopes down along the east side of the Fountains property.

On the east side of the lane there is a 0.93hectare, construction site with planning permission for a residential development (***Residential development at Glanmire Lodge, Reg. Ref. No. 20/39719)***. The permitted dwellings are to back on to the laneway.

The next property is to the east and adjoining the northern site boundary is the Rectory (2.57hectares). This is currently registered as Derelict Site 401. The property has an original brick built Victorian residence and Gate Lodge. The site is now an abandoned construction site with a large unfinished Residential Care Home (***Nursing home and childcare facility at the former Glanmire Rectory, Reg. Ref. No.'s 19/38900 and 21/40423***).

On the northern side of the road the terrain is steeply sloped with woodland cover and there are four detached dwellings set within mature gardens mid slope. On higher ground to the northeast a plateau area is occupied by Ballinglanna House and the Ballinglanna Residential Development. The lands from the L2998 up to the development are set out as open spaces, landscaped with extensive tree and shrub plantings.

Northeast of the site there is a junction on the L2998 Dunkettle Road with connecting roads serving the Ballinglanna Development and allowing further connections to the eastern side of the Glanmire-Riverstown settlement via Fernwood. There is a site reserved for the construction of a School on the corner of the junction. The existing Caherlag Road is to be truncated and diverted to meet the new distributor road. This connecting road is to climb from the distributor to reconnect with the Caherlag Road and there will be views toward the Dunkettle lands from this route corridor whilst the school site remains undeveloped.

A group of dwellings are situated on both sides of the Dunkettle Road south of the Rectory Gate Lodge. Two of these Woodlands (T45CH68) and Broomhill (T45WR80) are on extensive mature landscaped grounds with rear gardens adjoining the Dunkettle lands. On the opposing hill there is a large waterworks complex screened with coniferous tree planting.

South of Broomhill the Dunkettle Lands have a 101metre road frontage on to the Dunkettle Road. Due to a recent Dunkettle Road upgrade project, the roadside boundary wall and treeline have been removed with the small field area adjoining the road used as a construction compound for the duration of the project which is now complete. The boundary with the road is between Broomhill and a terrace of five cottages fronting east, directly onto the roadside. As part of the road upgrade a section of lands owned by the applicant has been provided to give shared parking to these dwellings. This is located at the north end of the terrace.

South of the terraced housing there is an access to the Woodville Residential Development. This development is set on lands extending west off the Dunkettle Road. The lands indent the applicants' property. There are significant treelines and some woodland within the Woodville property giving good screening between the existing dwellings and the residentially zoned Dunkettle Lands. The most western section of the Woodville property is zoned residential but remains undeveloped.

The northern, western, and southern boundaries enclosing this area are sod and stone walls with mature treelines shared with the Dunkettle lands. Within Woodville is a small section of a woodland that extends on to a hillside within the Dunkettle lands. This woodland restricts views from Woodville to the northwest. There are views from Woodville to a flat hilltop area extending north from the Avenue in Woodville. This area forms part of the Dunkettle lands but it is not included in any current plans for development as access from the main development area is challenging. This boundary in Woodville has a section of stone walling together with a treeline with views northeast across

Dunkettle lands to the Ballinglanna development. Along the southern boundary of Woodville twelve dwellings have rear and side gardens onto a shared boundary wall with a mature treeline.

South of Woodville the residentially zoned Dunkettle lands bound with four dwellings, two of these; Mirabel (T45CV62) and Tur Fhonn (T45XH04), back on to the property and two; Ashleigh House (T45TX89) and Woodlane (T45P761) have side gardens with the development site. Ashleigh House together with four other detached dwellings are accessed off the lane which is part of the applicants Property. The lane is also providing an agricultural access to the lands.

The Dunkettle House Demesne has a road frontage on to the Dunkettle Road from the laneway to a point south of the original entrance gateway into the demesne. This road boundary is well vegetated with mature trees and shrub trees. The southeast corner of the Dunkettle property is indented with three detached dwellings each with rear gardens adjoining the parkland area of the demesne; Cois Laoi (T45XN24), Sherwood (T45PD28 and Ballinderry House (T45KX73). These dwellings, adjoining the study area are not owned by the applicant, are accessed off a short section of road. The road is shared with the Inter-Urban IU1 segregated Cycleway which runs along the southern side of the parkland before turning north to pass these dwellings.

The estuary shore is occupied by mixed broad-leafed woodland covering an area of c.7hectares These are set on an increasing severe slope; flat at the southwest corner and rising progressively toward the north end of the estuary. These form a dense screen along the westside of the development lands. The woodland has the zoning objective ZO17 Landscape Preservation.

Dunkettle House is a historic period dwelling built between 1780 and 1800, with later additions. There is a walled garden to the rear of the house, an entrance from the Dunkettle Road with a Gate Lodge. The house overlooks a picturesque landscape in the Romantic Landscape Movement style. This includes a Ha-Ha, a concealed wall south of the house front a visual trick which renders invisible, the separation between the pleasure gardens immediate to the house and the surrounding parkland where livestock graze. The parkland would originally have swept down to the shore of Lough Mahon. This is no longer the case as traffic infrastructure has gradually encroached with highway, train and cycle paths now occupying the foreshore space. Dunkettle House retains an excellent vista to the south and southwest over Lough Mahon and the Lee River to the southwest.

5.6.3 Historic Landscape

5.6.3.1 Eighteenth century designed landscapes

The existing demesne landscape associated with Dunkettle House is essentially a creation of the eighteenth century. The pre-existing landscape of earlier times was modified to create the eighteenth-century landscaper's view of the ideal arcadian setting for a country house. It had become the fashion for eighteenth century British (and Irish) aristocrats to visit Italy on 'the grand tour'. The travellers returned home inspired as much by the beauty and harmony of the Italian landscape as by its architecture. The paintings of Claude Lorraine, which were extremely popular at the time, reinforced this vision of an ideal Arcadian landscape. In Britain 'Capability' Brown (1716-1783) was the great exponent of the new fashion for landscape gardening and in Ireland, particularly his ideas persisted well into the nineteenth century. Essentially the ideal Arcadian landscape was a subtle combination of beauty with agricultural utility; 'beauty with utility' being the maxim of the movement.

The value of agricultural improvements was not lost for the sake of any aesthetic gain. These values were manifested in the positioning of a classical mansion within a seemingly natural landscape in which deciduous trees framed the building and rivers, while cattle and sheep could graze almost up to the doorstep. Views from the house over open 'parkland' in which free-standing trees were dotted here and there were essential. A lake or river was desirable and craggy rocks a bonus. A belt of woodland generally surrounded the demesne.

Carriage drives laid out to take the shortest course to the house were abandoned in favour of broad curving sweeps to maximise the panorama. Not only did straight lines offend the aesthetic, but also views of the house and park were obtained from the side windows of a carriage (on straight drives views were the prerogative of the coachman sitting up-front). According to Edward Malins and the Knight of Glin (1976, 113), the shores ’of landlocked Cork Harbour were ideal for siting eighteenth-century houses and grounds – sunny, sheltered, on high ground and frostless.’

5.6.3.2 The historic landscape at Dunkettle

Historically the bulk of the Phase1 and Phase 2 LRD lands were not associated with Dunkettle House until the twentieth century.

The first edition of the Ordnance Survey (OS) map of 1844-45 (see below) shows Dunkettle as a typical estate landscape characterised by woodland fields and open parkland with specimen trees and deciduous trees.

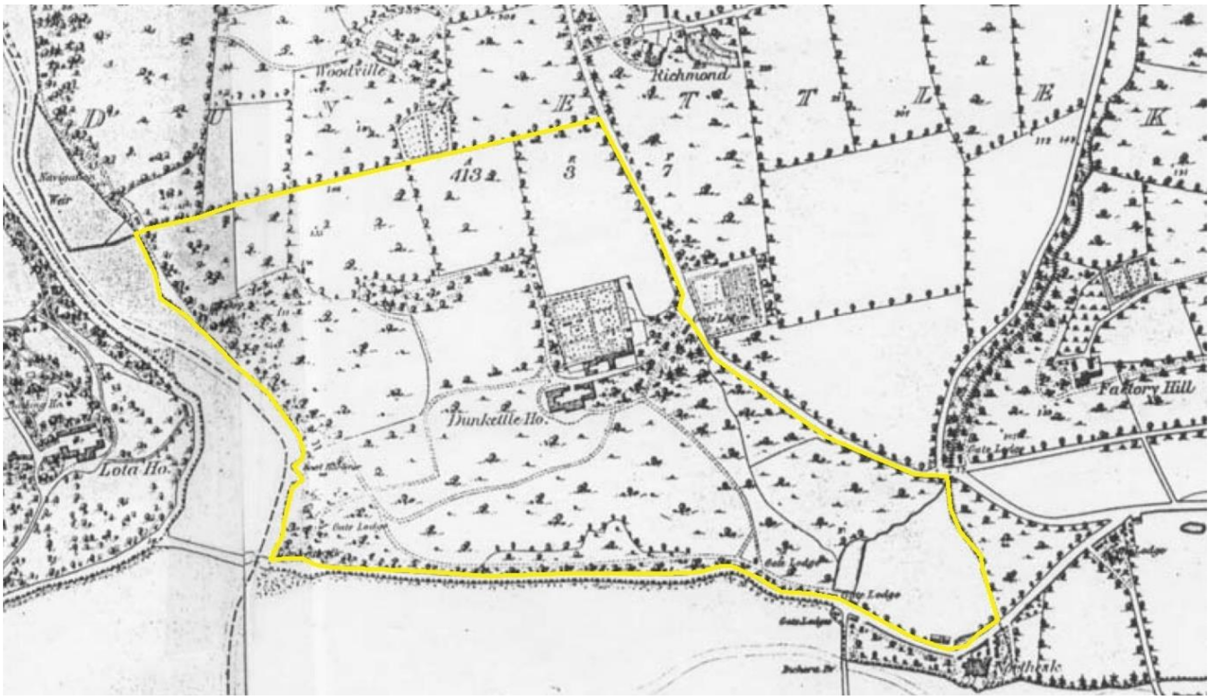

Figure 5-8 Extract from the 1842 (1st) edition of the OS 1:10,560 ‘Six-Inch’ map sheets (showing probable extent of parkland originally associated with Dunkettle House). Note the bulk of the Phase 1 LRD lands and a small amount of the Phase 2 LRD lands were not historically associated with Dunkettle House

First edition OS map shows a narrow ribbon of wooded parkland surrounding the mansions and villas of the wealthy, which lines the banks of the River Lee and its tributary the Glashaboy (or Glanmire) River. This wooded parkland presents a sharp contrast to the treeless agricultural landscape lying on the higher ground of Lotamore and Banduff Townlands to the northwest. This vivid contrast was noted and commented upon by a number eighteen-century travel writers visiting Ireland, including Arthur Young who visited the area in 1780 (John Cronin & Associates, 2004, 14-15). The section of the wooded parkland which lies to the east of the Glashaboy River and the west of the north-south road immediately to the east of Dunkettle House appears to the shared by both Dunkettle House and Woodville House.

Conifers are shown to the east of Dunkettle and in stands to the northwest and west in the first edition OS map. The landscape to the south of the house is still dominated by the 'natural style' of the eighteenth-century landscape designer to this day. Straight lines were confined to the walled garden as shown on the first edition OS map while the avenue and woodland walks are serpentine.

The pattern of rectangular fields to the north of Dunkettle House and to the west and north of the earlier Woodville House probably pre-date the designed landscape immediately associated with Dunkettle House and is more likely associated with the agricultural economy of the area. It is difficult to distinguish from documentary and cartographic sources or from field-walking, the precise extent of the original attendant grounds (including agricultural lands) of Dunkettle House. What is clear, however, is the extent of the parkland associated with Dunkettle House in the mid-nineteenth century. The probable extent of this parkland and the immediate attendant grounds is illustrated in the Figure above.

While the fortune of Abraham Morris was based on trade in the boom economy of the eighteenth century rather than on agriculture (Rynne 1999), nevertheless, Dunkettle House and estate were devised to impress an emulate the traditional estates whole economy was dependant on agriculture and revenue from land ownership. On estates like Dunkettle, agriculture was largely geared towards the domestic economy. Walled gardens and orchards were intended to cater for all the culinary needs of a 'country house' and its staff. Sufficient agricultural land was required for dairy cows, beef cattle, sheep and horses to service the needs of the house and its dependents, but a surplus was not critical for its economy. The romantic Arcadian landscape of eighteenth-century ideals was both functional and aesthetic without the need to succumb to the pressures of 'ugly necessity'.

In the planning of the demesne for both Dunkettle House and Woodville House, the removal of existing field boundaries and fences would have been considered acceptable and in fact often necessary if they were considered unsuitable in terms of the new landscape design. This often involved the wholesale removal (above ground level at least) of any ancient monuments such as earthworks that were present on site. It is noted that there are few surviving monuments on the north or south banks of Cork Harbour, an area where eighteenth and nineteenth century estate landscapes dominated.

By the early twentieth century, agricultural uses were beginning to encroach upon the parkland associated with Dunkettle House (see Figure below - the second edition of OS map, 1902). The area of parkland is, therefore, more clearly confined to the area to the south of Dunkettle House (i.e. the shaded grey area with trees to the south of the house on the 1902 OS map) while the fields to the north of the house and walled garden (i.e. the lands that make up the bulk of the LRD Phase 1 and Phase 2 development) are clearly of agricultural use. According to Spendiff (2002, 23), the estate continued throughout most of the twentieth century as an agricultural holding of approximately 120 acres).

Figure 5-9 Extract from the 1902 (2nd) edition of OS mapping

5.6.4 Views & Prospects

Beyond the streetscape of the city centre, Cork City is most appreciated by residents and visitors from its waterfront and hilltop locations. The Cork City Development Plan 2022-2028 identifies the views and prospects which need conservation and protection within the city. Cork County Development Plans also identify prominent locations surrounding the city and harbour and give them protection working with the city to ensure that hilltops, valley walls and ridges are protected to retain the landscape character beyond the city limits.

Dunkettle is at a key nodal point within the city. It is a gateway location with the M8 arriving from the north, the N25 entering the city from the east and where the harbour narrows and enters the River Lee. The Glanmire Road R639 is a key movement corridor within the city at it southern end it emerges into the Upper Harbour and as one travels north it arrives at the historic village of Glanmire. This route is designated as Scenic Route HVP5. From the Dunkettle Roundabout to Glanmire the R639 runs along the western shore of the Glashaboy Estuary. This section of the road has recently been upgraded with segregated pedestrian and cycleway paths on the waterfront setting the vehicular traffic back from the shore.

Route HVP5 continues east out of Glanmire and rises to run along the ridge of the valley in Caherlag and Glounthaune taking the traveller from the enclosed space of the estuary into the narrow valley then up to a ridge with open views out over the harbour, going from sea level to hilltop within a few kilometres. The terrain gives character and contrasting views in quick succession in Cork. The hillsides are covered in woodland or mature woodland gardens. Dotted into the woodland and elevated on the valley walls are a series of period dwellings; Fort William, Lotabeg, Lotamore, Lota Park, Lota House and Dunkettle House. Father Mathew Tower sits on the hilltop in Caherlag beyond the city. Across the river Blackrock Castle sits prominently on the waters-edge with period dwellings perched above the river to the west of it and further back more period dwellings set within mature woodland gardens. On the shoreline there are key waterside amenity areas with the Blackrock Greenway to the east of the castle on the Lough Mahon Shore and the tree lined Marina Walk to the east upriver.

5.7 The ‘Do Nothing’ Scenario

If no development occurs on the Dunkettle lands the residential zoned area will remain as woodland and or in agricultural use. The historic House will remain a residence, it has had a restoration project undertaken to secure it into the near future. The other cultural heritage features will continue to decay; Gate Lodge, Farm Courtyards, and walled garden. The ancient woodlands, field tree lines and parkland trees will deteriorate in the absence of conservation management. There are invasive plants in the woodlands and if these remain unchecked the biodiversity value of the woodlands will diminish.

If the new residential neighbourhood envisioned by Cork City Council for these lands proximate to the city centre and well connected to existing and proposed infrastructure are not realised, then other less accessible and connected locations for housing development may need to be zoned for development or the existing housing crisis will deteriorate further.

5.8 Potential Significant Effects

5.8.1 Construction Phase

There are no significant negative effects anticipated during the construction of the Dunkettle development. The most significant negative effect will be moderate. As with all construction sites, construction adds temporary machinery and disruption to terrain and soils with earth remodelling. Where existing trees are removed from within development sites, construction activity further exposed. Where there is road frontage, frontage with existing private properties and proximity to trees that need to be protected, there will need to be security fencing. This is a temporary, negative visual and landscape character impact.

Dunkettle House and parkland remain outside the development area except for the western edge area where lands are proposed to accommodate the greenway connection to the inter-urban cycleway. This is distant from the house and at a lower elevation. Protective fencing will be required to secure the parkland from construction activity. The construction of the southern access road into the residential development area will utilise the existing laneway route along the north side of the existing walled garden. Protection of the kitchen garden walls will be necessary. Dunkettle House and the parkland are at a remove from these works due to the presence of the kitchen garden.

In the case of the Dunkettle development there is very minor exposure to view with only a short section of road frontage on to the Dunkettle Road and two narrow laneway access points. The site is very well concealed. In addition, the adjacent Ballinglanna development has been ongoing for the last 10years. The existing construction activity will transfer from Ballinglanna to the more concealed Dunkettle Lands where negative visual will be reduced.

Consideration is being given to the provision of a second access point to service the zoned lands within LRD Phase 2. An existing southern access point from the L2998 will require the provision of a new section of roadway that may be accommodated within a portion of the former walled garden associated with Dunkettle House. The planned intervention is necessitated by the lack of space available to the north of the walled garden between its northern wall and existing houses to facilitate a road, along with associated cycling and pedestrian facilities that would meet minimum safety requirements. The space available is also constrained by the need to maintain access via the existing laneway which serves four houses to the north of the lands. The potential intervention will give rise to a negative impact on the immediate setting of Dunkettle that will require careful mitigation and design. The detail and extent of the intervention will be refined and will be fully detailed and assessed in the LRD Phase 2 application and the landscape and visual impact of the intervention will be fully assessed. At present, there is the potential for the LRD Phase 2 to give rise to a negative impact on the immediate setting of Dunkettle House but not on the wider landscape setting. Chapter 15 (Cultural Heritage) of the EIAR deals with this potential impact.

5.8.2 Operational Phase

The highest impacts in the operational phase will be from visual receptors (residential) located on lands sharing boundaries with the Dunkettle lands. The impacts will be slight to moderate negative, as described. Other receptors will experience slight to Imperceptible Negative visual impacts, as the existing woodland screening will be retained and reinforced, and these locations are at more of a remove from the development site.

The operation phase of the proposed Phase 1 development and the residential element of LRD Phase 2 will have the potential to result in permanent, indirect, residual adverse effects of a visual nature on the setting of Dunkettle House and this indirect effect is predicted to be negligible in significance.

Post construction it will be important that Dunkettle House complex and parkland area appropriately secured and fenced, reflecting use of the lands, at present the house is in use as a single-family residence.

5.8.3 Cumulative Effects

Cumulative Impact is the assessment of the gradual increase in impact due to the proposed development in the context of the site and its environs, existing construction site activity and potential future development. What visual changes to the landscape and the potential change to the rural and suburban setting resulting from recent and proposed development.

- The construction of the Dunkettle Interchange has been under construction for many years and is now complete.
- The Glanmire road upgrade scheme was undertaken in recent years involving works to the Dunkettle Road.
- The Glanmire to City Centre Cycle Route Phase I has recently completed involving the provision of road, cycleway, and pedestrian upgrades to the road on the western side of the estuary.
- The Ballinglanna development has been under construction for a decade and is now in its final phase of construction.
- Construction works have commenced on a site adjoining the Dunkettle lands with permission for a residential development
- There is an existing abandoned construction site adjoining the Dunkettle Lands on the former Rectory Lands with a large unfinished Care Home structure and a Creche.
- The Dunkettle lands are zoned to provide for a new residential neighbourhood. There is a further portion of land on the adjoining Woodville development which could become accessible via the Dunkettle lands development. This will complete the new neighbourhood as zoned by Cork City Council.
- A site for a new school is positioned on the Dunkettle Road and may be developed.

All the projects relate to lands within and adjoining the southeast quarter of Glanmire. The transport infrastructure projects will all have been completed in advance of the commencement of the new neighbourhood at Dunkettle. The Interchange has had a major negative visual impact on the landscape to the southeast of the Dunkettle lands. In its operational phase its impact may begin to reduce as tree landscaping in and around the junction infills green areas. The Glanmire Roads Upgrade Scheme has seen the upgrade of the Dunkettle Road L2998 from a narrow country road to a road with improved sightlines, junctions and the provision of pedestrian and cycle facilities. The Glanmire Road R639 is post construction and will contribute positively to Glanmire. The provision of a new pedestrian and cycle route along the estuary will have a Positive Impact as it enhances the amenity value of the existing blue and green infrastructure; the estuary, the Glanmire and the Dunkettle Shore Woodlands.

The Ballinglanna residential development is nearing completion, and this will further improve the road network with a new route connecting the Dunkettle Road to Brooklodge in the northeast of the town together with an upgrade to the Caherlag Road. The road upgrades are in operation and providing a Positive Impact delivering a more coherent townscape. The southwest area of Ballinglanna has tree landscaping that is now beginning to infill and is having a Positive Impact.

The residential development site fronting on to the Dunkettle Road is not extensive, but it will have a Negative Impact in its immediate vicinity in the construction phase as it is exposed to the Dunkettle Road. Its impact post construction will depend on the degree to which the existing mature tree vegetation on its east and south boundaries is retained. The abandoned Residential Care Home construction site is having a major Negative Impact. This is a large unfinished structure sitting very prominently in the landscape directly on the Dunkettle Road and in full view from Church Green, Ballinglanna. These sites sitting next to each other have a Negative Cumulative Impact.

The final Phase of the development on the Ballinglanna lands is the school site on the Dunkettle Road. This will have a Negative Cumulative Impact in the construction phase if the abandoned Residential Care Home remains derelict or is incomplete as a construction project. This area of the Dunkettle Road has been the focus of numerous construction projects over many years, prolonging that with a further project albeit smaller in nature is a Cumulative Impact.

The development of the New Neighbourhood on the Dunkettle and Woodville lands will have a Negative Cumulative Impact in the construction phases as the presence of construction activity on the road network and in the landscape will continue for more years to come. This will see areas under construction shifting from north to south. The cumulative effect will largely depend on the success of the woodland and tree line conservation within the Dunkettle lands. As the construction zone area relocates further south the Negative Impact will become more restricted to immediate residential properties along the Dunkettle Road. The Dunkettle lands benefit from a much greater degree of screening than the construction of any of the other projects discussed. The hilly terrain, existing dwelling with mature gardens fronting on to the Dunkettle Road, the existing Oak Woodlands, tree lines and the Dunkettle Demesne parkland to the south of the lands all contribute to conceal the residential zoned lands except from immediate neighbours. This reduces the potential for Cumulative Impact. Once the three connections completed on to the Dunkettle Road and the link to the Inter Urban Cycleway the development lands will have truly little exposure to external viewpoints.

Upon completion of the range of projects there will be a Positive Cumulative Impact as an urban landscape will be achieved with more coherence to the east and north of the site. To the west and south; Glashaboy Estuary and Lough Mahon will not see a Cumulative Impact due to the Cork City Council objective to preserve and enhance the existing woodland and parkland landscapes as existing. The extensively wooded valley walls and the estuary and valley terrain will remain the dominant landscape features giving the Cork City and Glanmire their distinctive landscape character.

It is considered that the cumulative impact on landscape character or views because of planning permissions being granted for the proposed development is negligible.

5.8.4 Summary

The following Table summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 5-1 Summary of Construction Phase Likely Significant Effects in the absence of mitigation

Viewpoint	Location	Sensitivity	Magnitude of Change	Construction Stage Significance & Quality	Cumulative Effects
1	Glanmire Village Dunkettle Road L2998 Eastbound Scenic Route HVP5	High	Low	Significant / Moderate Negative / Adverse	Medium
2	Church Green, Ballinglanna, Glanmire	High	Low	Not Significant / Imperceptible Neutral	Neutral
3	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Minor Slightly Negative / Adverse	Low
4	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Moderate Slightly Negative / Adverse	moderate
5	Caherlag Road, Glanmire, Scenic Route HPV5	High	Low to Medium	Significant / Minor Slightly Negative / Adverse	Low
6	Dunkettle Road L2998, Glanmire	Medium	High	Significant / Major Negative / Adverse	Neutral
7	The Beeches, Woodville, Dunkettle Road, Glanmire.	High	Medium	Significant / Moderate Negative Adverse	Neutral
8	Bankside, Dunkettle, Glanmire, T45HF74	High	High	Significant / Major Negative / Adverse	Neutral
9	Roundabout Dunkettle Road L2998	Low	None	Neutral	Neutral
10	Dunkettle Interchange	Low	Low	Not Significant / Negligible Neutral	Neutral
11	Inter Urban Cycleway IU1	Moderate	None	Neutral	Neutral
12	Dunkettle Roundabout	Low	Low	Not Significant / Minor Slightly Negative / Adverse	Neutral
13	Blackrock Greenway	High	Low	Significant / Negligible Slightly Negative / Adverse	Low
14	Blackrock Castle, Blackrock, Cork	High	None	Not Significant / Negligible Neutral	Neutral
15	Glanmire Road R639, Scenic Route HVP5	High	High	Significant / Major Negative / Adverse	Neutral

Viewpoint	Location	Sensitivity	Magnitude of Change	Construction Stage Significance & Quality	Cumulative Effects
	Glanmire to City Centre Cycleway				
16	Harbour View, Burkes Hill, Tivoli, Cork T23F9C8	High	Medium	Significant / Major Negative / Adverse	Low
17	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
18	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
19	Church Hill, Glanmire Near Eircode T45VY88	High	Low to Medium	Significant / Moderate Negative / Adverse	Low
20	Castlejane Woods, Glanmire Near Eircode T45X504	High	Medium	Significant / Moderate Negative / Adverse	Low

The following Table summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 5-2 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Viewpoint	Location	Sensitivity	Magnitude of Change	Operational Stage Significance & Quality	Cumulative Effects
1	Glanmire Village Dunkettle Road L2998 Eastbound Scenic Route HVP5	High	Low	Significant / Negligible Positive / Beneficial	Low
2	Church Green, Ballinglanna, Glanmire	High	Low	Not Significant / Negligible Neutral	Neutral
3	Church Green, Ballinglanna, Glanmire	High	Medium	Not Significant / Negligible Slightly Negative	Low
4	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Minor Slightly Negative	Neutral
5	Caherlag Road, Glanmire, Scenic Route HPV5	High	Low to Medium	Significant / Negligible Slightly Negative	Low
6	Dunkettle Road L2998, Glanmire	Medium	High	Significant / Moderate Slightly Negative	Neutral
7	The Beeches, Woodville, Dunkettle Road, Glanmire.	High	Medium	Significant / Moderate Slightly Negative / Adverse	Neutral
8	Bankside, Dunkettle, Glanmire, T45HF74	High	High	Significant / Minor Beneficial / Positive	Neutral
9	Roundabout Dunkettle Road L2998	Low	None	Neutral	Neutral
10	Dunkettle Interchange	Low	Low	Not Significant / Imperceptible	Neutral
11	Inter Urban Cycleway IU1	Moderate	None	Neutral	Neutral
12	Dunkettle Roundabout	Low	Low	Not Significant / Negligible Neutral	Neutral
13	Blackrock Greenway	High	Low	Not Significant / Negligible Neutral	Neutral
14	Blackrock Castle, Blackrock, Cork	High	None	Not Significant / Imperceptible Neutral	Neutral
15	Glanmire Road R639, Scenic Route HVP5	High	High	Significant / Moderate Negative / Adverse	Neutral

Viewpoint	Location	Sensitivity	Magnitude of Change	Operational Stage Significance & Quality	Cumulative Effects
	Glanmire to City Centre Cycleway				
16	Harbour View, Burkes Hill, Tivoli, Cork T23F9C8	High	Medium	Significant / Moderate Negative / Adverse	Low
17	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
18	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
19	Church Hill, Glanmire Near Eircode T45VY88	High	Low to Medium	Not Significant / Negligible Slightly Negative / Adverse	Low
20	Castlejane Woods, Glanmire Near Eircode T45X504	High	Medium	Significant / Moderate Slightly Negative / Adverse	Low

5.9 Mitigation Measures

5.9.1 Incorporated Design Mitigation

From the outset of the design process, site assessment and analysis has been undertaken to identify significant effects. Responding to those with the integration of mitigation measures addressing those potential Negative Visual and landscape impacts. Cork City Council's zonings on the Dunkettle lands mitigate by avoidance restricting the proposed residential development to within the agricultural field areas of the site. In the Cork City Development Plan 2022-2028, the objective is to preserve the existing heritage, green and blue biodiversity assets. This gives protection to existing pNHA designated Woodland, the Historic Dunkettle House complex and the Parkland.

The residential development will have interactions with the pNHA woodlands, the estuary with its SPA designation and an area of the parkland. Mitigation by avoidance is provided with the site layout stepped back from the woodland edge. In LRD Phase 1 a greenway for pedestrians and cyclists is proposed along the west side of the site (within the western portion of the historic demesne of Dunkettle House) will not give rise to negative impacts on historic landscape quality or the integrity of the setting of Dunkettle House, a protected structure. This pushes the development back from the estuary and the woodland and this reduces the potential Negative Impact on the estuary and woodland avoiding diminishing its conservation status post development. Dwellings in all cases front on to the woodland area and this creates a buffer space. Within the residential zoned area mitigation by avoidance is proposed with the retention of existing mature tree lines where possible.

Prevention mitigation strategies include the proposed exclusion of future residents from the pNHA woodland areas and thus keeping the eastern shore of the estuary a quiet zone. This will prevent the degradation of the conservation status of the PNHA and SPA areas.

The scale of the buildings proposed has been carefully considered in terms of design and location so that this large-scale residential development into the existing landscape with minimum exposure from external viewpoints.

Strategies to reduce Negative Impact include the minimisation of tree and hedgerow removal from the site. These are retained in most areas apart from the northern Phase I area of the development. This is achieved by designing one main route through the development that connects from north to south through each field area. The road network within each of the field areas connects to this through route with the mass of housing reduced to a series of pockets of development within the mature tree lines and woodland.

Negative Impact is reduced through the decision to retain the existing 'Woodville' oak woodland on site which is on an area zoned residential. Proposing bat friendly lighting along the greenway on the woodland edge is also an important mitigation measure as the woodlands are an important commuting and foraging corridor for bats. The reduction in lighting intensity along the woodland edge will in turn minimise light pollution in the estuarine area and make the presence of the residential development less intrusive at night from the western shore of the estuary.

There are two intrusions in the pNHA woodlands to provide for stormwater outfalls to the estuary; In the north the outfall follows the route of the historic walk path. The wayleave is 4metres wide and the path is narrow on steep terrain. It does require some loss of trees and disruption. In the south the route is taken where overhead lines already cross over the woodland, the position of the outfall requires the removal of diseased and dead elm and ash trees. Some woodland trees are to be removed in the northwest corner of the site to accommodate a stormwater attenuation pond. Mitigation measures to offset these identified Negative Impacts include the proposal to place the woodland areas into management with the sole objective of conservation. This will be done within the structure and guidance of the Native Woodland Conservation Scheme. The woodland areas are to be managed to ensure their conservation status is maintained and improved. The buffer zone along the woodland is to be planted with appropriate woodland edge vegetation to increase it biodiversity value.

The open space areas across the development (phase I & II) will feature native Irish Oaks integrating the woodland ambience into the development. Where earth remodelling works are undertaken to provide vehicular access from the Dunkettle Road in the north of the site. The regraded hillside will be planted under the Native Woodland Conservation Scheme, and this will compensate for the loss of existing tree lines by extending the 'Woodville' woodland and connecting it with the trees retained near to the Dunkettle Road. Extensive street tree planting will also occur across all phases of the development.

5.9.2 Construction Phase Mitigation

During the construction phase mitigation will be in place with the provision of tree protection fencing to all woodland areas and to treelines proposed for retention. The Parkland and Heritage assets in the southern area of the site are similarly to be excluded from any construction activity using secure protection fencing. The commencement of woodland management under the Native Woodland Conservation Scheme should begin in tandem or before the construction of the development. Where possible proposed tree planting should be undertaken as early as possible in the construction phase to allow for the vegetation to develop in advance of the construction and occupation of dwellings.

When the proposed southern access road is under construction, extra care will need to be taken in the vicinity of the Walled Garden and the landscape areas closer to the parkland. The Construction Management Plan will include a specific section on works to / in the vicinity of the walled garden and other protected structures on site. This will be written in consultation with the project conservation architect.

Works to road frontage areas on the Dunkettle Road should be undertaken at an early stage in the appropriate phase to minimise Negative Impact.

Site hoarding, where natural screening is not available, will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to.

5.9.3 Operational Phase Mitigation

No significant visual impacts are expected during the operational phase of the development and therefore no mitigation is required.

The woodland management should be ongoing under the Native Woodland Conservation Scheme and maintenance of the newly landscaped areas should be ongoing with an emphasis on broadening the biodiversity value across the Dunkettle lands.

5.10 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

5.10.1 Construction Phase

5.10.1.1 Landscape

No residual impacts are anticipated once mitigation measures have been implemented. Construction works will be confined to existing open field areas with the surrounding woodland and treelines protected.

5.10.1.2 Visual Impact

No residual impacts are anticipated once mitigation measures have been implemented.

Mitigation will reinforce the protection of the existing woodland and treelines, and these, or hoarding, provide effective visual screening to the development construction area.

5.10.2 Operational Phase

5.10.2.1 Landscape

No residual impacts are anticipated once mitigation measures have been implemented. The scale and distribution of structures, roads and cycleways in the site layout is entirely confined to existing open field areas leaving the surrounding woodland and treelines protected.

5.10.2.2 Visual Impact

No residual impacts are anticipated once mitigation measures have been implemented. The scale and distribution of structures, roads and cycleways in the site layout is entirely confined to existing open field areas leaving the surrounding woodland and treelines protected.

Within the residential neighbourhoods proposed mitigation incorporated into the design, including new woodland, street and open space area tree planting, is designed to reinforce the envelope of existing woodland and trees into which the completed development will sit.

5.10.3 Summary of Post-mitigation Effects

The viewpoints are assessed in the Table below during the construction phase of the proposed development, following the application of mitigation measures.

This assessment should be read in conjunction with the baseline photos (summer and winter) and the verified views presented in a separate standalone booklet to this EIAR - *Verified View Photomontages* prepared by G-Net 3D, with the 20 no. locations identified in Figure 5-1 of this Chapter.

Table 5-3 Summary of Construction Phase Effects Post Mitigation

Viewpoint	Location	Sensitivity	Magnitude of Change	Construction Stage Significance & Quality	Cumulative Effects
1	Glanmire Village Dunkettle Road L2998 Eastbound Scenic Route HVP5	High	Low	Significant / Minor Slightly Negative / Adverse	Medium
2	Church Green, Ballinglanna, Glanmire	High	Low	Not Significant / Imperceptible Neutral	Neutral
3	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Minor Slightly Negative / Adverse	Moderate
4	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Moderate Slightly Negative / Adverse	Moderate
5	Caherlag Road, Glanmire, Scenic Route HPV5	High	Low to Medium	Significant / Minor Slightly Negative / Adverse	Low
6	Dunkettle Road L2998, Glanmire	Medium	High	Significant / Moderate Negative Adverse	Neutral
7	The Beeches, Woodville, Dunkettle Road, Glanmire.	High	Medium	Significant / Moderate Negative / Adverse	Neutral
8	Bankside, Dunkettle, Glanmire, T45HF74	High	High	Significant / Moderate Negative / Adverse	Neutral
9	Roundabout Dunkettle Road L2998	Low	None	Neutral	Neutral
10	Dunkettle Interchange	Low	Low	Not Significant / Negligible Neutral	Neutral
11	Inter Urban Cycleway IU1	Moderate	None	Neutral	Neutral
12	Dunkettle Roundabout	Low	Low	Not Significant / Minor Neutral	Neutral
13	Blackrock Greenway	High	Low	Significant / Negligible Neutral	Neutral
14	Blackrock Castle, Blackrock, Cork	High	None	Not Significant / Imperceptible Neutral	Neutral
15	Glanmire Road R639, Scenic Route HVP5	High	High	Significant / Major Negative / Adverse	Neutral

Viewpoint	Location	Sensitivity	Magnitude of Change	Construction Stage Significance & Quality	Cumulative Effects
	Glanmire to City Centre Cycleway				
16	Harbour View, Burkes Hill, Tivoli, Cork T23F9C8	High	Medium	Significant / Major Negative Adverse	Neutral
17	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
18	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
19	Church Hill, Glanmire Near Eircode T45VY88	High	Low to Medium	Significant / Moderate Slightly Negative / Adverse	Low
20	Castlejane Woods, Glanmire Near Eircode T45X504	High	Medium	Significant / Minor Slightly Negative / Adverse	Low

The viewpoints are assessed in the Table below during the operational phase of the proposed development, post mitigation.

Table 5-4 Summary of Operational Phase Effects Post Mitigation

Viewpoint	Location	Sensitivity	Magnitude of Change	Operational Stage Significance & Quality	Cumulative Effects
1	Glanmire Village Dunkettle Road L2998 Eastbound Scenic Route HVP5	High	Low	Not Significant / Minor Positive / Beneficial	Low
2	Church Green, Ballinglanna, Glanmire	High	Low	Not Significant / Imperceptible Neutral	Neutral
3	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Negligible Neutral	Neutral
4	Church Green, Ballinglanna, Glanmire	High	Medium	Significant / Minor Neutral	Neutral
5	Caherlag Road, Glanmire, Scenic Route HPV5	High	Low / Medium	Not Significant / Negligible Neutral	Neutral
6	Dunkettle Road L2998, Glanmire	Medium	High	Significant / Minor Positive beneficial	Neutral
7	The Beeches, Woodville, Dunkettle Road, Glanmire.	High	Medium	Significant / Minor Slightly Negative / Adverse	Neutral
8	Bankside, Dunkettle, Glanmire, T45HF74	High	High	Significant / Minor Positive Beneficial	Neutral
9	Roundabout Dunkettle Road L2998	Low	None	Neutral	Neutral
10	Dunkettle Interchange	Low	Low	Neutral	Neutral
11	Inter Urban Cycleway IU1	Moderate	None	Neutral	Neutral
12	Dunkettle Roundabout	Low	Low	Not Significant / imperceptible Neutral	Neutral
13	Blackrock Greenway	High	Low	Not Significant / Negligible Neutral	Neutral
14	Blackrock Castle, Blackrock, Cork	High	None	Not Significant / Imperceptible Neutral	Neutral
15	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	High	Significant / Minor Negative / Adverse	Neutral
16	Harbour View, Burkes Hill, Tivoli, Cork T23F9C8	High	Medium	Significant / Minor Neutral	Neutral

Viewpoint	Location	Sensitivity	Magnitude of Change	Operational Stage Significance & Quality	Cumulative Effects
17	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
18	Glanmire Road R639, Scenic Route HVP5 Glanmire to City Centre Cycleway	High	None	Neutral	Neutral
19	Church Hill, Glanmire Near Eircode T45VY88	High	Low / Medium	Not Significant / Negligible Slightly Negative	Low
20	Castlejane Woods, Glanmire Near Eircode T45X504	High	Medium	Significant / Minor Slightly Negative	Low

5.10.4 Cumulative Residual Effects

No cumulative residual impacts are anticipated as a result of the proposed development at Dunkettle. There have been major infrastructural and residential projects undertaken in the area in recent years including the Dunkettle Interchange and the residential development at Ballinglanna. These are now complete. There are smaller construction sites on the Dunkettle Road at a lower elevation to the Dunkettle lands where works are current, abandoned or potential. All of these developments are within the development area of Glanmire.

The Dunkettle House and Parkland provides separation between Glanmire and the transport infrastructure to the southeast and south. The Woodville and Glanmire Woodlands together with the Glashaboy Estuary are key landscape features that will maintain the unique landscape setting Glanmire has as existing and will have post development. Photomontage viewpoint 16 illustrates this and shows the consolidation of the townscape on the southeast quarter of the settlement.

5.11 Risk of Major Accidents or Disasters

This project proposes the construction of a new residential neighbourhood with an extensive area of proposed Natural Heritage Areas (pNHAs) within the site boundary. The lands bound on to an Estuary designated as a Special Protection Area part of the Cork Harbour SPA and it includes a range of heritage buildings together with an historic parkland landscape. It is imperative that during the construction stage of the development every precaution is put in place to protect this Blue, Green and heritage infrastructure. The estuary mudflats are particularly sensitive to any water flows or pollutants that could enter from the development. The ancient woodlands are not extensive in area and are vulnerable during construction and operation of the development. Protective fencing will need to be in place and maintained in place during construction. This fencing will need to be replaced with appropriate fencing to exclude casual human intrusion in the operational stage. The conservation status of the Cork Harbour SPA, the Glanmire, Dunkettle Shore and Woodville oak woodlands is not to be diminished during or post construction.

There are no current proposals in the southern area of the site outside of the residentially zoned lands. The historic Dunkettle House and parkland landscape should similarly be protected with its conservation management to continue as has been the case since circa 2005.

5.12 Worst Case Scenario

In the worst-case scenario, a development could be halted before it completes, as is the case with the Residential Care Home project on lands adjoining the Dunkettle site, now a registered derelict site. In such a situation ground works and incomplete structures could begin to deteriorate looking increasingly unsightly until the economy recovers. The phasing of the development is therefore critical so that only sections of the development are built to completion at any given period. It is also important that the section of the development fronting on to the Dunkettle Road are constructed at an early stage. This also applies to other areas which are more exposed to external viewpoints. This strategy then minimises the potential for halted construction works areas, partially built structures or infrastructure to sit exposed to public view.

5.13 Interactions

5.13.1 Biodiversity

Existing trees are proposed to be removed to facilitate the construction of the proposed development at Dunkettle. This impacts on flora and fauna supported by this vegetation and the biodiversity value of the agricultural field areas of the site as existing. The proposed management of existing woodland solely for conservation will see an overall improvement in biodiversity value especially along the Glashaboy Estuary Shoreline. Conservation management of the historic parkland area and trees on the south side of the proposed residential development will see an enhancement of existing biodiversity in that area of the Dunkettle lands. Proposed new woodland, street and open space tree planting across the development site with native species will also contribute further enhancement to biodiversity as it matures.

5.13.2 Land & Soils

There are some significant recontouring works required to achieve the proposed development. This cut and fill is proposed to be absorbed into the site layout using retaining structures within duplex and apartment structures. Where road works require general regrading of slopes these are proposed to be planted with new woodland.

5.13.3 Air, Dust & Climatic Factors

Proposed new woodland, street, and open space tree planting across the development site with native species will also contribute to the improvement in air quality and provide further shelter and enhancement of existing microclimate areas within the existing envelope of existing woodland surrounding the site.

5.13.4 Cultural Heritage

The proposed new residential area is proposed within an envelope of existing woodland, and this separates it from the existing historic Dunkettle House, walled gardens and parkland landscape. There may be some interaction of the area to the northeast of the house where an access to the southern end of the residential development area is proposed.

5.14 Monitoring

Monitoring of the development is to be undertaken from commencement of construction of the development on site. This is to be undertaken by on site construction personnel responsible for the provision and maintenance of hoardings, tree protective fencing and the control of and management of water runoff.

Woodland areas are to be monitored by an ecologist and forester appointed under the Native Woodland Conservation Scheme. The sole aim of monitoring is to ensure there is no degradation in biodiversity value or loss in existing tree cover occurs. Where conservation value is detected then remedial action is to be taken to restore and enhance habitat areas affected.

5.15 Summary of Mitigation and Monitoring

The following summarises the Construction Phase mitigation and monitoring measures.

- All required tree protection fencing is to be erected as planned for each phase of the development and is to be kept in place and regularly inspected throughout the construction phase of the development.
- Where construction work to provide for outfalls to the Glashaboy Estuary shoreline are proposed within woodland areas these works are to be supervised by the ecologist and forester appointed under the Native Woodland Conservation Scheme, once in place the woodland areas concerned are to be secured from any further construction activity with secured gate access provided for maintenance access only.
- A freshwater ecologist is to periodically monitor the operation of the SUDs features on site; swales and attenuation pond to maximise their habitat value.
- Hoarding to provide visual screening is also to be erected and monitored during the construction process.

The following summarises the Operational Phase mitigation and monitoring measures.

- All woodland areas are to be managed solely for conservation under the Native Woodland Conservation Scheme, access to the estuary pNHA woodlands is to be restricted to maintenance personnel only, using the existing historic walk paths.
- The Woodville Woodland is also to be managed under the Native Woodland Conservation Scheme without formal exclusion of public access. Proposed new woodland, street, and open

space tree planting across the development site will also require periodic monitoring to ensure the establishment of the landscaping proposed. Where there are failures in planting these are to be assessed with appropriate action taken to replace the failed stock with similar or replace the stock with species more likely to thrive in the same location.
- A freshwater ecologist is to periodically monitor the operation of the SUDs features on site; swales and attenuation pond to maximise their habitat value.

5.16 Conclusion

The proposed residential neighbourhood to be constructed and occupied on the Dunkettle lands will benefit from the City Council zonings for landscape protection of existing woodlands along the Glashaboy Estuary shore along the western and northwestern sides of the site.

The protected historic heritage features and parkland on the south of the residential zoned area have been respected and incorporated into the design. Dunkettle House and its parkland are dominant elements in the landscape character of the upper harbour area and Glanmire.

The proposed development has been laid out and scaled to sit into the existing landscape. It is envisaged that the development will be absorbed into the existing landscape leaving what is of value from historic, visual and biodiversity perspectives intact and enhanced with conservation management into the future.

5.17 References and Sources

- A provisional inventory of ancient and long-established woodland in Ireland (2010); National Parks & Wildlife Service
- Cork City Development Plan 2022-2028; Cork City Council
- Cork City Landscape Study for Cork City Council (2008); Mitchell& Associates
- Cork Harbour Study Public Consultation Draft (2011); Cork County Council
- Environmental Impact Assessment of Projects: Guidelines on the Preparation of the Environmental Impact Assessment Report (EIAR) (2017); European Commission
- Guidelines for Landscape & Visual Impact Assessment, 3rd edition (2013), Landscape Institute
- Guidelines on Landscape & Landscape Assessment (2000); Department of the Environment, Community & Local Government
- Guidelines on Landscape & Visual Assessment (2002); Irish Landscape Institute
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022); Environmental Protection Agency
- John Cronin & Associates (2004) 'Dunkettle House – Conservation Plan'
- Malins, E. and the Knight of Glin (1976) *Lost Demesnes – Irish Landscape Gardening, 1660 – 1845*. London: Barrie & Jenkins.
- Management Guidelines for Ireland's Native Woodlands (2017); Cross & Collins
- National Biodiversity Action Plan 2023-2030; National Parks & Wildlife Service
- National Landscape Strategy 2015-2025; Department of Arts, Heritage and the Gaeltacht
- Rynne, C. (1999) *The Industrial Archaeology of Cork*. Dúchas – The Heritage Service, Dublin.
- Spendiff, S. (2002) 'A hidden treasure that overlooks Cork', *Hollybough*, p.23.

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 6

Material Assets: Traffic & Transport

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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6 Material Assets: Traffic & Transport

6.1 Introduction

Material assets are resources that are valued and intrinsic to the site of the proposed development and the surrounding area. These may be of either natural or human origin and the value may arise for economic or cultural reasons. This chapter considers and assesses the effects of the proposed development on the material assets, including the existing roads network around the site, during the construction and operational phases.

In relation to material assets, the EPA (2022) Guidelines on the information to be contained in the Environmental Impact Assessment Reports states that:

> *"In Directive 2011/92/EU this factor included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils."*

In this Chapter, Traffic-related impacts on the local roads infrastructure in the receiving environment have been considered.

6.2 Expertise & Qualifications

This chapter has been prepared by Ken Manley, Director at MHL Consulting Engineers regarding traffic related impacts of the scheme on the local roads network.

Ken Manley BE, CEng, MIEI, HDip Envm Eng, FConsEI is a director in MHL Consulting Engineers and has 33 years post graduate experience in carrying out traffic impact assessments of similar type schemes in Ireland including large residential development projects requiring EIAR's.

6.3 Proposed Development

The development is described in Chapter 2 of this EIAR. The following is relevant to the assessment of Traffic & Transport.

6.3.1 Aspects Relevant to this Chapter

The proposed scheme the subject of this application is based on developing a single vehicular access to the serve the site from the L2998. Figure 6-1 details the proposed access which includes a right turn lane serving the development constructed as part of NTA road improvement works on the L2998.

It is the intention of the applicant to develop all sustainable routes associated with the site as part of the first phase of the scheme implying that access to the East Cork Greenway, Little Island train station and the re-routed Bus 2A will be available for new residents.

Figure 6-1 Proposed Scheme Access from the L2998

LRD Phase 2:

A second access point from Dunkettle Road (L2998) is envisaged will be included in the LRD Phase 2 development. This access will utilise an existing access serving the applicants lands and a number of private dwellings. It is envisaged that the existing access (Junction 8 – refer to Figure 6-3) will be upgraded to facilitate vehicular, pedestrian and cyclist movements. The design and specification of this second access are currently being developed in consultation with Cork City Council officials – they do not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed.

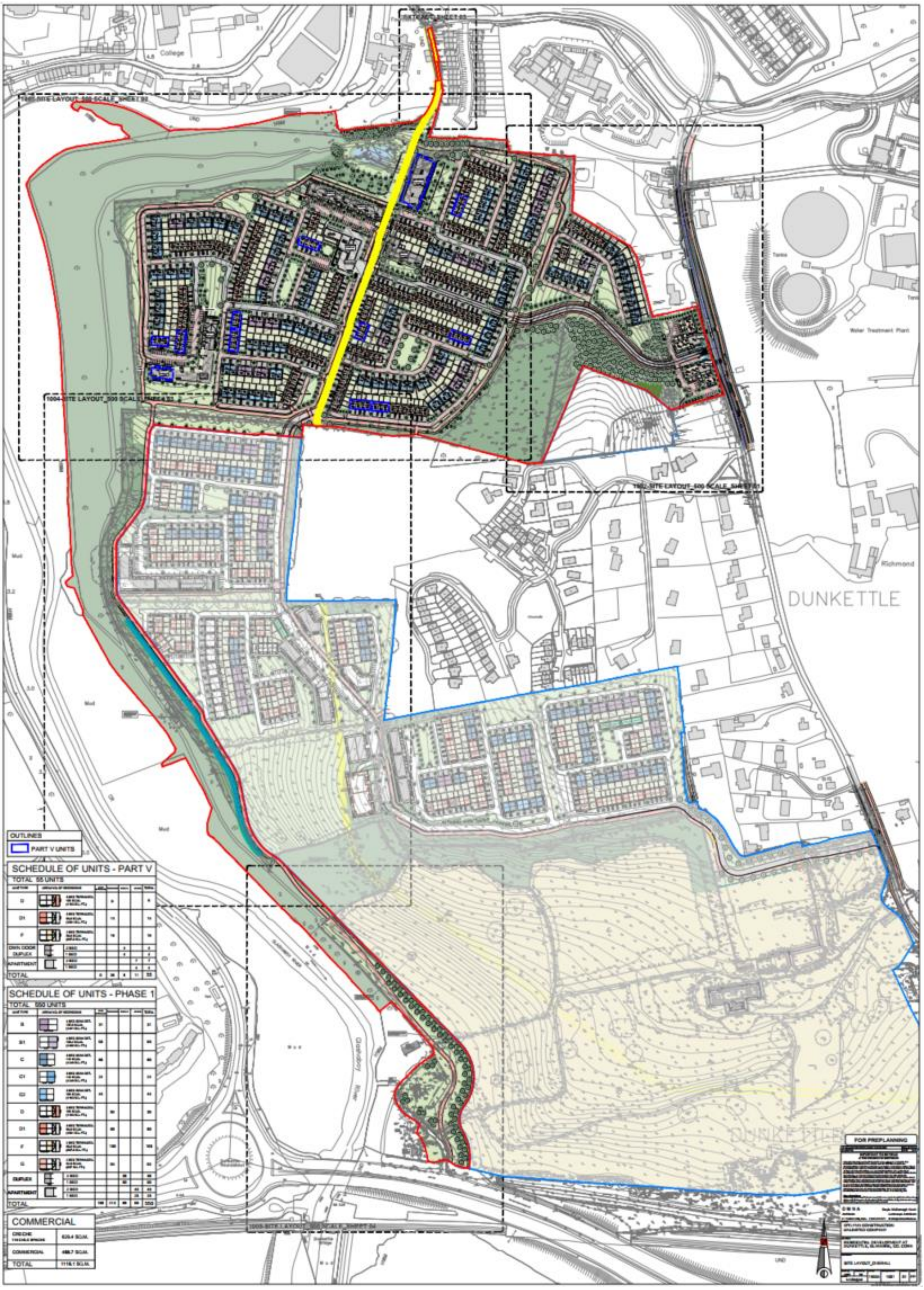


Figure 6-2 Proposed Site Layout

In respect of the proposed phasing of development as described in Chapter 2, at the writing of this document the assessment described in this chapter is based on LRD Phase 1. The Cumulative Impacts Section include the potential future development of additional phases, LRD Phase 2 and Dunkettle House.

LRD Phase 1 – The traffic Impact of a Phase 1 developed Scheme.

LRD Phase 2 – The cumulative impact of Phase 1 & Phase 2 developed Scheme.

The Cumulative Effects also considers further development within the area, as outlined in Section 6.8.3.

6.4 Methodology

6.4.1 Desktop Study

The potential impacts to material assets because of the proposed development in terms of traffic generation were assessed through a desktop study of available information. The following principal sources were consulted:

- Cork City Development Plan
- Little Island/Glanmire Cycle Network Strategy
- NTA, Cork Metropolitan Bus Network (June 2022)
- Cork City Council Infrastructure Department
- TII, Dunkettle Interchange Delivery Team
- TII, trafficdata.tii.ie

6.4.2 Relevant Legislation and Guidance

The methodology is consistent with the following relevant guidance:

- EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- EPA (2015). Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;
- National Roads Authority (NRA) (2008). Environmental Impact Assessment of National Road Schemes – A Practical Guide.
- NRA’s 2014 publication “Traffic and Transport Assessment Guidelines” and the “Guidelines for Traffic Impact Assessments” as published by the Institution of Highways & Transportation U.K. in 1994;

6.4.3 EIAR Study Boundary

For the purposes of this Chapter the EIAR study boundary encompasses the local roads network as presented in Figure 6-3. The extent of the study area was agreed with the Traffic & Transportation Department of Cork City Council.

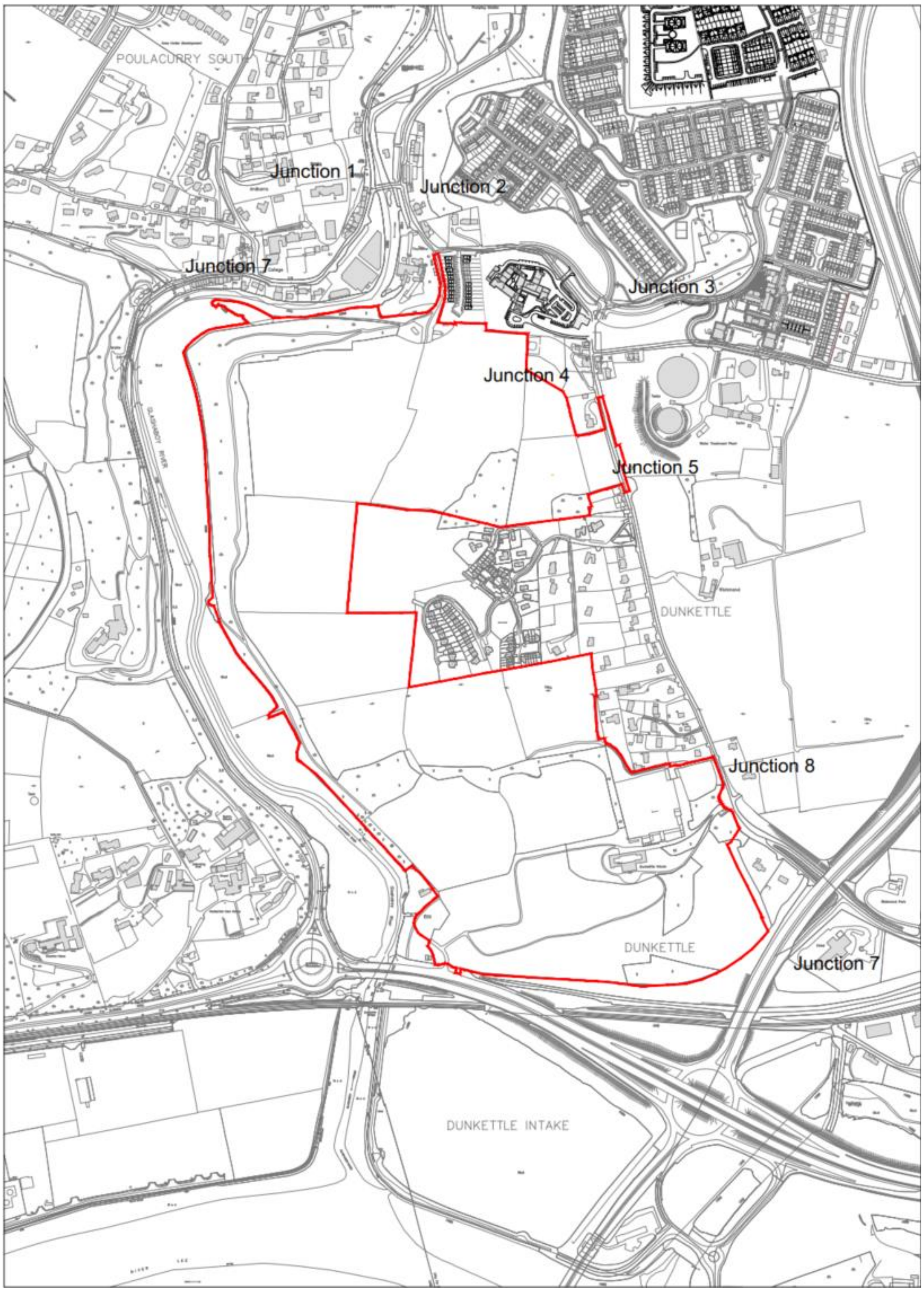


Figure 6-3 Critical Junction Locations

6.4.4 Site Surveys

A variety of different data sources have been used, including:

- 12-hour classified turning counts carried out in 2024 at 6 locations identified in Figure 6-3. Traffic counts;

- Traffic data taken from the recently completed Ballinglanna Residential Development to the north of the lands as well as predicted traffic generation from the remainder of this site;
- Traffic Flow information received from the Dunkettle Interchange Team;
- Background OS Mapping and aerial photography;
- On-site junction measurements including saturation flows, link speeds, queue length measurements, pedestrian movements at signalled crossings and geometric data for each of the modelled junctions;

On-site measurements including lane widths, junction turning radii, lane lengths and saturation flows were undertaken by MHL at various times in the intervening months since the traffic count date. As part of the original data collection study queue length surveys as well as pedestrian surveys were carried out by Trascis simultaneous with the traffic count surveys. Further site-specific queue length and pedestrian crossing frequency surveys were undertaken as part of the calibration of the constructed models.

6.4.5 Consultation

Notwithstanding ongoing consultation with the Traffic & Transportation Department of Cork City Council, the Design Team have engaged with the Dunkettle Interchange Design Team, Irish Water, TII, NTA and with various departments within Cork City Council with a view to agreeing the respective issues raised as part of the LRD assessment process.

These engagements have informed this document including access arrangements for vehicular, pedestrian and cycle modes of transport.

6.5 Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

6.6 Baseline Environment

6.6.1 Recorded Network Traffic Flows

Figures 6-4 and 6-5 present the recorded AM and PM traffic profiles based on recorded traffic flows through junctions on the network.

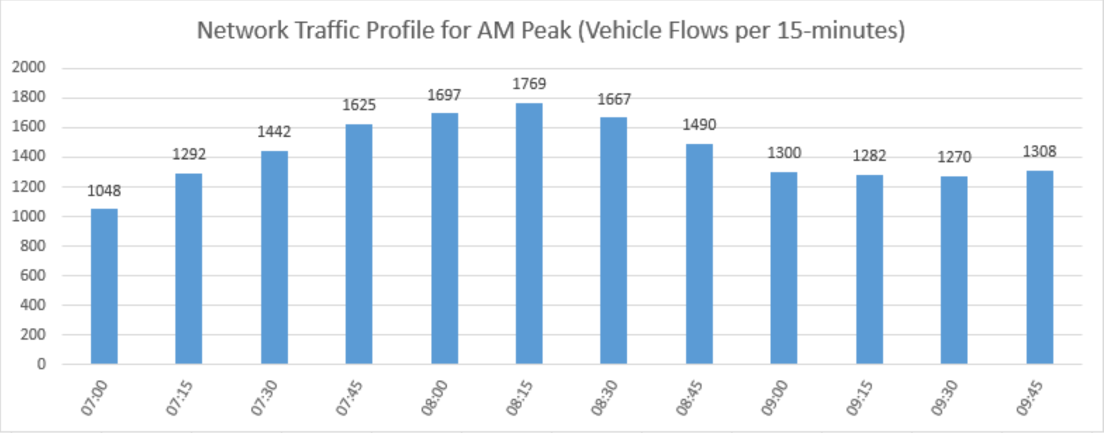


Figure 6-4 AM Network Traffic Profile

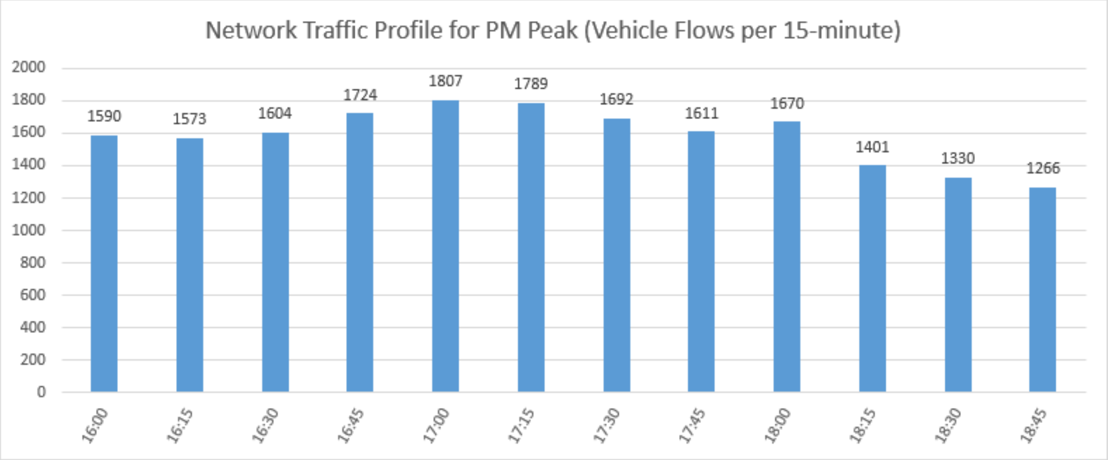
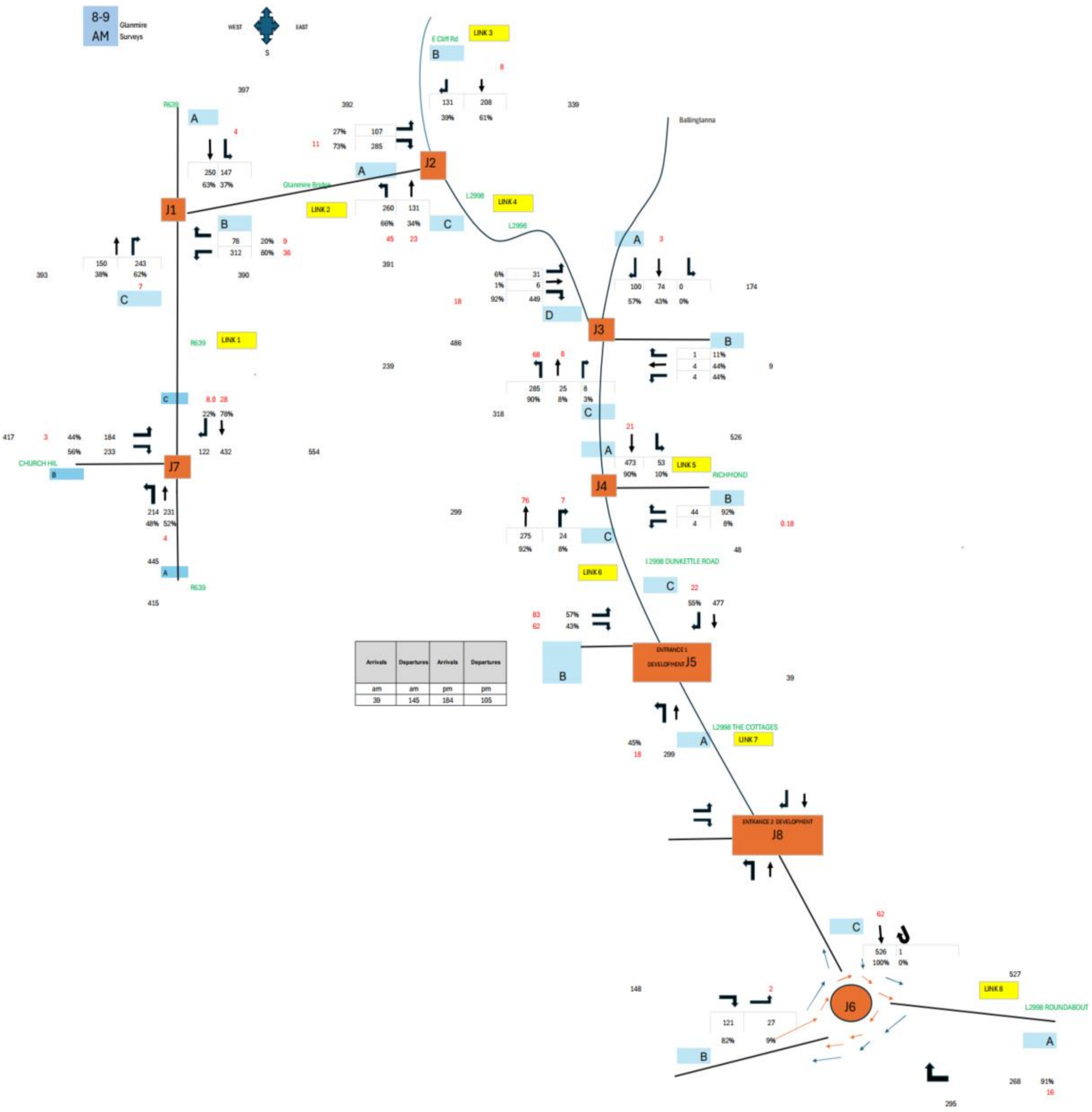


Figure 6-5 PM Network Traffic Profile

The data presented in the above figures show the peak hour traffic periods for both morning and evening, 08:00-09:00 and 17:00-18:00 respectively. Traffic models at the identified critical junctions will be constructed for these time periods.

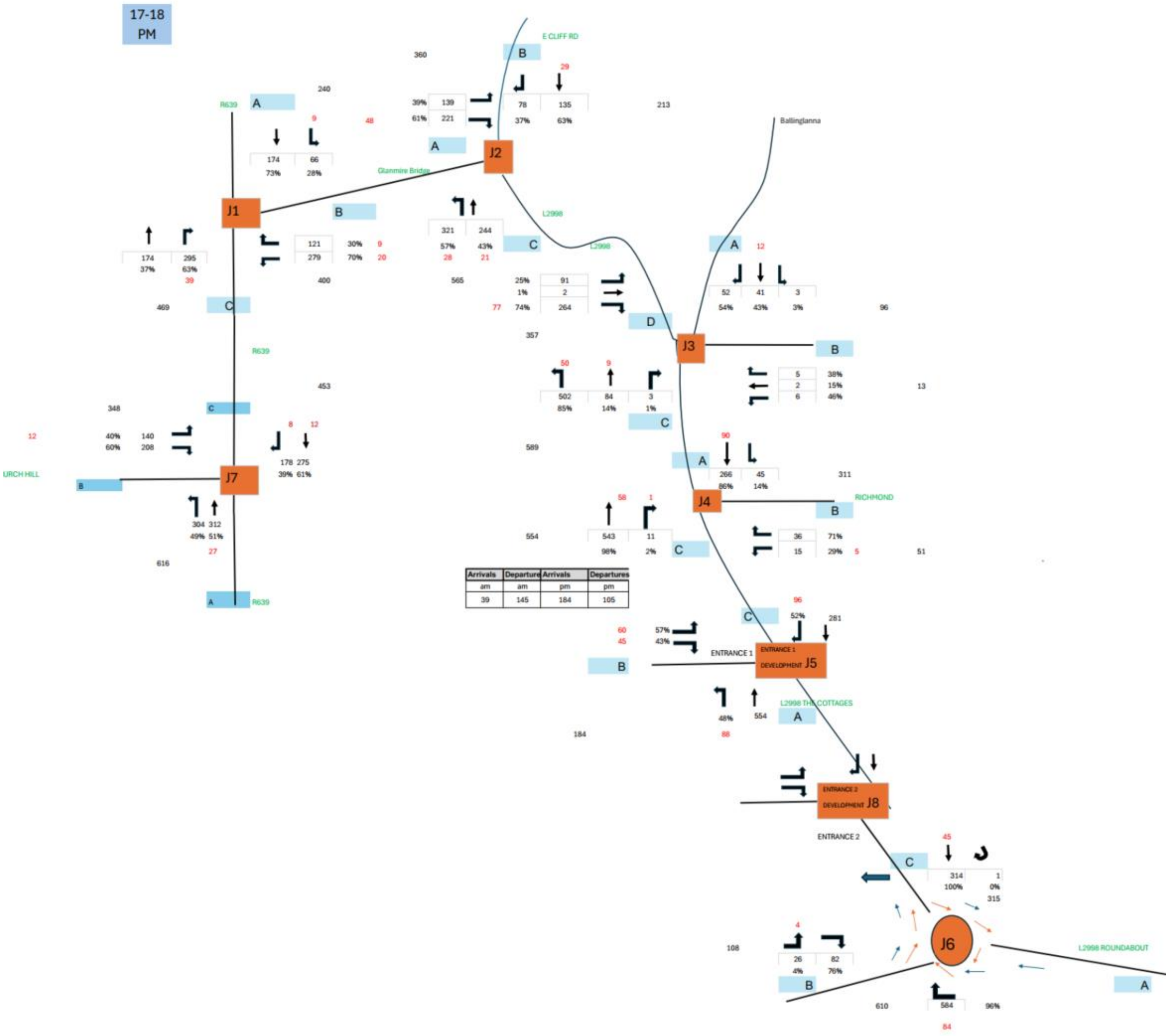
The percentage of classified vehicles recorded was used within the generated traffic models to accurately reflect existing conditions.

The following two figures show the AM and PM peak flows at each of the junctions which were used to develop with/without development traffic scenarios at each location.



Arrivals	Departures	Arrivals	Departures
am	am	pm	pm
39	145	184	105

Figure 6-6 AM Peak (08:00-09:00) Junction Flows



Arrivals	Departure	Arrivals	Departures
am	am	pm	pm
39	145	184	105

Figure 6-7 PM Peak (17:00-18:00) Junction Flows

Table 6-1 presents the calculated AADT for each link road based on 2024 recorded AM peak flows. A theoretical capacity for each link road is included based on the classification of roads.

Table 6-1 2024 Link AADT's (Annual Average 2-way Traffic Flow)

Link Road	Peak Hour Direction	AM Peak Hour Flows	AADT 2024	AADT Link Capacity
Link 1: R639	AM Southbound	562	10386	18706
	AM Northbound	393		
Link 2: Glanmire Bridge	AM Southbound	391	8494	18706
	AM Northbound	390		
Link 3: East Cliff Road	AM Southbound	339	6275	18706
	AM Northbound	238		
Link 4: L2998 Ballinglanna	AM Southbound	493	9592	18706
	AM Northbound	389		
Link 5: L2998 Dunkettle Road	AM Southbound	477	8439	18706
	AM Northbound	299		
Link 6: Richmond Hill	AM Southbound	48	1359	18706
	AM Northbound	77		
Link 7: L2998 The Cottages	AM Southbound	527	9233	18706
	AM Northbound	322		
Link 8: L2998 Roundabout	AM Southbound	268	10169	18706
	AM Northbound	647		

6.6.2 Characteristics of Existing Junctions

Using recorded turning movements at each junction, baseline traffic models were constructed for the purpose of assessing future year scenarios both with/without development traffic. These models were calibrated using recorded queue lengths, delay times and the geometric characteristics of each junction.

6.6.2.1 J1: R639 Glanmire Road and the L2999 Glanmire Bridge

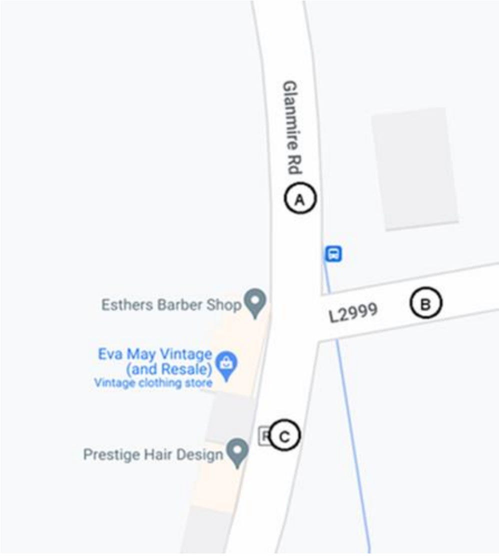
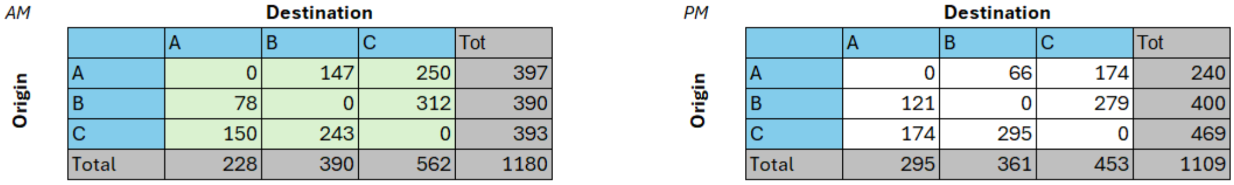


Figure 6-8 Junction 1 (J1): R639 Glanmire Road and the L2999 Glanmire Bridge

Table 6-2 Junction 1 (J1): AM / PM Recorded Traffic Movements 2024



AM

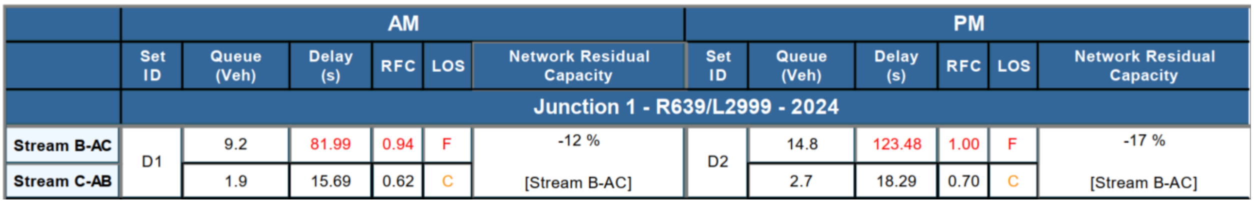
Origin	Destination			
	A	B	C	Tot
A	0	147	250	397
B	78	0	312	390
C	150	243	0	393
Total	228	390	562	1180

PM

Origin	Destination			
	A	B	C	Tot
A	0	66	174	240
B	121	0	279	400
C	174	295	0	469
Total	295	361	453	1109

Junction 10 Traffic Modelling Software was used to develop current year peak hour models for this junction using the recorded traffic flows. The following table presents the results showing that the current junction operates above capacity for the minor Arm B (Glanmire Bridge) during both morning and evening peak periods. The average queue of 9.2vehs (approx. 50m) for the AM peak extends back along the L2298 to Junction 2. The evening PM queue is modelled at 14.8 vehs (approx. 75m). A level of service (LOS) F for both time periods implies significant delay is incurred. The observed queues on this arm of the junction confirms the findings of the model.

Table 6-3 Junction 1 (J1): AM / PM 2024 Traffic Modelling Results



	AM						PM					
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity
	Junction 1 - R639/L2999 - 2024											
Stream B-AC	D1	9.2	81.99	0.94	F	-12 % [Stream B-AC]	D2	14.8	123.48	1.00	F	-17 % [Stream B-AC]
Stream C-AB		1.9	15.69	0.62	C			2.7	18.29	0.70	C	

6.6.2.2 J2: East Cliff Road and the L2998

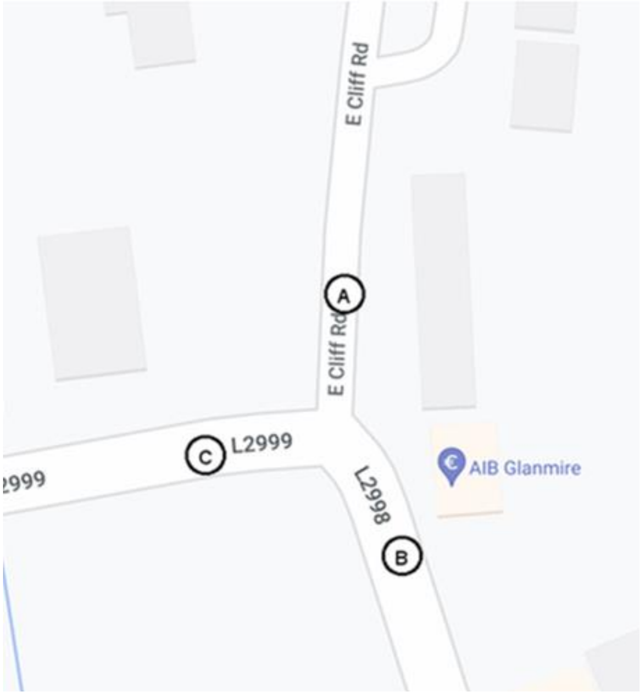
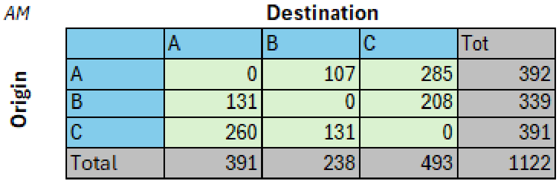


Figure 6-9 Junction 2 (J2): East Cliff Road and the L2998

Table 6-4 Junction 2 (J2): AM / PM Recorded Traffic Movements 2024

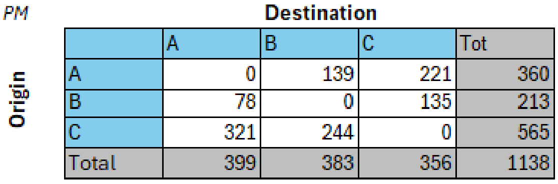


AM

Destination

Origin

	A	B	C	Tot
A	0	107	285	392
B	131	0	208	339
C	260	131	0	391
Total	391	238	493	1122



PM

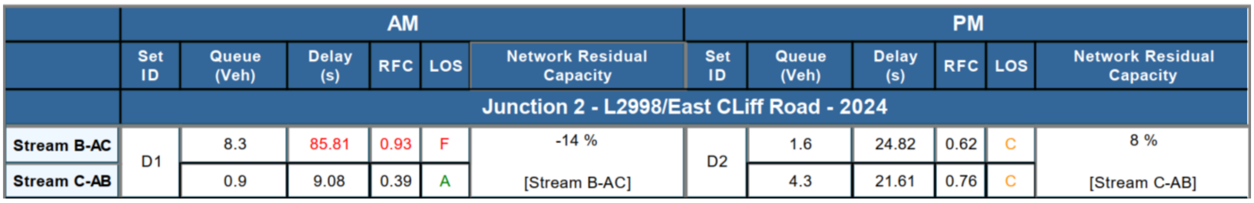
Destination

Origin

	A	B	C	Tot
A	0	139	221	360
B	78	0	135	213
C	321	244	0	565
Total	399	383	356	1138

Junction 10 Traffic Modelling Software was used to develop current year peak hour models for this junction using the recorded traffic flows. The following table presents the results showing that the current junction operates above capacity for the minor Arm B (East Cliff Road) during both morning and evening peak periods. The average queue of 8.3 vehs (approx. 45m) for the AM peak results in an expected delay of 85.81 sec implying a Level of Service F. The evening PM queue is modelled at 1.6 vehs achieving a LOS C. The modelled junction is reflective of observed on-site conditions implying the developed traffic model is suitable for use.

Table 6-5 Junction 2 (J2): AM / PM 2024 Traffic Modelling Results

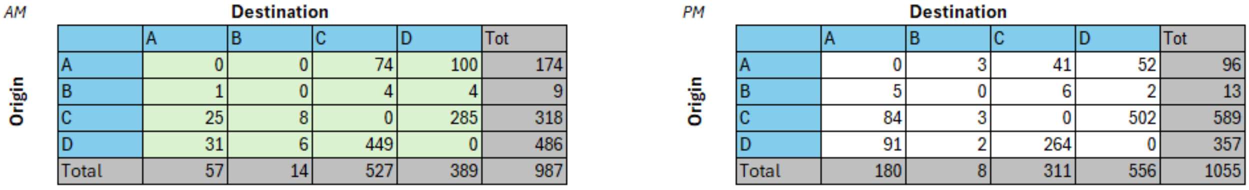


	AM						PM					
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity
	Junction 2 - L2998/East CLiff Road - 2024											
Stream B-AC	D1	8.3	85.81	0.93	F	-14 % [Stream B-AC]	D2	1.6	24.82	0.62	C	8 % [Stream C-AB]
Stream C-AB		0.9	9.08	0.39	A			4.3	21.61	0.76	C	

6.6.2.3 J3: Balinglanna L2998 Junction

Figure 6-10 Junction 3 (J3): Balinaglanna Junction

Table 6-6 Junction 3 (J3): AM / PM Recorded Traffic Movements 2024



AM

		Destination				
		A	B	C	D	Tot
Origin	A	0	0	74	100	174
	B	1	0	4	4	9
	C	25	8	0	285	318
	D	31	6	449	0	486
	Total	57	14	527	389	987

PM

		Destination				
		A	B	C	D	Tot
Origin	A	0	3	41	52	96
	B	5	0	6	2	13
	C	84	3	0	502	589
	D	91	2	264	0	357
	Total	180	8	311	556	1055

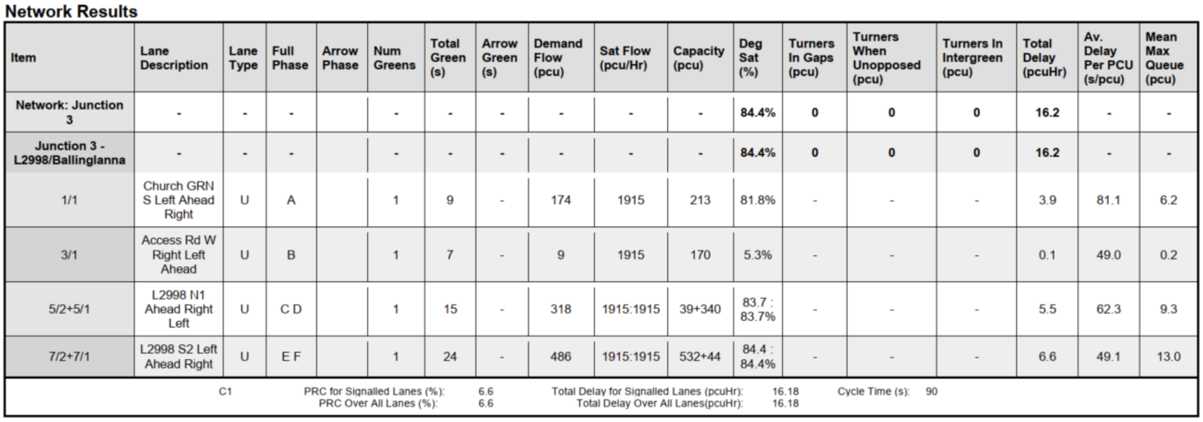
LinSig Traffic Modelling Software was used to develop current year peak hour models for this signal-controlled junction using the recorded traffic flows.

The following tables present the results showing that the current junction operates within capacity for both morning and evening peak periods.

The average queue of 13 pcu's (approx. 65m) for the AM peak results in an expected delay of 50 sec. The evening PM queue is modelled at 15.8 pcu's with an average delay of 47 sec. The configuration of the signal control to avoid conflict issues because of the geometric layout is a contributing factor in the delay experienced.

The existing junction is observed to operate marginally better than the modelled junction primarily because of little to no pedestrian movements occurring. The traffic model includes for an all-red pedestrian phase to account for expected increase in pedestrian movements into the future.

Table 6-7 Junction 3 (J3): AM 2024 Traffic Modelling Results

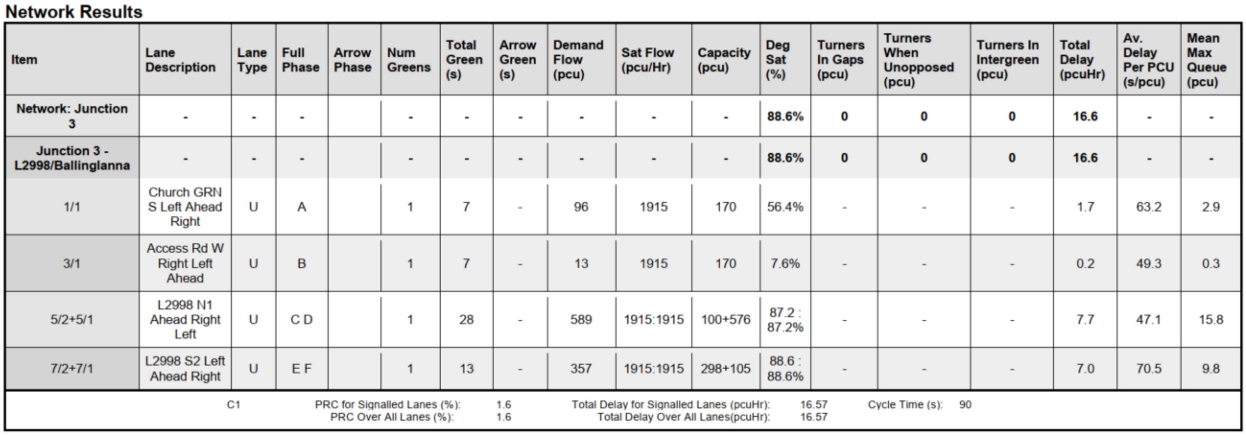


Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 3	-	-	-		-	-	-	-	-	-	**84.4%**	**0**	**0**	**0**	**16.2**	-	-
Junction 3 - L2998/Ballinglanna	-	-	-		-	-	-	-	-	-	**84.4%**	**0**	**0**	**0**	**16.2**	-	-
1/1	Church GRN S Left Ahead Right	U	A		1	9	-	174	1915	213	81.8%	-	-	-	3.9	81.1	6.2
3/1	Access Rd W Right Left Ahead	U	B		1	7	-	9	1915	170	5.3%	-	-	-	0.1	49.0	0.2
5/2+5/1	L2998 N1 Ahead Right Left	U	C D		1	15	-	318	1915:1915	39+340	83.7 : 83.7%	-	-	-	5.5	62.3	9.3
7/2+7/1	L2998 S2 Left Ahead Right	U	E F		1	24	-	486	1915:1915	532+44	84.4 : 84.4%	-	-	-	6.6	49.1	13.0

C1 PRC for Signalled Lanes (%): 6.6 Total Delay for Signalled Lanes (pcuHr): 16.18 Cycle Time (s): 90
PRC Over All Lanes (%): 6.6 Total Delay Over All Lanes(pcuHr): 16.18

Table 6-8 Junction 3 (J3): PM 2024 Traffic Modelling Results



Network Results

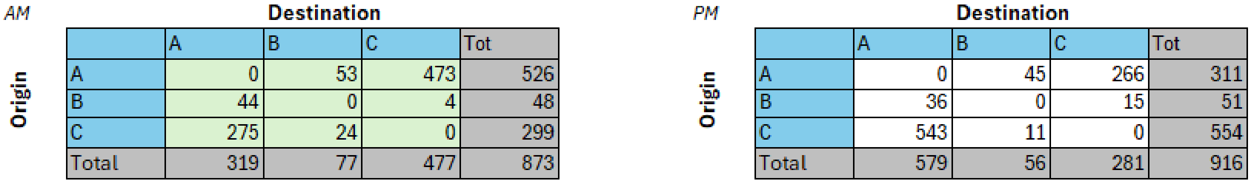
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 3	-	-	-		-	-	-	-	-	-	**88.6%**	**0**	**0**	**0**	**16.6**	-	-
Junction 3 - L2998/Ballinglanna	-	-	-		-	-	-	-	-	-	**88.6%**	**0**	**0**	**0**	**16.6**	-	-
1/1	Church GRN S Left Ahead Right	U	A		1	7	-	96	1915	170	56.4%	-	-	-	1.7	63.2	2.9
3/1	Access Rd W Right Left Ahead	U	B		1	7	-	13	1915	170	7.6%	-	-	-	0.2	49.3	0.3
5/2+5/1	L2998 N1 Ahead Right Left	U	C D		1	28	-	589	1915:1915	100+576	87.2 : 87.2%	-	-	-	7.7	47.1	15.8
7/2+7/1	L2998 S2 Left Ahead Right	U	E F		1	13	-	357	1915:1915	298+105	88.6 : 88.6%	-	-	-	7.0	70.5	9.8

C1 PRC for Signalled Lanes (%): 1.6 Total Delay for Signalled Lanes (pcuHr): 16.57 Cycle Time (s): 90
PRC Over All Lanes (%): 1.6 Total Delay Over All Lanes(pcuHr): 16.57

6.6.2.4 J4: Richmond Hill and the L2998

Figure 6-11 Junction 4 (J4): Richmond Hill and the L2998

Table 6-9 Junction 4 (J4): AM / PM Recorded Traffic Movements 2024



AM — Destination; Origin

	A	B	C	Tot
A	0	53	473	526
B	44	0	4	48
C	275	24	0	299
Total	319	77	477	873

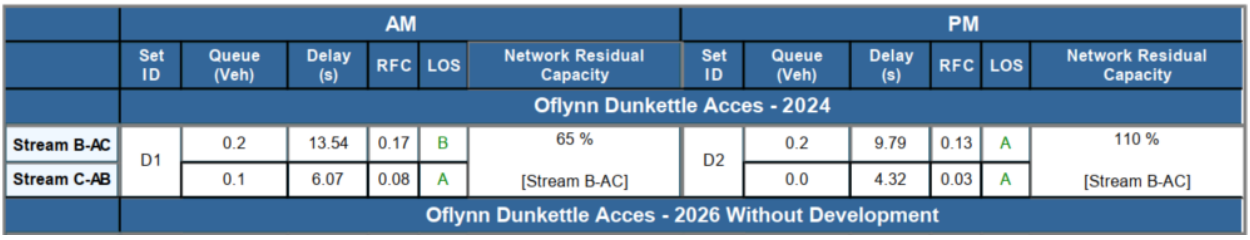
PM — Destination; Origin

	A	B	C	Tot
A	0	45	266	311
B	36	0	15	51
C	543	11	0	554
Total	579	56	281	916

Junction 10 Traffic Modelling Software was used to develop current year peak hour models for this junction using the recorded traffic flows. The following table presents the results showing that the current junction operates well within capacity with minimal delay experience on all approaches. The

modelled junction is reflective of observed on-site conditions implying the developed traffic model is suitable for use.

Table 6-10 Junction 4 (J4): AM / PM 2024 Traffic Modelling Results

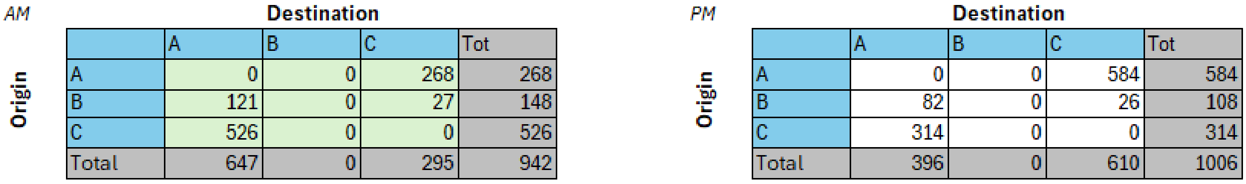


	AM						PM					
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity
	Oflynn Dunkettle Acces - 2024											
Stream B-AC	D1	0.2	13.54	0.17	B	65 % [Stream B-AC]	D2	0.2	9.79	0.13	A	110 % [Stream B-AC]
Stream C-AB		0.1	6.07	0.08	A			0.0	4.32	0.03	A	
	Oflynn Dunkettle Acces - 2026 Without Development											

6.6.2.5 J6: L2998/East Cork Parkway Slip-off/L2998 (NNW)

Figure 6-12 Junction 6 (J6): Roundabout Junction Slip-off the L2998

Table 6-11 Junction 6 (J6): AM / PM Recorded Traffic Movements 2024



AM

Origin / Destination

	A	B	C	Tot
A	0	0	268	268
B	121	0	27	148
C	526	0	0	526
Total	647	0	295	942

PM

Origin / Destination

	A	B	C	Tot
A	0	0	584	584
B	82	0	26	108
C	314	0	0	314
Total	396	0	610	1006

Junction 10 Traffic Modelling Software was used to develop current year peak hour models for this junction using the recorded traffic flows. The following table presents the results showing that the current junction operates well within capacity with minimal delay experience on all approaches. The

modelled junction is reflective of observed on-site conditions implying the developed traffic model is suitable for use.

Table 6-12 Junction 6 (J6): AM / PM 2024 Traffic Modelling Results

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2024									
Arm 1	D1	0.8	6.87	0.43	A	D2	1.9	10.95	0.64	B
Arm 2		1.9	11.39	0.64	B		0.2	5.51	0.14	A
Arm 3		0.0	0.00	0.00	A		0.4	4.44	0.28	A

6.6.2.6 J7: R639/Church Hill Signal Controlled Junction

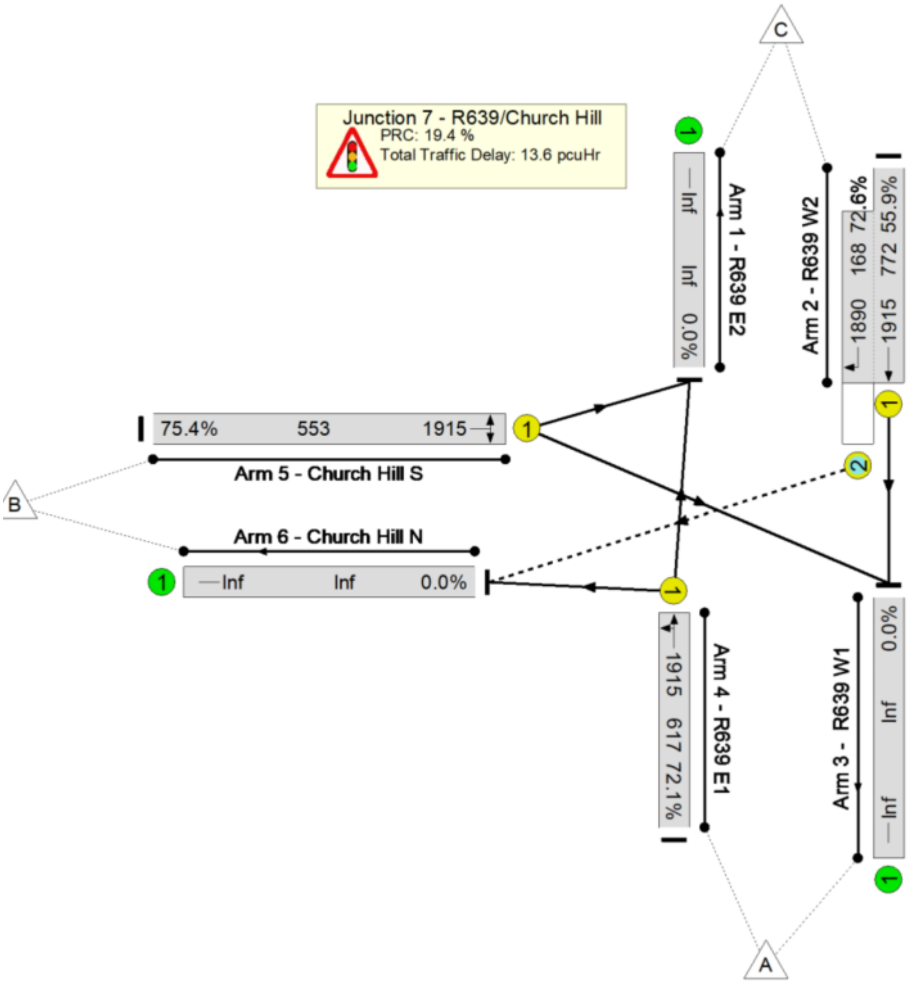
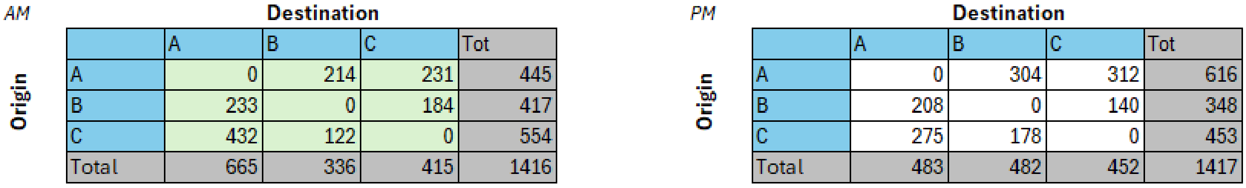


Figure 6-13 Junction 7 (J7): R639/Church Hill

Table 6-13 Junction 7 (J7): AM / PM Recorded Traffic Movements 2024



AM

Destination

Origin

	A	B	C	Tot
A	0	214	231	445
B	233	0	184	417
C	432	122	0	554
Total	665	336	415	1416

PM

Destination

Origin

	A	B	C	Tot
A	0	304	312	616
B	208	0	140	348
C	275	178	0	453
Total	483	482	452	1417

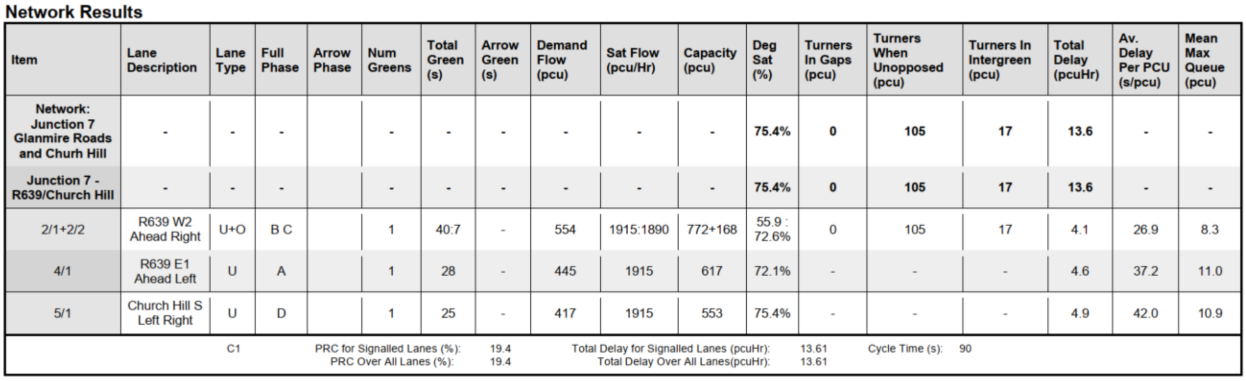
LinSig Traffic Modelling Software was used to develop current year peak hour models for this signal controlled junction using the recorded traffic flows.

The following tables present the results showing that the current junction operates borderline within capacity for both morning and evening peak periods.

The average queue of 10.0 pcu's (approx. 55m) for the AM peak results in an expected delay of 42 sec. The evening PM queue is modelled at 17.7 pcu's with an average delay of 46 sec.

The observed junction is seen to operate broadly in-line with the modelled junction implying that the constructed traffic model is fit for purpose.

Table 6-14 Junction 7 (J7): AM 2024 Traffic Modelling Results

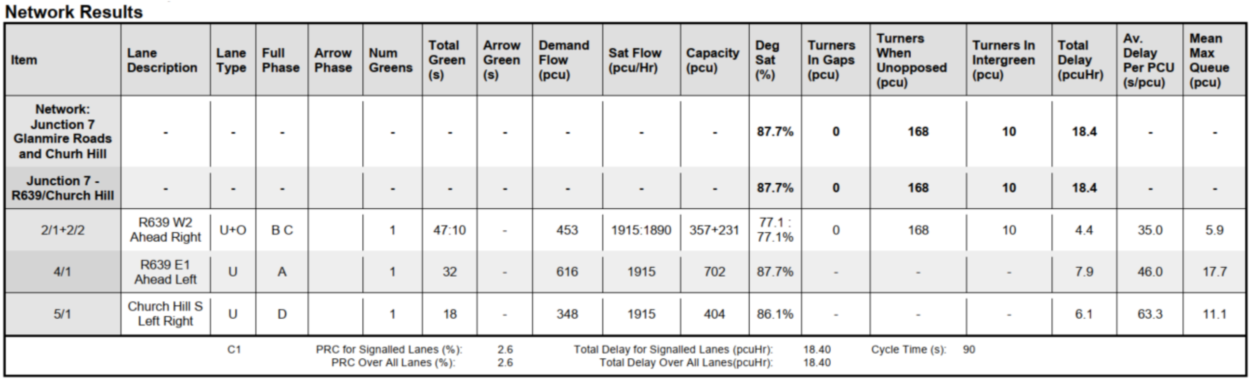


Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 7 Glanmire Roads and Churh Hill	-	-	-		-	-	-	-	-	-	**75.4%**	**0**	**105**	**17**	**13.6**	-	-
Junction 7 - R639/Church Hill	-	-	-		-	-	-	-	-	-	**75.4%**	**0**	**105**	**17**	**13.6**	-	-
2/1+2/2	R639 W2 Ahead Right	U+O	B C		1	40:7	-	554	1915:1890	772+168	55.9 : 72.6%	0	105	17	4.1	26.9	8.3
4/1	R639 E1 Ahead Left	U	A		1	28	-	445	1915	617	72.1%	-	-	-	4.6	37.2	11.0
5/1	Church Hill S Left Right	U	D		1	25	-	417	1915	553	75.4%	-	-	-	4.9	42.0	10.9

C1 PRC for Signalled Lanes (%): 19.4 Total Delay for Signalled Lanes (pcuHr): 13.61 Cycle Time (s): 90
PRC Over All Lanes (%): 19.4 Total Delay Over All Lanes(pcuHr): 13.61

Table 6-15 Junction 7 (J7): PM 2024 Traffic Modelling Results



Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Junction 7 Glanmire Roads and Churh Hill	-	-	-		-	-	-	-	-	-	**87.7%**	**0**	**168**	**10**	**18.4**	-	-
Junction 7 - R639/Church Hill	-	-	-		-	-	-	-	-	-	**87.7%**	**0**	**168**	**10**	**18.4**	-	-
2/1+2/2	R639 W2 Ahead Right	U+O	B C		1	47:10	-	453	1915:1890	357+231	77.1 : 77.1%	0	168	10	4.4	35.0	5.9
4/1	R639 E1 Ahead Left	U	A		1	32	-	616	1915	702	87.7%	-	-	-	7.9	46.0	17.7
5/1	Church Hill S Left Right	U	D		1	18	-	348	1915	404	86.1%	-	-	-	6.1	63.3	11.1

C1 PRC for Signalled Lanes (%): 2.6 Total Delay for Signalled Lanes (pcuHr): 18.40 Cycle Time (s): 90
PRC Over All Lanes (%): 2.6 Total Delay Over All Lanes(pcuHr): 18.40

6.6.2.7 Jn19 N8/N25 Dunkettle Baseline Traffic Flows

The Average Daily Traffic Flow on the N8/N25 (trafficdata.tii.ie/sitedashboard.asp) over a 10-year period is shown in Figure 6-14. This traffic count location's in proximity to the southern boundary of the site.

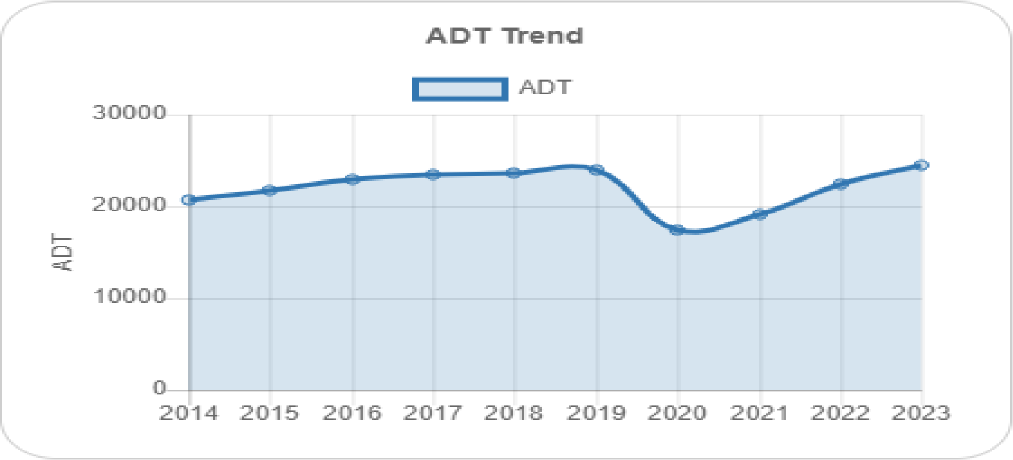


Figure 6-14 N8/N25 2-way AADT

Sensitivity:

Traffic Flows as recorded are a snapshot of the roads network on a particular day and are thereby sensitive to several factors such as:

- Time of the year, as an example when schools are closed for holidays traffic flows are significantly reduced.
- Adverse weather conditions can result in increased traffic flows and poor visibility resulting in a reduction in link capacity.
- On-going road works that may result in normal traffic being diverted from the area.
- The introduction of new bus routes can result in a reduction in private car usage.
- The provision of sustainable transport options such as cycling and walking can result in reduced car usage.
- Accidents on the network can distort normal traffic flows.

The traffic surveys carried out as part of this study were undertaken during the normal school year when the weather was dry. There was no major roadworks being carried out in the area. The Dunkettle Interchange had been open to traffic for several months implying motorists had time to adopt to the changed infrastructure. Travel patterns were deemed to be normal.

6.7 The 'Do Nothing' Scenario

The local roads network has been assessed for the Do-Nothing Scenario and is presented as the 'without dev' results for the modelled junctions. The results tables generated by the traffic modelling software have been constructed to make it easy to make a direct comparison between the with/without scenarios for each of the years and peak periods.

Section 6.7 presented the operating characteristics of the existing network showing that several junctions are currently operating close to or above capacity resulting in queues and delays during peak periods. The affected junctions are;

- Junction 1: R639/Glanmire Bridge.
- Junction 2: Glanmire Bridge/East Cliff Road.
- Junction 3: Ballinglanna Signal Controlled Junction.
- Junction 7: R639/Church Hill Signal Controlled Junction.

However, as the lands are zoned for development, in the absence of the proposed development proceeding, it is likely that a development of similar nature will proceed in the future in line with national policy and the Development Plan objectives. Therefore, the effects predicated are likely to occur in the future even in the absence of the current proposals.

6.8 Potential Significant Effects

6.8.1 Construction and Demolition Phase

Construction stage traffic will result in an increase in HGV content on the local roads network with the potential for abnormal loads which will extend over the construction stage of the scheme.

Potential Direct effects of the construction phase on the Local Roads Network are:

- Uncontrolled and/or misdirected HGV's arriving via minor roads unsuitable to the task;
- Queuing at junctions due to slow moving vehicles;
- Mud attached to site vehicles will contaminate the existing road surface and road network drainage system with the potential to cause flooding and unsafe driving conditions for all road users;
- Excessive noise due to hilly nature of site

In the absence of mitigation measures the **Direct** impact of the construction phase on the local roads network is **Negative** in quality, **Significant** significance, **Likely** probability, **Medium-term** in duration.

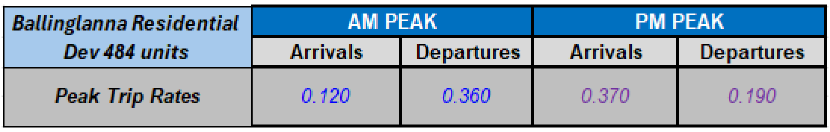
Potential Indirect Impacts of the construction phase also include Damage to the road surface due to higher HGV use.

In the absence of mitigation measures the **Indirect** impact of the construction phase on the local roads network is **Negative** in quality, **Significant** significance, **Likely** probability, **Medium-term** in duration.

6.8.2 Operational Phase

The 'With Development' scenario of the LRD Phase 1 development has been assessed using the developed traffic models as previously described. Traffic Generation from the residential element of the site is based on recorded traffic generation from existing occupied residential units in the general area (Ballinglanna Housing Development comprising (484 apts/houses currently occupied)). These counts were carried out on the 02nd May 2024.

Table 6-16 Trip Generation Per unit based on Ballinglanna Residential Dev



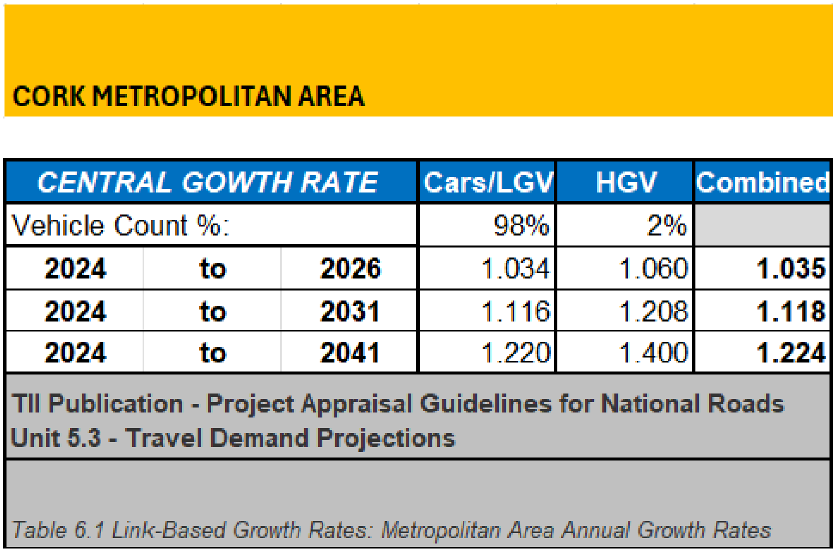
Ballinglanna Residential Dev 484 units	AM PEAK		PM PEAK	
	Arrivals	Departures	Arrivals	Departures
Peak Trip Rates	*0.120*	*0.360*	*0.370*	*0.190*

Traffic generation from the next Phase of residential development within the study area has been added to the developed traffic models and is assessed in Section 6.8.3 Cumulative Effects below.

Traffic Generation from the creche and commercial elements of LRD Phase 1 were derived from the TRICS database. When assessing future traffic flows from the scheme the current modal shift was determined using the 2022 Census online SAP data, small area population. The current sustainable modal share in this area is 7% which is significantly lower than the CMATS Active Travel Mode Share of 33.3%. The future year target in 2040 is 50.7% which is an expected 50% increase over current levels. It was agreed with Cork City Council Traffic & Transportation Department that for the purpose of developing future year traffic models a 30% future modal share would be appropriate. This reduction is only applied to ‘new’ residential development traffic (traffic generation is based on the above table) and is not applied to background traffic flows.

In addition to development traffic, recorded background traffic was factored using TII (Transport Infrastructure Ireland) Project Appraisal Guidelines (Unit 5.3 Travel Demand Projections, 2021) for use in future year scenarios. The following table presents the factors used on recorded pcu’s based on Link Based Growth Rates (Central Growth) for the Southwest Region. The percentage HGV content is based on that recorded on the R639 and the L2998 (2.0%).

Table 6-17 Background Traffic Growth Rates Per Annum



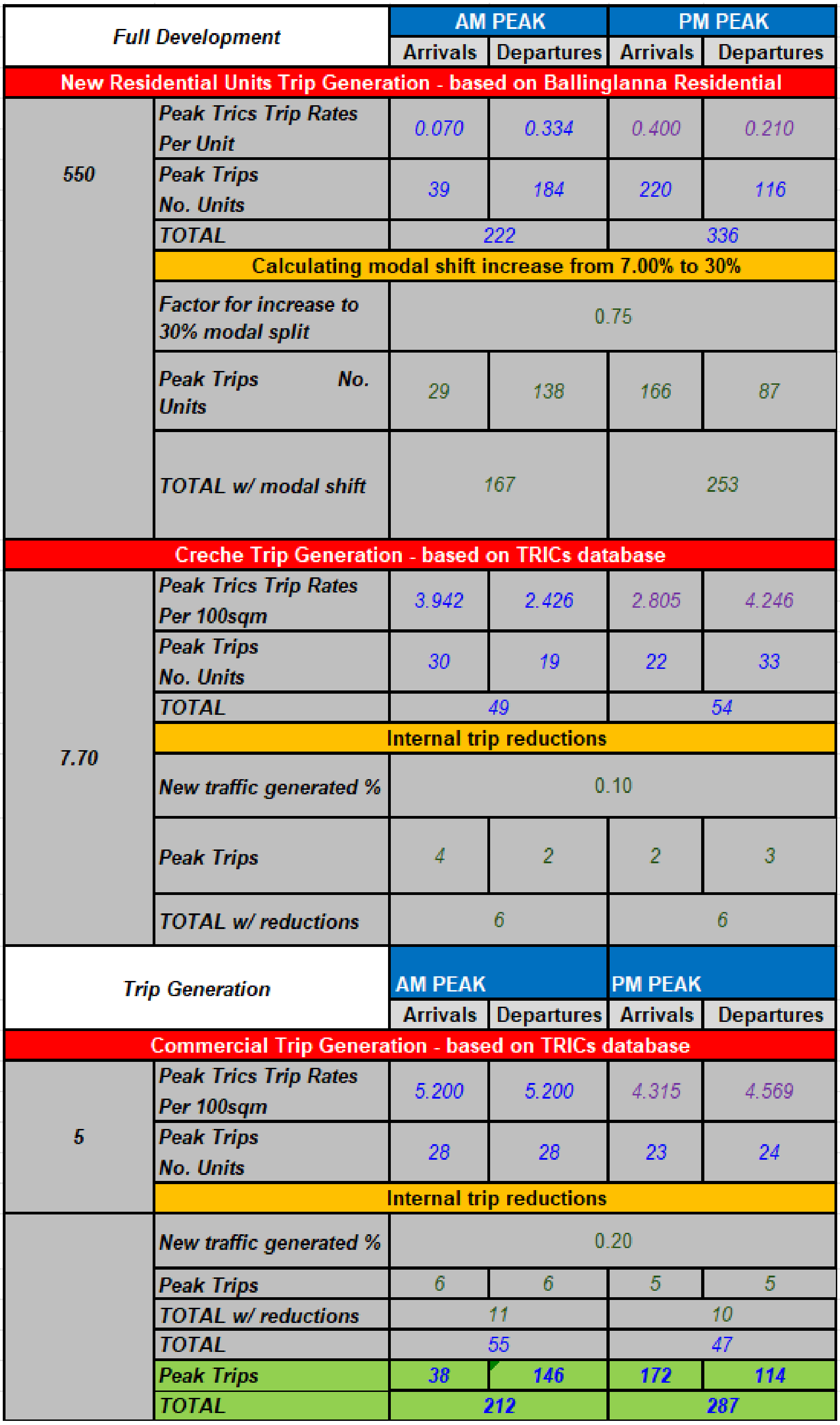
CORK METROPOLITAN AREA

CENTRAL GOWTH RATE			Cars/LGV	HGV	Combined
Vehicle Count %:			98%	2%	
2024	**to**	**2026**	1.034	1.060	**1.035**
2024	**to**	**2031**	1.116	1.208	**1.118**
2024	**to**	**2041**	1.220	1.400	**1.224**

TII Publication - Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections

Table 6.1 Link-Based Growth Rates: Metropolitan Area Annual Growth Rates

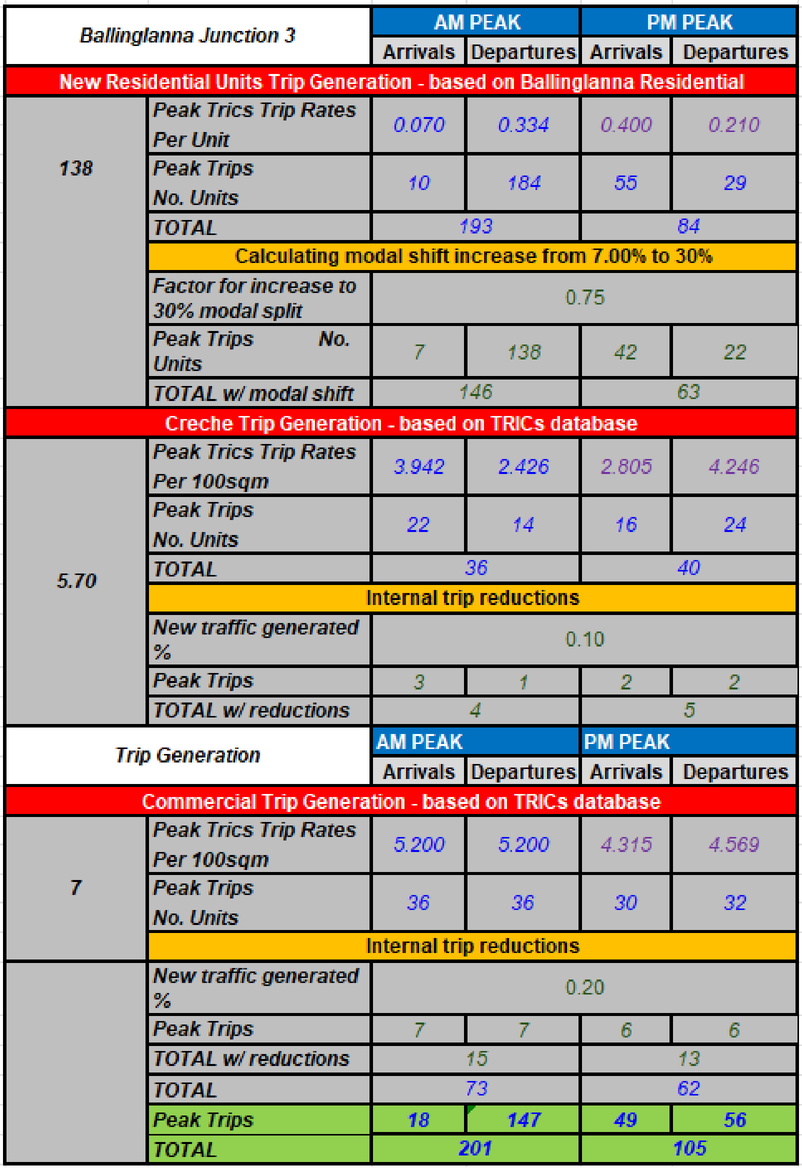
Table 6-18 Proposed Development Traffic (LRD: Phase 1, 550 units)



Full Development		AM PEAK		PM PEAK	
		Arrivals	Departures	Arrivals	Departures
New Residential Units Trip Generation - based on Ballinglanna Residential					
550	*Peak Trics Trip Rates Per Unit*	*0.070*	*0.334*	*0.400*	*0.210*
	Peak Trips No. Units	*39*	*184*	*220*	*116*
	TOTAL	*222*		*336*	
	Calculating modal shift increase from 7.00% to 30%				
	Factor for increase to 30% modal split	0.75			
	Peak Trips No. Units	*29*	*138*	*166*	*87*
	TOTAL w/ modal shift	*167*		*253*	
Creche Trip Generation - based on TRICs database					
7.70	*Peak Trics Trip Rates Per 100sqm*	*3.942*	*2.426*	*2.805*	*4.246*
	Peak Trips No. Units	*30*	*19*	*22*	*33*
	TOTAL	*49*		*54*	
	Internal trip reductions				
	New traffic generated %	0.10			
	Peak Trips	*4*	*2*	*2*	*3*
	TOTAL w/ reductions	*6*		*6*	
Trip Generation		AM PEAK		PM PEAK	
		Arrivals	Departures	Arrivals	Departures
Commercial Trip Generation - based on TRICs database					
5	*Peak Trics Trip Rates Per 100sqm*	*5.200*	*5.200*	*4.315*	*4.569*
	Peak Trips No. Units	*28*	*28*	*23*	*24*
	Internal trip reductions				
	New traffic generated %	0.20			
	Peak Trips	*6*	*6*	*5*	*5*
	TOTAL w/ reductions	*11*		*10*	
	TOTAL	*55*		*47*	
	Peak Trips	***38***	***146***	***172***	***114***
	TOTAL	***212***		***287***	

In addition to the above, traffic from Phase 2 of the Ballinglanna Residential Scheme, currently under construction, was added to future year models. Table 6-19 presents this additional traffic.

Table 6-19 Ballinglanna Completed Scheme Development Traffic (138 units)



Ballinglanna Junction 3		AM PEAK		PM PEAK	
		Arrivals	Departures	Arrivals	Departures
New Residential Units Trip Generation - based on Ballinglanna Residential					
138	*Peak Trics Trip Rates Per Unit*	*0.070*	*0.334*	*0.400*	*0.210*
	Peak Trips No. Units	*10*	*184*	*55*	*29*
	TOTAL	*193*		*84*	
	Calculating modal shift increase from 7.00% to 30%				
	Factor for increase to 30% modal split	0.75			
	Peak Trips No. Units	*7*	*138*	*42*	*22*
	TOTAL w/ modal shift	*146*		*63*	
Creche Trip Generation - based on TRICs database					
5.70	*Peak Trics Trip Rates Per 100sqm*	*3.942*	*2.426*	*2.805*	*4.246*
	Peak Trips No. Units	*22*	*14*	*16*	*24*
	TOTAL	*36*		*40*	
	Internal trip reductions				
	New traffic generated %	0.10			
	Peak Trips	*3*	*1*	*2*	*2*
	TOTAL w/ reductions	*4*		*5*	
Trip Generation		AM PEAK		PM PEAK	
		Arrivals	Departures	Arrivals	Departures
Commercial Trip Generation - based on TRICs database					
7	*Peak Trics Trip Rates Per 100sqm*	*5.200*	*5.200*	*4.315*	*4.569*
	Peak Trips No. Units	*36*	*36*	*30*	*32*
	Internal trip reductions				
	New traffic generated %	0.20			
	Peak Trips	*7*	*7*	*6*	*6*
	TOTAL w/ reductions	*15*		*13*	
	TOTAL	*73*		*62*	
	Peak Trips	***18***	***147***	***49***	***56***
	TOTAL	***201***		***105***	

The combined traffic was distributed onto the modelled network and traffic flow matrices were developed for each of the affected junctions for the following years:

LRD Phase 1:

- 2026 AM/PM With/Without Dev (550 units + creche + retail)
- 2031 AM/PM With/Without Dev (550 units + creche + retail)
- 2041 AM/PM With/Without Dev (550 units + creche + retail)

6.8.2.1 Network Modelling Results

The Junction 10 Software Package was used to analyse each of the existing and proposed priority/roundabout junctions namely:

- Junction 1: The Glanmire Bridge/Glanmire Road Priority Junction

- Junction 2: Priority Junction of East Cliffe Road and the L2998
- Junction 4: Priority Junction of the L2998 and Richmond Hill
- Junction 5: Proposed Development Access 1 (Phase 1)
- Junction 6: Roundabout junction of the L2998/L3004 (Access to Dunkettle Interchange)
- Junction 8: Proposed Development Access 2 (Phase 2) (Refer Table 6-29 Cumulative Impact Results)

The Junctions 10 modelling software produces an RFC % (Ratio of Flow to Capacity), a Delay figure measured in seconds and a LOS (Level of Service) which are used to compare the effects the development will have on the junction being modelled. An RFC of 85% on a priority/roundabout junction implies that the junction has reached capacity but is still operational with delay incurred. The following table describes the different LOS and the implications for the junction being assessed.

Table 6-20 Junction 1: Priority Controlled

Level of Service A	Free-Flow
Level of Service B	Reasonably Free-Flow (no delay incurred)
Level of Service C	Stable Operation (busy but operational with acceptable delay incurred)
Level of Service D	Borderline Unstable (Junctions reaching capacity – but still operational- delay incurred)
Level of Service E	Extremely Unstable (Junctions at capacity or over, any incident will cause a grid-lock situation-significant delay incurred)
Level of Service F	Breakdown (Junctions over capacity, unacceptable delay traffic at a standstill)

LinSig modelling software was used to analyse the signalised junctions namely:

- Junction 3: Ballinglanna Cross-roads Signalised Junction
- Junction 7: Traffic Signal Controlled Junction of the R639 Glanmire Road/Church Hill Junction

LinSig also produces an RFC % (Ratio of Flow to Capacity. Generally, an RFC of 90% or less is considered acceptable during the peak period for signalised junctions. An RFC of this value would indicate that at peak times the junction is at 90% of its operational capacity and therefore has a practical reserve capacity of 10%. This reserve capacity of 10% is considered by traffic engineers to be the level of reserve capacity at a signalised junction required to cater for periods of unusually high traffic flows, such as bank holiday weekends.

6.8.2.2 Junction 1: R639 Glanmire Road/Glanmire Bridge

The PICADY results for this junction both with/without development traffic are presented in Table 6-21 below. The results are based on a fully completed Phase 1 development exiting onto the network from 2026 onwards.

The modelling results indicate that currently this junction operates above capacity for the minor arm accessing on to the R639 for both morning and evening periods. A LOS F is modelled on this approach resulting in significant delay. The resulting queues are seen to dissipate relatively quickly once the peak period has passed (within a 5-10 min window).

Future year scenarios both with/without development traffic, shows the operation of this junction further deteriorating.

Table 6-21 Junction 1: Priority Controlled

	AM						PM					
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity
	Junction 1 - R639/Glanmire Bridge - 2024											
Stream B-AC	D1	9.2	81.99	0.94	F	-12 % [Stream B-AC]	D2	14.8	123.48	1.00	F	-17 % [Stream B-AC]
Stream C-AB		1.9	15.69	0.62	C			2.7	18.29	0.70	C	
	Junction 1 - R639/Glanmire Bridge - 2026 without Development											
Stream B-AC	D3	13.3	111.42	0.99	F	-15 % [Stream B-AC]	D4	21.5	166.74	1.05	F	-19 % [Stream B-AC]
Stream C-AB		2.1	16.93	0.64	C			3.1	20.27	0.73	C	
	Junction 1 - R639/Glanmire Bridge - 2026 with Development											
Stream B-AC	D5	31.5	220.44	1.10	F	-22 % [Stream B-AC]	D6	42.1	297.73	1.17	F	-25 % [Stream B-AC]
Stream C-AB		2.3	17.95	0.66	C			5.0	30.55	0.82	D	
	Junction 1 - R639/Glanmire Bridge - 2031 without Development											
Stream B-AC	D7	30.1	217.02	1.10	F	-22 % [Stream B-AC]	D8	44.1	316.55	1.18	F	-25 % [Stream B-AC]
Stream C-AB		3.0	21.40	0.72	C			4.7	28.08	0.81	D	
	Junction 1 - R639/Glanmire Bridge - 2031 with Development											
Stream B-AC	D9	55.4	403.33	1.22	F	-27 % [Stream B-AC]	D10	70.0	564.11	1.31	F	-30 % [Stream B-AC]
Stream C-AB		3.2	22.87	0.74	C			8.5	48.97	0.90	E	
	Junction 1 - R639/Glanmire Bridge - 2041 without Development											
Stream B-AC	D11	61.8	471.60	1.26	F	-28 % [Stream B-AC]	D12	83.0	674.72	1.36	F	-32 % [Stream B-AC]
Stream C-AB		5.0	32.41	0.82	D			9.4	52.39	0.91	F	
	Junction 1 - R639/Glanmire Bridge - 2041 with Development											
Stream B-AC	D13	98.4	757.01	1.39	F	-33 % [Stream B-AC]	D14	126.4	1036.89	1.53	F	-36 % [Stream B-AC]
Stream C-AB		5.6	36.37	0.84	E			20.2	105.74	1.00	F	

6.8.2.3 Junction 2: East Cliff Road and the L2998

Like Junction 1 the minor arm (East Cliffe Road) is seen to experience significant delay in accessing the L2998 (Glanmire Bridge) both with/without development traffic. The results are reflective of the observed operation of this junction which is linked to the operation of Junction 1 which is located just 50m away.

Table 6-22 Junction 2: Priority Controlled

	AM						PM					
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity
Junction 2 - L2998/East CLiff Road - 2024												
Stream B-AC	D1	8.3	85.81	0.93	F	-14 %	D2	1.6	24.82	0.62	C	8 %
Stream C-AB		0.9	9.08	0.39	A	[Stream B-AC]		4.3	21.61	0.76	C	[Stream C-AB]
Junction 2 - L2998/East CLiff Road - 2026 Without Development												
Stream B-AC	D3	11.9	115.69	0.98	F	-17 %	D4	1.8	27.95	0.66	D	4 %
Stream C-AB		1.0	9.36	0.41	A	[Stream B-AC]		5.3	25.69	0.80	D	[Stream C-AB]
Junction 2 - L2998/East CLiff Road - 2026 With Development												
Stream B-AC	D5	17.9	163.02	1.04	F	-20 %	D6	3.1	42.92	0.77	E	-5 %
Stream C-AB		1.5	10.53	0.50	B	[Stream B-AC]		12.5	57.77	0.93	F	[Stream C-AB]
Junction 2 - L2998/East CLiff Road - 2031 Without Development												
Stream B-AC	D7	26.0	218.61	1.09	F	-23 %	D8	2.7	39.35	0.75	E	-4 %
Stream C-AB		1.3	10.04	0.46	B	[Stream B-AC]		10.5	48.79	0.91	E	[Stream C-AB]
Junction 2 - L2998/East CLiff Road - 2031 With Development												
Stream B-AC	D9	36.2	296.60	1.16	F	-25 %	D10	4.0	59.83	0.83	F	-12 %
Stream C-AB		2.0	11.74	0.56	B	[Stream B-AC]		26.5	118.19	1.02	F	[Stream C-AB]
Junction 2 - L2998/East CLiff Road - 2041 Without Development												
Stream B-AC	D11	54.3	468.28	1.26	F	-29 %	D12	6.0	80.63	0.90	F	-12 %
Stream C-AB		1.7	11.34	0.53	B	[Stream B-AC]		28.0	123.77	1.02	F	[Stream C-AB]
Junction 2 - L2998/East CLiff Road - 2041 With Development												
Stream B-AC	D13	67.4	613.37	1.34	F	-32 %	D14	19.3	209.07	1.12	F	-19 %
Stream C-AB		2.7	14.09	0.64	B	[Stream B-AC]		57.6	234.94	1.12	F	[Stream C-AB]

6.8.2.4 Junction 3: Ballinglanna Signalised Junction

The operation of this junction is currently restricted due to geometrical constraints which significantly reduces the capacity of the junction as evident in the results.

Table 6-23 Junction 3: Traffic Signal Controlled

			Without Development			With Phase 1 Development		
			DOS/RFC %	Queue (pcu)	Delay (s)	DOS/RFC %	Queue (pcu)	Delay (s)
Junction 3	2024	AM	84.4	13	80	N/A	N/A	N/A
		PM	88.6	15.8	70.5	N/A	N/A	N/A
	2026	AM	87.4	14.3	87.2	95.6	18	138
		PM	91.6	17.3	79	106.3	44.1	180.9
	2031	AM	94.4	18.4	110.3	103.4	28.2	206.9
		PM	99	24.1	118.6	114.1	68.5	290.1
	2041	AM	103.4	32.8	164.5	112.8	52.7	252.4
		PM	108.4	47.8	225	123.8	91	418.5

6.8.2.5 Junction 4: Priority 'T' Junction L2998 and Richmond Hill

The results show that this junction will operate within capacity both with/without development traffic for all future year scenarios.

Table 6-24 Junction 4: Priority Controlled Junction

	AM						PM					
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Network Residual Capacity
	Junction 4 - L2998/Richmond - 2024											
Stream B-AC	D1	0.2	14.86	0.18	B	59 % [Stream B-AC]	D2	0.2	10.71	0.14	B	104 % [Stream B-AC]
Stream C-AB		0.1	6.09	0.08	A			0.0	4.33	0.03	A	
	Junction 4 - L2998/Richmond - 2026 Without Development											
Stream B-AC	D3	0.2	15.42	0.19	C	54 % [Stream B-AC]	D4	0.2	10.91	0.15	B	97 % [Stream B-AC]
Stream C-AB		0.2	6.09	0.08	A			0.0	4.29	0.03	A	
	Junction 4 - L2998/Richmond - 2026 With Development											
Stream B-AC	D5	0.2	17.23	0.20	C	41 % [Stream B-AC]	D6	0.2	11.98	0.17	B	72 % [Stream B-AC]
Stream C-AB		0.2	5.82	0.11	A			0.1	4.21	0.05	A	
	Junction 4 - L2998/Richmond - 2031 Without Development											
Stream B-AC	D7	0.3	16.79	0.21	C	43 % [Stream B-AC]	D8	0.2	11.56	0.17	B	82 % [Stream B-AC]
Stream C-AB		0.2	6.07	0.09	A			0.1	4.21	0.04	A	
	Junction 4 - L2998/Richmond - 2031 With Development											
Stream B-AC	D9	0.3	18.58	0.23	C	32 % [Stream B-AC]	D10	0.2	12.76	0.19	B	60 % [Stream B-AC]
Stream C-AB		0.3	5.81	0.12	A			0.1	4.13	0.05	A	
	Junction 4 - L2998/Richmond - 2041 Without Development											
Stream B-AC	D11	0.3	19.03	0.26	C	30 % [Stream B-AC]	D12	0.2	12.52	0.19	B	67 % [Stream B-AC]
Stream C-AB		0.2	6.04	0.11	A			0.1	4.10	0.05	A	
	Junction 4 - L2998/Richmond - 2041 With Development											
Stream B-AC	D13	0.4	21.38	0.28	C	21 % [Stream B-AC]	D14	0.4	17.55	0.26	C	32 % [Stream B-AC]
Stream C-AB		0.4	5.80	0.14	A			0.1	4.29	0.07	A	

6.8.2.6 Junction 5: Proposed Development Access (Phase 1)

The proposed junction is seen to operate within capacity up to an including the Design Year 2041.

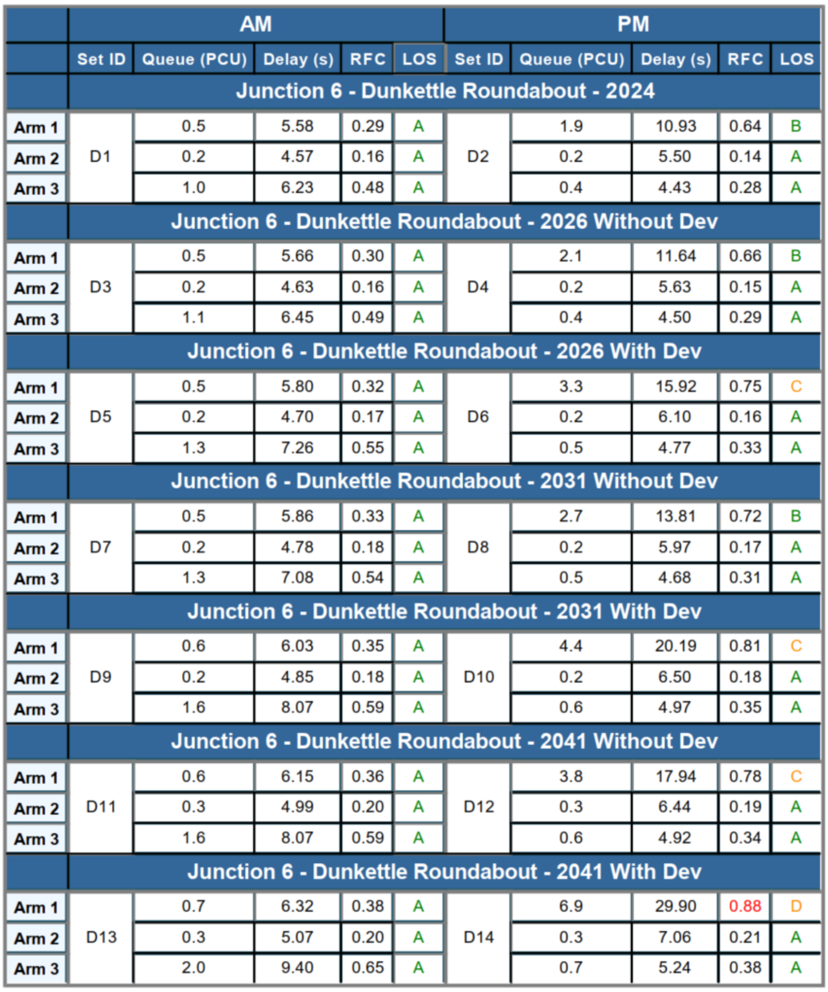
Table 6-25 Junction 5: Priority Controlled Junction

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Junction 5 - Development Access - 2024									
Stream B-AC	D1	0.0	0.00	0.00	A	D2	0.0	0.00	0.00	A
Stream C-AB		0.0	0.00	0.00	A		0.0	0.00	0.00	A
	Junction 5 - Development Access - 2026 Without Dev									
Stream B-AC	D3	0.0	0.00	0.00	A	D4	0.0	0.00	0.00	A
Stream C-AB		0.0	0.00	0.00	A		0.0	0.00	0.00	A
	Junction 5 - Development Access - 2026 With Dev									
Stream B-AC	D5	0.6	14.37	0.37	B	D6	0.6	16.88	0.35	C
Stream C-AB		0.1	4.89	0.06	A		0.6	7.59	0.26	A
	Junction 5 - Development Access - 2031 Without Dev									
Stream B-AC	D7	0.0	0.00	0.00	A	D8	0.0	0.00	0.00	A
Stream C-AB		0.0	0.00	0.00	A		0.0	0.00	0.00	A
	Junction 5 - Development Access - 2031 With Dev									
Stream B-AC	D9	0.7	15.00	0.38	C	D10	0.6	18.15	0.37	C
Stream C-AB		0.1	4.80	0.06	A		0.7	7.63	0.27	A
	Junction 5 - Development Access - 2041 Without Dev									
Stream B-AC	D11	0.0	0.00	0.00	A	D12	0.0	0.00	0.00	A
Stream C-AB		0.0	0.00	0.00	A		0.0	0.00	0.00	A
	Junction 5 - Development Access - 2041 With Dev									
Stream B-AC	D13	0.7	15.92	0.39	C	D14	0.7	20.04	0.39	C
Stream C-AB		0.1	4.69	0.07	A		0.8	7.68	0.29	A

6.8.2.7 Junction 6: Roundabout junction of the L2998/L3004 (Access to Dunkettle Interchange)

The proposed junction is seen to operate within capacity up to an including the Design Year 2041. Evening peak in 2041 with development traffic is seen to approach capacity.

Table 6-26 Junction 6: Roundabout Junction



	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	Junction 6 - Dunkettle Roundabout - 2024									
Arm 1	D1	0.5	5.58	0.29	A	D2	1.9	10.93	0.64	B
Arm 2		0.2	4.57	0.16	A		0.2	5.50	0.14	A
Arm 3		1.0	6.23	0.48	A		0.4	4.43	0.28	A
	Junction 6 - Dunkettle Roundabout - 2026 Without Dev									
Arm 1	D3	0.5	5.66	0.30	A	D4	2.1	11.64	0.66	B
Arm 2		0.2	4.63	0.16	A		0.2	5.63	0.15	A
Arm 3		1.1	6.45	0.49	A		0.4	4.50	0.29	A
	Junction 6 - Dunkettle Roundabout - 2026 With Dev									
Arm 1	D5	0.5	5.80	0.32	A	D6	3.3	15.92	0.75	C
Arm 2		0.2	4.70	0.17	A		0.2	6.10	0.16	A
Arm 3		1.3	7.26	0.55	A		0.5	4.77	0.33	A
	Junction 6 - Dunkettle Roundabout - 2031 Without Dev									
Arm 1	D7	0.5	5.86	0.33	A	D8	2.7	13.81	0.72	B
Arm 2		0.2	4.78	0.18	A		0.2	5.97	0.17	A
Arm 3		1.3	7.08	0.54	A		0.5	4.68	0.31	A
	Junction 6 - Dunkettle Roundabout - 2031 With Dev									
Arm 1	D9	0.6	6.03	0.35	A	D10	4.4	20.19	0.81	C
Arm 2		0.2	4.85	0.18	A		0.2	6.50	0.18	A
Arm 3		1.6	8.07	0.59	A		0.6	4.97	0.35	A
	Junction 6 - Dunkettle Roundabout - 2041 Without Dev									
Arm 1	D11	0.6	6.15	0.36	A	D12	3.8	17.94	0.78	C
Arm 2		0.3	4.99	0.20	A		0.3	6.44	0.19	A
Arm 3		1.6	8.07	0.59	A		0.6	4.92	0.34	A
	Junction 6 - Dunkettle Roundabout - 2041 With Dev									
Arm 1	D13	0.7	6.32	0.38	A	D14	6.9	29.90	0.88	D
Arm 2		0.3	5.07	0.20	A		0.3	7.06	0.21	A
Arm 3		2.0	9.40	0.65	A		0.7	5.24	0.38	A

6.8.2.8 Junction 7: Signal Controlled Junction of the R639 Glanmire Road/Church Hill Junction.

The proposed junction is seen to operate within capacity up to 2031 where it begins to approach capacity both with/without development traffic.

Table 6-27 Junction 7: Traffic Signal Controlled Junction

			Without Development			With Phase 1 Development		
			DOS/RFC %	Queue (pcu)	Delay (s)	DOS/RFC %	Queue (pcu)	Delay (s)
Junction 7	2024	AM	74.7	10.6	39.5	0	0	0
		PM	86.1	16.8	63.3	0	0	0
	2026	AM	77.2	12	28	77.9	12	43.7
		PM	89	18.2	69.6	91.9	20.4	77.5
	2031	AM	83.4	13.9	46.2	84.2	13.4	49.6
		PM	96	23.7	96.2	98.9	28	116.3
	2041	AM	91.5	17.6	59.9	92.2	17.6	65.1
		PM	105.4	43	185.7	108.3	54.4	223.9

6.8.2.9 Summary of Potential Significant Effects

Operational stage traffic will result in an increase in traffic flows on the surrounding roads network with the potential for queuing and delay occurring during peak periods as indicated in the modelling results presented for each junction.

Potential Direct effects of the operational phase on the Local Roads Network are:

- Increased traffic volumes on the local roads network;
- An increase in overall journey times;
- Increased risk of accidents due to heavier traffic volumes and more pedestrian/cyclists using the available sustainable travel modes;
- Increase in noise and air pollution from residential traffic;
- Potential for significant congestion at identified junctions;

In the absence of mitigation measures the **Direct** impact of the operational phase on the local roads network is **Negative** in quality, **Significant** significance, **Likely** probability, **Long-term** in duration.

Potential Indirect impacts of the operational phase on the local roads network are:

- Potential positive effect for an increase in sustainable travel modes with users opting for a modal shift to avoid congestion at junctions.
- Lack of dedicated Bus-Lanes implies Bus will be stuck in same queues as the private car;

In the absence of mitigation measures the **Indirect** impact of the operational phase on the local roads network is **Negative** in quality, **Significant** significance, **Likely** probability, **Long-term** in duration.

6.8.3 Cumulative Effects

In developing future year models industry standard growth rates (Central Growth for the Southwest Region) have been applied to background traffic for future year assessments to account for further development within the area. These growth rates make allowance for modal shift targets as set by national policy but do not take account of site-specific measures that may be implemented to mitigate against traffic generation from a particular development. The schemes accounted for include;

Nursing home and childcare facility at the former Glanmire Rectory (Reg. Ref. No.'s 19/38900 and 21/40423) - This is a care facility on a site adjacent to the site of the proposed development. Construction of the facility is partially completed but at the date of writing of this document is paused. If this development does re-commence, the level of traffic associated with the completion of the nursing home is not considered to be significant and the local road network can accommodate the additional traffic.

Residential development at Glanmire Lodge, Glanmire (Reg. Ref. No. 20/39719) - This is a residential development of 30 dwellings that is currently under construction on a site adjacent to the northern extent of the study area boundary.

The following scheme is partially complete but as outlined in the description below is expected to be complete before works on the proposed site commence. The traffic from this site has been included in addition to the standard growth rates. Table 6-28 presents the quantum of traffic expected which has been distributed onto all future year models.

Ballinglanna residential development (ABP Ref. SHD ABP-300543-18, Reg. Ref. No.'s 20/39179 and 23/42154) - This is a large residential development at Ballinglanna that is currently under construction by the applicant. The permitted developments are located to the north-east of the site of the proposed project. The final phase of this development is currently under construction. The applicant has noted that construction of the permitted developments at Ballinglanna will be close to completion or completed before works commence on the proposed project with traffic volumes associated with these works added to Baseline Traffic Matrices and therefore the cumulative effect has been accounted for.

In this instance the development of strategic transport corridors in-line with the CMATS study and BusConnects as well as the provision of a direct link to the East Cork Greenway. The following are a list of current schemes at varying stages of development.

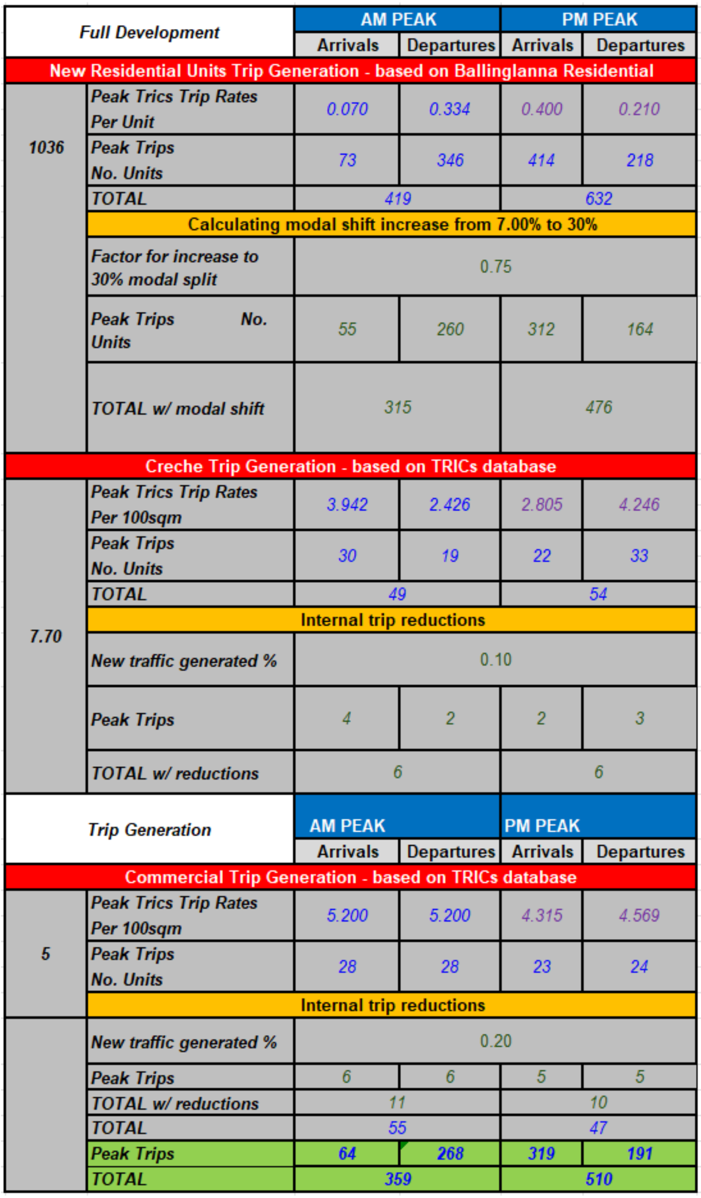
Glanmire Roads Improvement Scheme - This is a Part 8 scheme which involves a suite of projects to improve the accessibility, sustainability, capacity and safety of the transport network in the Glanmire, Riverstown and Sallybrook areas. The elements of the scheme planned and with funding secured in the vicinity of the study area are projects 1, 3, 9 I.e. Church Hill Junction, Glanmire Bridge / Village and Dunkettle Road upgrade respectively. Projects 1, 3, and 9A of this scheme commenced in Feb 2022, with substantial completion achieved in Q1 2023. Some works are currently continuing. Project 9B (Dunkettle Road South – Woodville to Dunkettle) has yet to commence but is at detailed design stage. The construction of this element of the scheme and other remaining approved projects has the potential to overlap with the construction of the proposed development.

Glanmire to City Centre Cycle Route – This is a Part 8 Scheme by the local authority to provide dedicated cycle tracks and improved pedestrian footpaths between Glanmire and the city centre. Phase 1A comprises improved pedestrian and cycling facilities along the Glashaboy River, from Glanmire village to the Dunkettle / Tivoli Roundabout. This development is located west of our site, separated by the Glashaboy River. Works commenced on Phase 1A of the scheme in January 2024 and is scheduled to be completed by Q4 2024

6.8.3.1 Full Development including Phase 2 (Combined total of c. 1036 residential units)

Traffic generation from the next Phase of this scheme and including Dunkettle House in its existing form has been added to the developed traffic models. Table 6-28 presents the expected future generation from a fully completed Dunkettle Site.

Table 6-28 Traffic Generation from a fully completed site (1036 units)

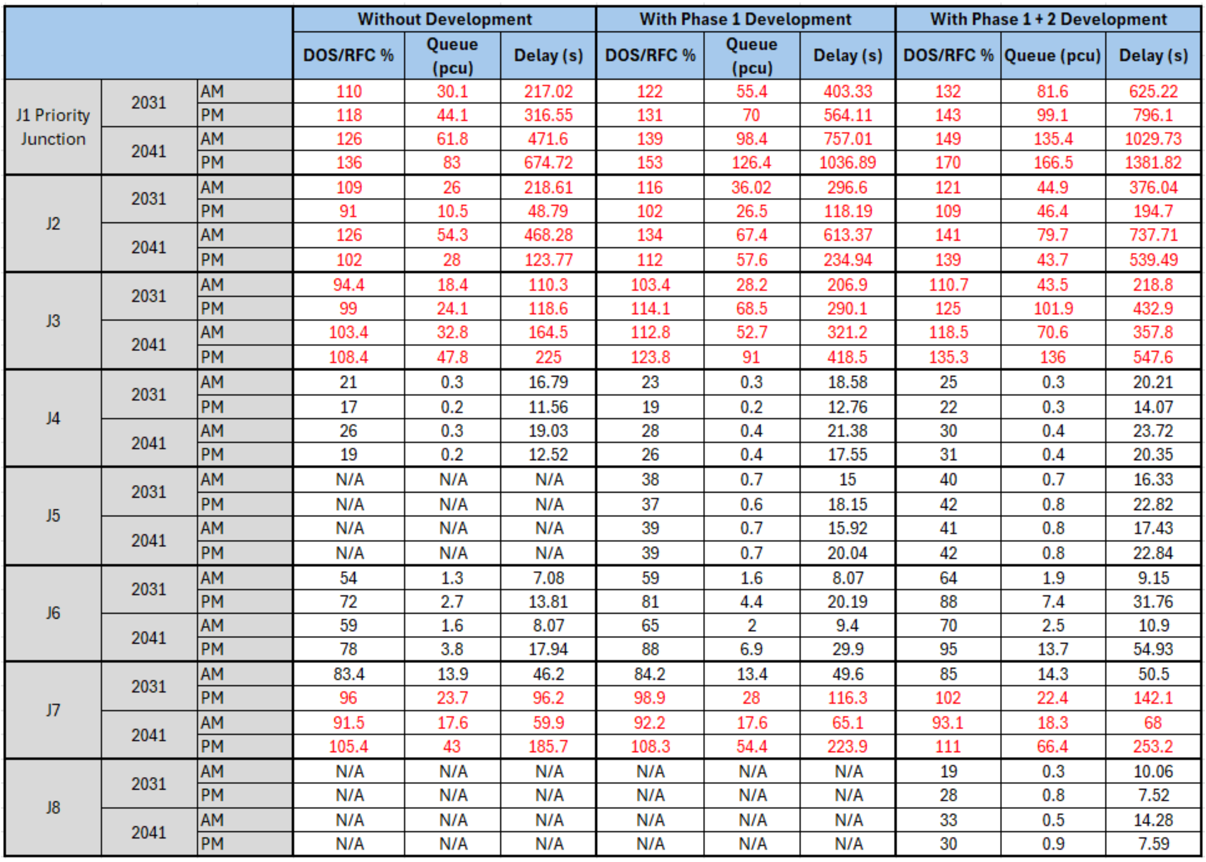


Full Development		AM PEAK		PM PEAK	
		Arrivals	Departures	Arrivals	Departures
New Residential Units Trip Generation - based on Ballinglanna Residential					
1036	Peak Trics Trip Rates Per Unit	0.070	0.334	0.400	0.210
	Peak Trips No. Units	73	346	414	218
	TOTAL	419		632	
	Calculating modal shift increase from 7.00% to 30%				
	Factor for increase to 30% modal split	0.75			
	Peak Trips No. Units	55	260	312	164
	TOTAL w/ modal shift	315		476	
Creche Trip Generation - based on TRICs database					
7.70	Peak Trics Trip Rates Per 100sqm	3.942	2.426	2.805	4.246
	Peak Trips No. Units	30	19	22	33
	TOTAL	49		54	
	Internal trip reductions				
	New traffic generated %	0.10			
	Peak Trips	4	2	2	3
	TOTAL w/ reductions	6		6	
Trip Generation		AM PEAK		PM PEAK	
		Arrivals	Departures	Arrivals	Departures
Commercial Trip Generation - based on TRICs database					
5	Peak Trics Trip Rates Per 100sqm	5.200	5.200	4.315	4.569
	Peak Trips No. Units	28	28	23	24
	Internal trip reductions				
	New traffic generated %	0.20			
	Peak Trips	6	6	5	5
	TOTAL w/ reductions	11		10	
	TOTAL	55		47	
	Peak Trips	64	268	319	191
	TOTAL	359		510	

Traffic models for future year scenarios (2031 & 2041) have been developed to assess the cumulative impact of a fully completed scheme on the roads network. Traffic generation as outlined above has been added to base models which include the fully completion of the existing Ballinglanna Site.

Table 6-29 present the results both with/without development for these future years on the current network (no mitigation measures applied). (*Note: red highlighted figures imply that the junction is operating over capacity.)*

Table 6-29 Traffic Modelling Results for a fully completed site (1036 residential units)



			Without Development			With Phase 1 Development			With Phase 1 + 2 Development		
			DOS/RFC %	Queue (pcu)	Delay (s)	DOS/RFC %	Queue (pcu)	Delay (s)	DOS/RFC %	Queue (pcu)	Delay (s)
J1 Priority Junction	2031	AM	110	30.1	217.02	122	55.4	403.33	132	81.6	625.22
		PM	118	44.1	316.55	131	70	564.11	143	99.1	796.1
	2041	AM	126	61.8	471.6	139	98.4	757.01	149	135.4	1029.73
		PM	136	83	674.72	153	126.4	1036.89	170	166.5	1381.82
J2	2031	AM	109	26	218.61	116	36.02	296.6	121	44.9	376.04
		PM	91	10.5	48.79	102	26.5	118.19	109	46.4	194.7
	2041	AM	126	54.3	468.28	134	67.4	613.37	141	79.7	737.71
		PM	102	28	123.77	112	57.6	234.94	139	43.7	539.49
J3	2031	AM	94.4	18.4	110.3	103.4	28.2	206.9	110.7	43.5	218.8
		PM	99	24.1	118.6	114.1	68.5	290.1	125	101.9	432.9
	2041	AM	103.4	32.8	164.5	112.8	52.7	321.2	118.5	70.6	357.8
		PM	108.4	47.8	225	123.8	91	418.5	135.3	136	547.6
J4	2031	AM	21	0.3	16.79	23	0.3	18.58	25	0.3	20.21
		PM	17	0.2	11.56	19	0.2	12.76	22	0.3	14.07
	2041	AM	26	0.3	19.03	28	0.4	21.38	30	0.4	23.72
		PM	19	0.2	12.52	26	0.4	17.55	31	0.4	20.35
J5	2031	AM	N/A	N/A	N/A	38	0.7	15	40	0.7	16.33
		PM	N/A	N/A	N/A	37	0.6	18.15	42	0.8	22.82
	2041	AM	N/A	N/A	N/A	39	0.7	15.92	41	0.8	17.43
		PM	N/A	N/A	N/A	39	0.7	20.04	42	0.8	22.84
J6	2031	AM	54	1.3	7.08	59	1.6	8.07	64	1.9	9.15
		PM	72	2.7	13.81	81	4.4	20.19	88	7.4	31.76
	2041	AM	59	1.6	8.07	65	2	9.4	70	2.5	10.9
		PM	78	3.8	17.94	88	6.9	29.9	95	13.7	54.93
J7	2031	AM	83.4	13.9	46.2	84.2	13.4	49.6	85	14.3	50.5
		PM	96	23.7	96.2	98.9	28	116.3	102	22.4	142.1
	2041	AM	91.5	17.6	59.9	92.2	17.6	65.1	93.1	18.3	68
		PM	105.4	43	185.7	108.3	54.4	223.9	111	66.4	253.2
J8	2031	AM	N/A	N/A	N/A	N/A	N/A	N/A	19	0.3	10.06
		PM	N/A	N/A	N/A	N/A	N/A	N/A	28	0.8	7.52
	2041	AM	N/A	N/A	N/A	N/A	N/A	N/A	33	0.5	14.28
		PM	N/A	N/A	N/A	N/A	N/A	N/A	30	0.9	7.59

6.8.4 Summary

The following Table summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 6-30 Summary of Construction Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
HGV's using minor Roads to access the site	Negative	Significant	Extent 1,2	Likely	Medium-term	Direct
Additional queueing at critical junctions	Negative	Significant	Extent 1,2	Likely	Medium-term	Direct
Site vehicles binging mud/silt onto roads network	Negative	Significant	Extent 1,2	Likely	Medium-term	Direct
Additional noise due to steep nature of site	Negative	Significant	Extent 1,2	Likely	Medium-term	Direct

In respect of Extent listed in Table above, the following meanings apply:

Extent 1 – Junctions and Link Roads to the north of the Scheme Entrance (Glanmire Direction)

Extent 2 - Junctions and Link Roads to the south of the Scheme Entrance (Dunkettle Interchange Direction)

The following Table summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 6-31 Summary of Operational Phase Likely Significant in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Increased traffic volumes on the local roads network	Negative	Significant	Extent 1,2	Likely	Long-term	Direct
An increase in overall journey times	Negative	Significant	Extent 1,2	Likely	Long-term	Direct
Increased risk of accidents due to heavier traffic volumes and more pedestrian/cyclists using the available sustainable travel modes	Negative	Significant	Extent 1,2	Likely	Long-term	Direct
Increase in noise and air pollution from residential traffic	Negative	Significant	Extent 1,2	Likely	Long-term	Direct
Potential for significant congestion at identified junctions	Negative	Significant	Extent 1,2	Likely	Long-term	Direct

In respect of Extent listed in Table above, the following meanings apply:

Extent 1 – Junctions and Link Roads to the north of the Scheme Entrance (Glanmire Direction)

Extent 2 - Junctions and Link Roads to the south of the Scheme Entrance (Dunkettle Interchange Direction)

6.9 Mitigation Measures

6.9.1 Construction Phase Mitigation

As part of this application a Construction Environmental Management Plan (CEMP) has been developed which includes Traffic Management Plan. This traffic management plan has identified the optimum route for construction access and quantifies the expected maximum daily HGV movements to and from site (ie, 15 no. HGV’s 30 trips). It is concluded, from a junction capacity assessment perspective, that the operational phase of the scheme will generate more traffic during the peak traffic periods than the construction stage. Operational phase junction models therefore present a worst-case scenario in terms of impact for the modelled network.

The recorded HGV (Heavy Goods Vehicles) content on the L2998 is 2%. The development of the site will see this percentage increase to 4.5% during the construction stage of the scheme, estimated at a maximum of 15 no. HGV’s/day. This equates to 30 HGV movements per day.

In addition, allowance is made for a maximum of 120 workers/staff on-site (4 movements per employee including for lunch break) giving an overall construction phase traffic generation of 430 movements per day. This would equate to an increase in the AADT of 4.321% on the L2998 to 10,381 vehicles.

The developed CEMP proposes mitigation measures to minimise the impact of this increase:

- A Construction & Environmental Management Plan coupled with a Construction Stage Traffic Management Plan has been developed by the appointed engineers for the scheme. These plans seek to minimise the number of materials imported and exported from site as well as minimising construction stage traffic. These plans are to be updated by the appointed Main contractor(s).
- The Contractor’s Construction Traffic Management Plan will identify suitable routes to accommodate HGV traffic and will include specific times of operation. These times will ideally avoid peak hour traffic times as identified in this assessment.
- An on-site wheel wash facility will ensure no site material is brought on to the public roads network.

6.9.2 Operational Phase Mitigation

Several mitigation measures are proposed to increase the capacity of the junctions listed below which are required both with/without development traffic. These measures include the signalisation of Junction 1, the incorporation of new line markings for Junction 2 and making geometric improvements to Junction 3 which will facilitate changes to the phasing of the signals to improve capacity. Further measures include the introduction of a new bus route to serve the area (Route 2A) which is an NTA funded scheme due to open Q4 2024.

The negatively impacted junctions are identified as follows:

- Junction 1: The Glanmire Bridge/Glanmire Road Priority Junction
- Junction 2: Priority Junction of East Cliffe Road and the L2998
- Junction 3: Ballinglanna Signal Controlled Junction.
- Junction 7: R639/Church Hill Signal Controlled Junction

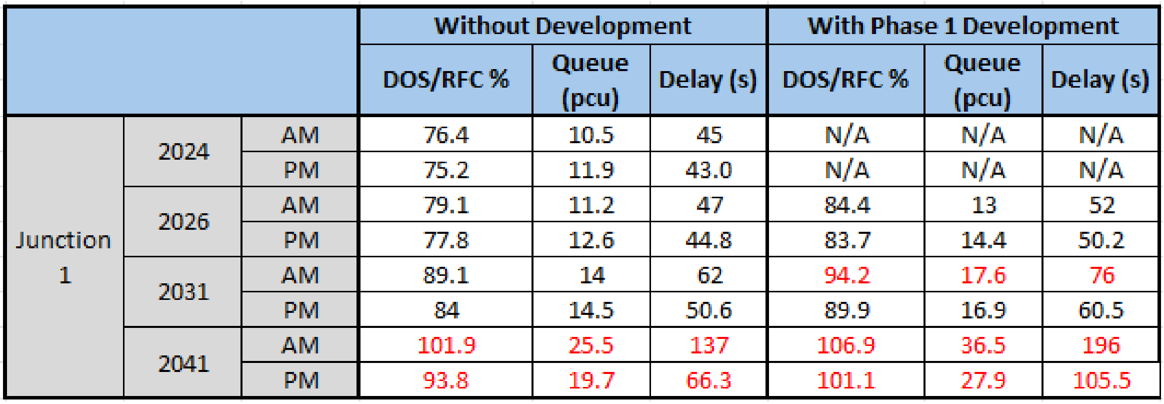
6.9.2.1 Junction 1: R639 Glanmire Road/Glanmire Bridge

The recommendation is that this junction becomes traffic signal controlled which will also facilitate the proposed new 2A Bus route.

Table 6-32 presents the modelled results showing the signalisation of this junction. The junction is seen to operate within capacity up to 2031 with no development. With Phase 1 development traffic included the AM peak period in 2031 is seen to be marginally failing with a modest delay incurred. When compared to the current operation of the junction the future year results when signalised are much more favourable.

As previously outlined the current modal shift in this area (7%) is significantly below the Cork City average of 33%. This is based on limited viable alternatives to the private car currently in the area. This is set to change, and it is expected that this will result in a reduction in background traffic flows. The modelled results include applying growth to background traffic flows implying that the results shown are a worst-case scenario. The developed Mobility Management Plan seeks to promote sustainable travel options which will help grow the modal shift in the general area thereby reducing flows.

Table 6-32 Junction 1: Traffic Signal Controlled Junction



			Without Development			With Phase 1 Development		
			DOS/RFC %	Queue (pcu)	Delay (s)	DOS/RFC %	Queue (pcu)	Delay (s)
Junction 1	2024	AM	76.4	10.5	45	N/A	N/A	N/A
		PM	75.2	11.9	43.0	N/A	N/A	N/A
	2026	AM	79.1	11.2	47	84.4	13	52
		PM	77.8	12.6	44.8	83.7	14.4	50.2
	2031	AM	89.1	14	62	94.2	17.6	76
		PM	84	14.5	50.6	89.9	16.9	60.5
	2041	AM	101.9	25.5	137	106.9	36.5	196
		PM	93.8	19.7	66.3	101.1	27.9	105.5

6.9.2.2 Junction 2: East Cliff Road and the L2998

The signalisation of Junction 1 as presented will improve the operation of this junction. It is recommended that a ‘Yellow box’ junction be provided on the L2998 to facilitate some level of right turners from East Cliff Road. The option of including this junction as part of the signalisation of Junction 1 could be investigated.

A further consideration will be the opening of the link road through Ballinglanna Residential Development to Fernwood and the L3010 Glanmire Village. This link will provide an alternative route for vehicles currently using Junction 2. It is recommended that the operation of Junction 2 be reconsidered when this link road is in operation.

6.9.2.3 Junction 3: Ballinglanna Signalised Junction

It is recommended that the existing junction be upgraded to facilitate the revised phasing which will significantly improve the capacity of Junction 3. Once upgraded the junction is seen to operate within capacity both with/without development traffic. Figure 6-15 presents the upgrade works recommended.

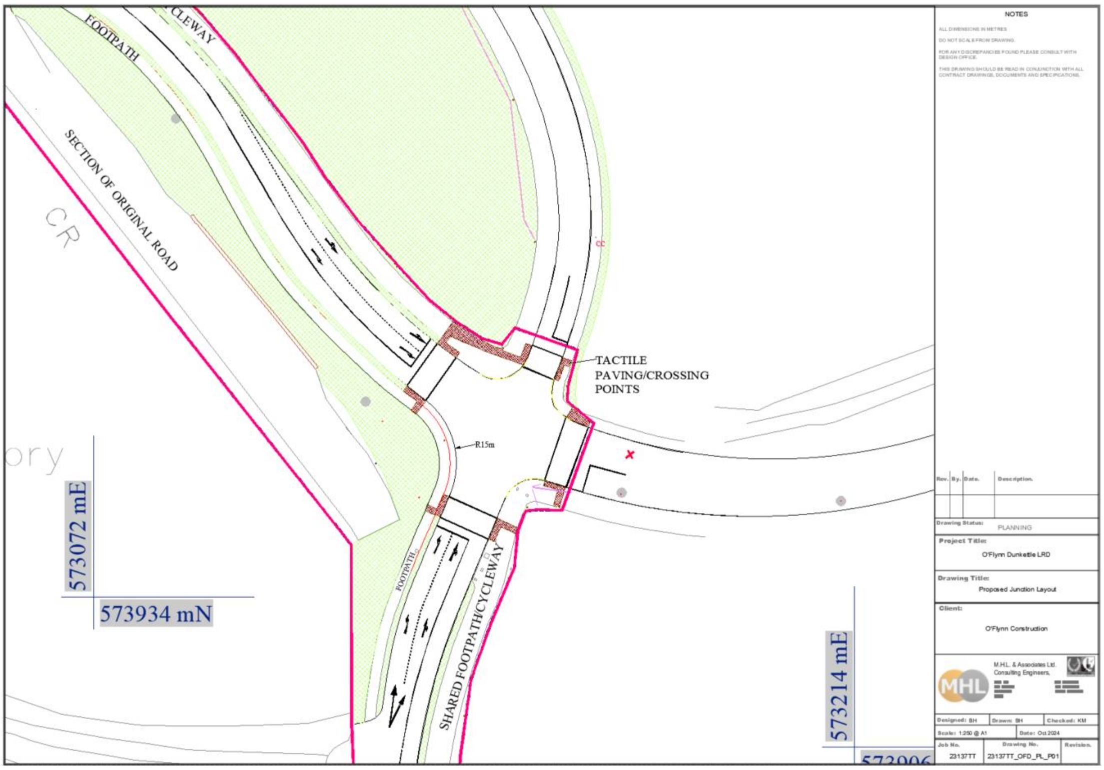


Figure 6-15 Ballinglanna Junction Geometric Upgrade Works

Table 6-33 presents the results of an ‘Upgraded’ Junction 3 accounting for the anticipated re-routing of traffic when the Fernwood Connection is opened (2024). The junction is seen to operate within capacity for future years with/without development traffic. The redistribution of traffic on the network when Junction 3 becomes fully operational will result in less traffic on Junction 2 (East Cliff Road) which will further improve the operational characteristics of this junction.

Table 6-33 Junction 3: Traffic Signal Controlled Junction - Upgraded Junction

			Without Development			With Phase 1/2 Development		
			DOS/RFC %	Queue (pcu)	Delay (s)	DOS/RFC %	Queue (pcu)	Delay (s)
Junction 3 Upgraded Re-routed Traffic	2024	AM	N/A	N/A	N/A	N/A	N/A	N/A
		PM	N/A	N/A	N/A	N/A	N/A	N/A
	2026	AM	64.2	9.3	51.2	65.8	9.5	51.7
		PM	61.2	6.7	59.5	68.5	7.8	62.9
	2031	AM	69.4	10.4	53.1	72.3	11.1	54.1
		PM	66.2	7.4	61.3	76.3	10.2	69.6
	2041	AM	76	12	56.6	78	12.5	57.9
		PM	72.4	8.5	64.2	82.9	11.6	74.8

6.9.2.4 Junction 7: Signal Controlled Junction of the R639 Glanmire Road/Church Hill Junction

It is anticipated that an improved modal shift in future years will result in a reduction in background traffic flows which will have a positive impact on this junction. No remedial measures are recommended at present.

6.9.2.5 Summary of Mitigation Measures

It has been clearly demonstrated that the site the subject of this EIAR falls within the category of development where the use of sustainable transport solutions will be a real option. This premise is further supported by the Local Authority and the National Transport Authority's commitment to the delivery of CMATS measures in the coming years. The proposed development will impact on the surrounding roads network for both construction and operational phases. Public realm works necessary for the development have already been completed as part of earlier NTA Schemes, namely the upgrade of the L2998 to include a right turn lane to facilitate the development as well as the provision of dedicated off-road cycle and pedestrian facilities serving Glanmire.

To minimise disruption to the local roads network during the operational phase, the following mitigation measures are proposed.

- It is proposed to make the site permeable to the surrounding roads network ensuring it will be connected to existing and proposed cycle/pedestrian linkages to public transport offerings, schools, retail and amenity destinations.
- The proposed new access arrangement onto the L2998 is safe and suitable and is in accordance with the Design Manual for Roads & Bridges (DMRB) and the Design Manual for Urban Roads & Streets (DMURS).
- The traffic impact assessment carried out has included the re-distribution of traffic via Junction 3 when the Fernwood link road is open. This will facilitate traffic heading towards Glanmire Centre to use this route as an alternative to Junction 2 East Cliff Road.
- Junction 3 upgrade works will significantly improve the capacity of this junction which has the capacity to cater for all phases of development.
- The signalisation of Junction 1 R639/Glanmire Bridge is seen to improve traffic flows, specifically for the minor arm serving the development.
- The site benefits from being near regular public transport provision, within walking distance of the site, which enables journeys throughout Cork City to the west and Little Island, Carrigtwohill and Midelton to the East.
- The site is adjacent to the Dunkettle Interchange, accessed from the site via Junction 6, which has been recently upgraded to a free-flow interchange. This interchange provides direct access to the N40, M8 and the N25 reducing development traffic impacting on the local roads network (Glanmire Direction).
- The introduction of a new bus route to serve the area (Route 2A) which is an NTA funded scheme due to open Q4 2024

It is the intention of the applicant to develop all sustainable routes associated with the site as part of the first phase of the scheme implying that access to the East Cork Greenway, Little Island train station and the re-routed Bus 2A will be available for new residents. This infrastructure may also result in an improvement in the modal shift percentage in the wider area implying background traffic flows could reduce as opposed to grow.

Mitigation measures as outlined should only be implemented when necessary.

6.10 Residual Impact Assessment

Assuming the full and proper implementation of the mitigation measures set out herein; and given that the design, construction and operation of the final scheme will be in accordance with the plans submitted; it is considered that the residual impact on the local roads network of the proposed development will be Slightly **Negative** in quality, **Significant** significance, **Likely** probability, **Long-term** in duration.

6.10.1 Construction Phase

Potential **Direct** effects of the construction phase on the local roads network after mitigation measures have been implemented are:

- Potential for road surface failure due to increased HGV content on the Local Roads Network.
- Silting of roadside drainage systems.
- Degradation of the wearing course on the roads network.
- Loss of peak hour capacity resulting in queues and delay.
- Driver frustration leading to an increase in accident potential

6.10.2 Operational Phase

Potential **Direct** effects of the operational phase on the local roads network after mitigation measures have been implemented are:

- Potential for an increase in sustainable travel modes due to congestion at junctions (positive impact).
- Loss of peak hour capacity resulting in queues and delay;
- Driver frustration leading to an increase in accident potential;

6.10.3 Summary of Post-Mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 6-34 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Increase in HGV Content	Negative	Significant	Extent 3	Likely	Medium-term	Direct Indirect
Contaminating Road Surface	Negative	Significant	Extent 3	Unlikely	Medium-term	Direct Indirect
Noise Generation	Negative	Significant	Extent 3	Likely	Medium-term	Direct
Increase in queue lengths	Negative	Significant	Extent 3	Unlikely	Medium-term	Direct

In respect of Extent listed in Table 6-34 above, the following meanings apply:

Extent 3 – Includes all Junctions within the Study Area

The following Table summarises the identified likely significant residual effects during the operational phase of the proposed development following the application of mitigation measures.

Table 6-35 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Increase in Traffic Flow	Negative	Significant	Extent 3	Likely	Long-term	Direct
Increase in modal shift	Positive	Significant	Extent 3	Likely	Long-term	Direct Indirect
Noise Generation	Negative	Insignificant	Extent 3	Likely	Long-term	Direct
Increase in queue lengths	Negative	Significant	Extent 3	Likely	Long-term	Direct Indirect
Increase in accident occurrence	Negative	Significant	Extent 3	Unlikely	Long-term	Direct Indirect

In respect of Extent listed in Table 6-35 above, the following meanings apply:

Extent 3 – Includes all Junctions within the Study Area

6.10.4 Cumulative Residual Effects

The following Table summarises the identified likely significant residual effects during the cumulative phase of the proposed development following the application of mitigation measures.

Table 6-36 Summary of Cumulative Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Increase in Traffic Flow	Negative	Significant	Extent 3	Likely	Long-term	Direct
Increase in modal shift	Positive	Significant	Extent 3	Likely	Long-term	Direct Indirect
Noise Generation	Negative	Insignificant	Extent 3	Likely	Long-term	Direct
Increase in queue lengths	Negative	Significant	Extent 3	Likely	Long-term	Direct Indirect
Increase in accident occurrence	Negative	Significant	Extent 3	Unlikely	Long-term	Direct Indirect

In respect of Extent listed in Table 6-36 above, the following meanings apply:

Extent 3 – Includes all Junctions within the Study Area

6.11 Risk of Major Accidents or Disasters

6.11.1 Overview

The proposed development has been designed and will be constructed in line with best practice and, as such, major accidents and / or natural disasters will be low. The identification, control, and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle.

The following major accidents or disasters involving transportation could potentially occur:

- Overturning of HGV traffic on the local roads network;
- Spillage of materials on the trafficked carriageway;
- Road accidents involving machinery;
- Accidents involving vehicles or machinery through trespass onto the site;
- With the provision of connections to Greenways and public transport there is an increased risk of accidents between pedestrians/cyclist/motor vehicles.

Measures to mitigate risks associated with the Construction and operational Phases are described in above and in consideration of such mitigation measures, the risk of major accidents or disasters is considered not to be significant.

6.11.2 Road Collision Database

There is currently no road collision data available.

The proposed development will include several measures that are deemed necessary to improve road safety in the area. These measures include an access road designed to DMRB standards as well as full pedestrian/cycle connectivity to the proposed adjoining Greenway and the wider roads network.

Junction 3: The Cross-roads signalised junction Ballinglanna will be upgraded to improve operational safety.

A Stage 1 & 2 Road Safety Audit of the internal layout was carried out and is presented as a separate document in the submission.

6.12 Worst Case Scenario

6.12.1 Construction Phase

In the construction phase the following are credible worst case scenarios involving transportation that may occur:

- Major accident on the public road network because of materials being brought to site;
- Release of chemicals onto the surface carriageway on the local roads network with the potential for widespread chemical contamination, risk to human health and risk to the natural environment;

The Construction Phase mitigation measures described above, to be implemented in the Contractor's CEMP, inlcuding the Traffic Management measures, are intended to minimise the risk of such occurrences and will be strictly adhered to.

6.12.2 Operational Phase

In the evaluation of traffic impact, the future year junction performance assessments undertaken also include traffic flows to be generated by other nearby planned developments, as well as robust growth factors by the TII. Therefore, the predicted effects on surrounding junction performance outlined in this chapter represent a worst-case scenario.

In the operational phase, either in normal operation or during maintenance, the following are credible worst case scenarios involving transportation that may occur:

- Development traffic will incur significant delay at junctions on a regular basis;
- Internal within the scheme a breakdown of a Refuse/Delivery truck will restrict movement in/out of the scheme;
- Breakage and/or outage of electrical distribution services will result in controlled junctions becoming uncontrolled and hazardous to pedestrian/cycle movements.

6.13 Interactions

Interactions associated with transportation with other aspects of the environment are listed below.

6.13.1 Population and Human Health

The following activities may result in an impact on population and human health:

Construction Phase activities:

- HGV's interacting with normal traffic, both vehicular and pedestrian;
- Emergency access routes to the site restricted by construction traffic;
- Spillage of hazardous material in the public realm;

Operational Phase activities:

- Increase in traffic volumes on the local roads network;
- Queues and delay leading to driver frustration;
- Potential for interaction between cyclists/pedestrians on the proposed greenway through the site.

Refer to Chapter 4: Population & Human Health for an assessment of associated impacts.

6.13.2 Land & Soils

The following activities may result in an impact on Land & soils:

Construction Phase activities:

- Construction based traffic contaminating the Local Roads Network resulting in slippery surfaces;
- HGV traffic resulting in dust emissions;
- Spillage of hazardous material in the public realm;

Operational Phase activities:

- Spillage of carbon-based fuels from development-based traffic into the environment.

Refer to Chapter 9: Lands & Soils for an assessment of associated impacts.

6.13.3 Water & Hydrology

The following activities may result in an impact on Water & Hydrology:

Construction Phase activities:

- Spillage of hazardous material in the public realm;

Operational Phase activities:

- Spillage of carbon-based fuels from development-based traffic into the environment.

Refer to Chapter 10: Water & Hydrology for an assessment of associated impacts.

6.13.4 Biodiversity

The following activities may result in an impact on Biodiversity:

Construction Phase activities:

- Spillage of hazardous material in the public realm;

Operational Phase activities:

- Spillage of carbon-based fuels from development-based traffic into the environment;

Refer to Section 11: Biodiversity for an assessment of associated impacts.

6.13.5 Air Quality and Climate

The following activities may result in an impact:

- 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. Also, with increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase.

Refer to Chapters 13 + 14, Air Quality and Climate, for an assessment of associated impacts.

6.14 Monitoring

The following specific monitoring measures over and above expected normal construction and operational practices for such a development are proposed:

Construction Phase:

- HGV movements to from the site (dedicated routes);
- Operating times for deliveries to and from the site;

Operational Phase:

- On-going monitoring of modal shift patterns in the area (National Census timeline);
- On-going collection of traffic generation data from the site (once a year);
- Monitoring of the operational characteristics of junctions within the study area (annual review);

It is recommended that on-going monitoring of the critical junctions is carried out to determine the impact of the construction stage of the scheme as phases of the development become occupied.

6.15 Summary of Mitigation and Monitoring

The following Table summarises the Construction Phase mitigation and monitoring measures.

Table 6-37 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
HGV's using minor Roads to access the site	Implement the Construction Environmental Management Plan (CEMP)	on-going
Additional queueing at critical junctions	Implement the Construction Traffic Management Plan (CTMP)	on-going

The following Table summarises the Operational Phase mitigation and monitoring measures.

Table 6-38 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Increased traffic volumes on the local roads network	Implement the proposed junction upgrade works	on-going
Potential for significant congestion at identified junctions	Constructed Cycle Pedestrian Links	Monitoring of sustainable transport usage

6.16 Conclusion

The construction and operation phase of the scheme has the potential to result in environmental impacts on the local roads network both during the construction phase and the operational phase. Mitigation measures as described in this chapter shall be implemented during the construction phase and during the operational phase to minimise the risk of impact on the environment.

6.17 References and Sources

- National Roads Authority (May 2014) Traffic and Transport Assessment Guidelines NRA, Dublin
- Institution of Highways & Transportation (1994) Guidelines for Traffic Impact Assessment IHT, London
- National Roads Authority (2000) Road Geometry Handbook NRA, Dublin
- National Roads Authority (revised 2003) Design Manual for Roads and Bridges NRA, Dublin
- National Roads Authority (November 2004) Draft Traffic and Transport Assessment Guidelines NRA, Dublin
- RSA Ireland Road Collisions
- http://www.rsa.ie/RSA/Road-Safety/Our-Research/Ireland-Road-Collisions/
- EPA (2022). *Guidelines on the information to be contained in Environmental Impact Assessment Reports.*
- EPA (2015). *Draft Advice Notes on Current Practice in the Preparation of Environmental Impact*
- *Statements.*
- NRA (2008). *Environmental Impact Assessment of National Road Schemes – A Practical Guide.*

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 7

Material Assets: Built Services

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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7 Material Assets: Built Services

7.1 Introduction

Material assets are resources that are valued and intrinsic to the site of the proposed development and the surrounding area. These may be of either natural or human origin and the value may arise for economic or cultural reasons. This chapter considers and assesses the effects of the proposed development on the material assets, including the existing major utilities within and around the site, during the construction and operational phases.

In relation to material assets, the EPA (2022) Guidelines on the information to be contained in the Environmental Impact Assessment Reports states that:

> *"In Directive 2011/92/EU this factor included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils."*

In this instance 'built services' is taken to mean surface water drainage, foul water drainage, water supply and utilities (electricity, gas and telecommunications) infrastructure in the receiving environment. Traffic-related impacts have been addressed under the scope of Chapter 6 (Material Assets: Traffic & Transport). Water quality and other hydrological / hydrogeological impacts of the proposed development have been assessed under the scope of Chapter 10 (Water & Hydrology).

7.2 Expertise & Qualifications

This chapter has been prepared by Paul Murphy, Director at JODA Engineering Consultants regarding water supply, surface water drainage systems, wastewater drainage systems, and John Kelleher MSc., C.Eng., M.C.I.B.S.E., Managing Director at John Kelleher & Associates Building Services Engineers regarding electricity, telecommunications, public lighting and gas.

Paul Murphy BE, MSc, CEng, MIEI, MIStructE, FConsEI, Managing Director of JODA Engineering Consultants, Paul has 38 years experience in planning, designing and directing the construction of developments in Ireland and in the UK, including large residential development projects and EIARs.

7.3 Proposed Development

The development is described in Chapter 2 of this EIAR. The following is relevant to the assessment of Built Services.

7.3.1 Aspects Relevant to this Chapter

7.3.1.1 Overview of current project design status

In respect of the proposed phasing of development as described in Chapter 1, at the writing of this document the assessment described in this chapter is on basis of a design status of the services infrastructure and facilities for the development as follows:

LRD Phase 1 – A detailed design of the following services has been performed: Surface Water drainage, Wastewater drainage, Water Supply Services and Public Lighting.

LRD Phase 2 – An overall outline scheme for the following services has been considered but a detailed design of services has not been performed: Surface water drainage services, Wastewater drainage services and water supply services and Public Lighting.

Dunkettle House – At present there is no proposed development scheme for Dunkettle house and so there is no design scheme for new services as follows: Surface water drainage services, Wastewater drainage services and water supply services and Public Lighting. The current situation will remain.

7.3.1.2 Surface Water Drainage services

A surface water drainage system has been designed for Phase 1 of the overall development to provide for the operational requirements of Phase 1 of the development.

The proposed surface water drainage system has been designed in accordance with the Storm Water & Flood Risk Management Requirements of Cork City Council and in accordance with the technical guidelines of the Greater Dublin Strategic Drainage Study (GDSDS).

Sustainable drainage systems (SuDS) features incorporated in the design include green roofs, tree pits, swales, ponds, percolation areas, petrol interceptors and flow control devices in accordance with CIRIA publication C753 SuDS Manual. These design features will aid in managing rainwater close to where it falls, allow rainwater to soak into the ground, promote evapotranspiration, slow down and store runoff, treat runoff to reduce contamination through pollution prevention and controlling the runoff at source and reduce the risk of urban contaminants causing environmental pollution.

The surface water catchments of the proposed drainage system is shown in Figure 7-1 below and will respect the overall surface water catchment regime of the existing site. Catchment 1 drains eastwards towards Dunkettle Road discharging to an existing engineered piped system on Dunkettle Road. The majority of Catchment 2a drains northwards to Glashaboy river with a discharge point to the river north of the Cork Harbour Special Protection Area (SPA). A small portion of Catchment 2a consists of the pedestrian connection from the north end of the development to Glanmire village that will drain to an existing surface water drain on Dunkettle Road. Catchment 3 drains westwards towards Glashaboy river with a discharge point to the river at the Cork Harbour SPA. Catchment 4 drains eastwards towards Dunkettle Road with discharge to the existing surface water drainage system on Dunkettle Road.

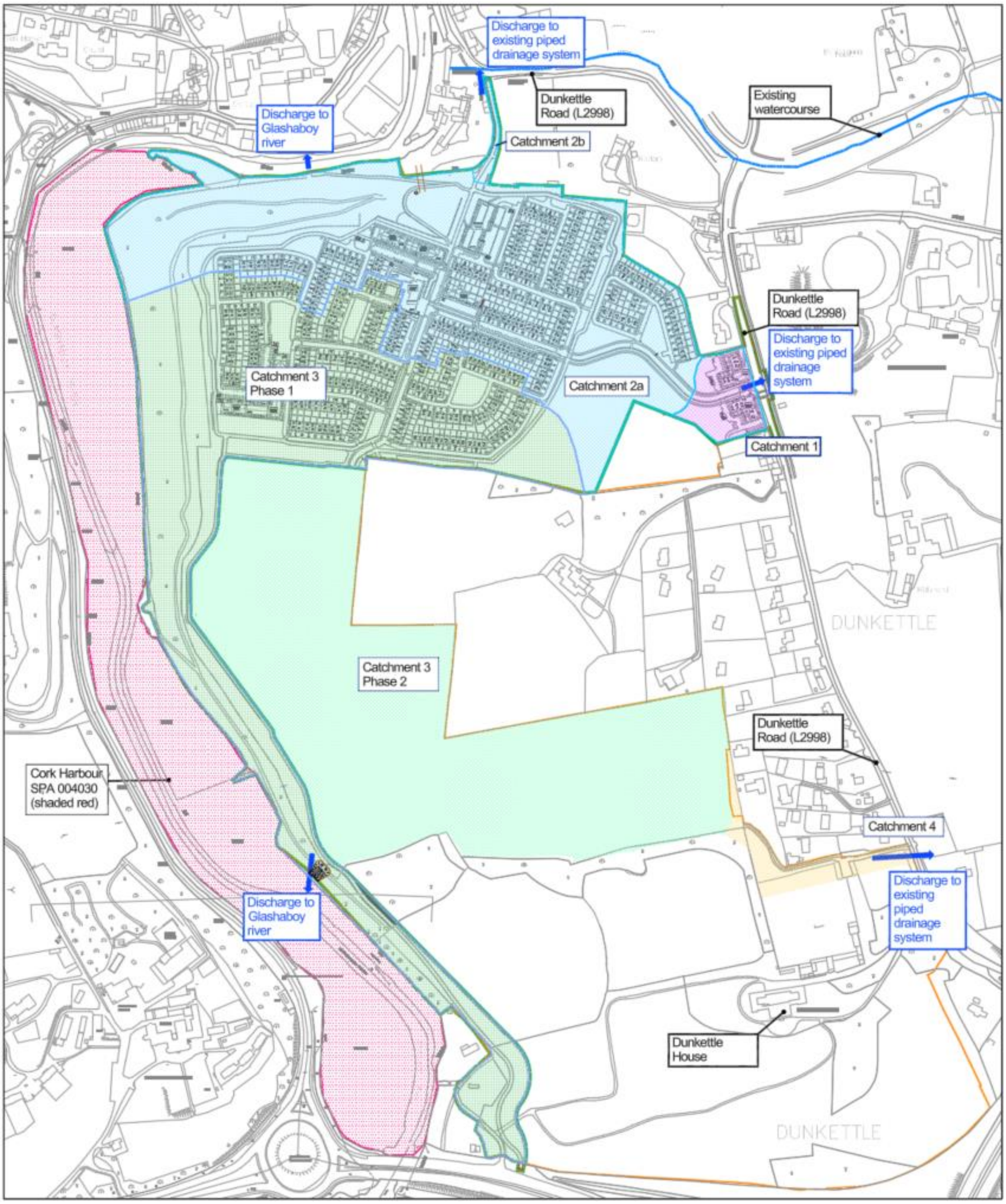

Figure 7-1 Developed site surface water drainage catchments and discharge locations

Surface water run-off from the site will be attenuated to the equivalent run-off from the existing greenfield site in accordance with the GDSDS for discharges to existing drainage systems on Dunkettle Road. Surface water runoff from the site that is directed towards the Glashaboy river will not be attenuated which is acceptable in accordance with the GDSDS guidelines Volume 2, Section 6.3.3.4 which states: -

> *"developments that are proposed at the downstream end of a catchment, by definition, do not have to be concerned with worsening the river state downstream. In this situation, it may not be necessary to provide either "long term" storage or attenuation storage. Similarly issues such as river erosion might also not be applicable. Water quality may therefore be the only principle that needs to be considered in terms of the receiving water"*

SuDS features incorporated in the surface water drainage system provide for mitigation of surface water pollutants in the discharge to the receiving surface water environment in accordance with CIRIA C753 guidelines.

A quantitative assessment of the hydraulic effects of the proposed surface water discharges from the fully developed site on the Glashaboy river has been performed by JODA Engineering Consultants and is appended to the *Site Civil Infrastructure Design Statement and SuDS Impact Assessment* submitted with the LRD Phase 1 application. The assessment includes discharges from Phase 1 and Phase 2 shows that water levels in the Glashaboy river rise by less than 1mm due to unattenuated surface water flows from the site in the 0.01AEP (1:100 year) design rainfall event with allowance for climate change. The results of the assessment are contained in the JODA Infrastructure Report included in the planning application support documentation – Reference *Site Civil Infrastructure Design Statement and SuDS Impact Assessment*.

The surface water outlets to the river have been designed to minimise the risk of erosion of the river channel. In the case of discharge from Catchment 2 the outlet to the river discharges directly to the tidally influenced main channel stream with rock outcropping at river bed level locally during low tides. which is resistant to erosion. In the case of discharge from Catchment 3 the outlet to the river is located where the river bed is exposed locally at low tides but the permanent water channel is locally close to the existing stone wall that defines the high tide mark thus minimising the length of exposed river bed at low tide between the outlet and the permanent water channel. The outlet to the river has been designed in accordance with the recommendations of *Hydraulic Design of Energy Dissipators for Culverts and Channels* published by US Dept of Transportation Federal Highway Administration (Hydraulic Engineering Circular No. 14, Third Edition) and in accordance with The SuDS manual by CIRIA C753 publication so that the energy of the water is dissipated prior to discharge and the discharge flow velocity is limited to that which does not cause erosion of the river bed.

Figure 7-2 Existing foreshore at proposed surface water outlet from Catchment 3

For further details of the surface water drainage system, refer to the *Site Civil Infrastructure Design Statement and SuDS Impact Assessment* and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application.

In respect of Phase 2 development, an outline scheme for Phase 2 at this stage of the development design process is expected to consist of two additional surface water drainage systems. The majority of the Phase 2 site is within Catchment 3 and will discharge at the outlet to the Glashaboy River and this outlet has been designed with an allowance for the expected flows from the Phase 2 development. A small part of the Phase 2 development, primarily the proposed additional road connection to Dunkettle Road and indicated in Figure 7-1 above as Catchment 4, will discharge to the existing surface water drainage system on Dunkettle Road. There will be no alterations required to the Phase 1 site surface water drainage network as a result of the Phase 2 development works.

In respect of Dunkettle House, at present there is no proposed development and so there is currently no proposed change to the existing surface water management regime at the house.

7.3.1.3 Wastewater Drainage services

The quantity of wastewater discharge from Phase 1 and 2 of the development has been estimated and submitted in a Pre-Connection Enquiry to Uisce Éireann. Uisce Éireann has issued a Confirmation of Feasibility in respect of the capacity of the existing wastewater drainage network to accept wastewater discharge from both phases of the development.

Wastewater drainage infrastructure has been designed for Phase 1 of the overall development to provide for the operational requirements of Phase 1 of the development.

The proposed wastewater infrastructure is a conventional piped system, designed and constructed in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03). The system will be completely segregated from the surface water drainage network.

The wastewater discharged from the Phase 1 development will connect to the existing Uisce Éireann wastewater drainage network at three locations on site and at the site boundaries as shown in Figure 7-3 below:

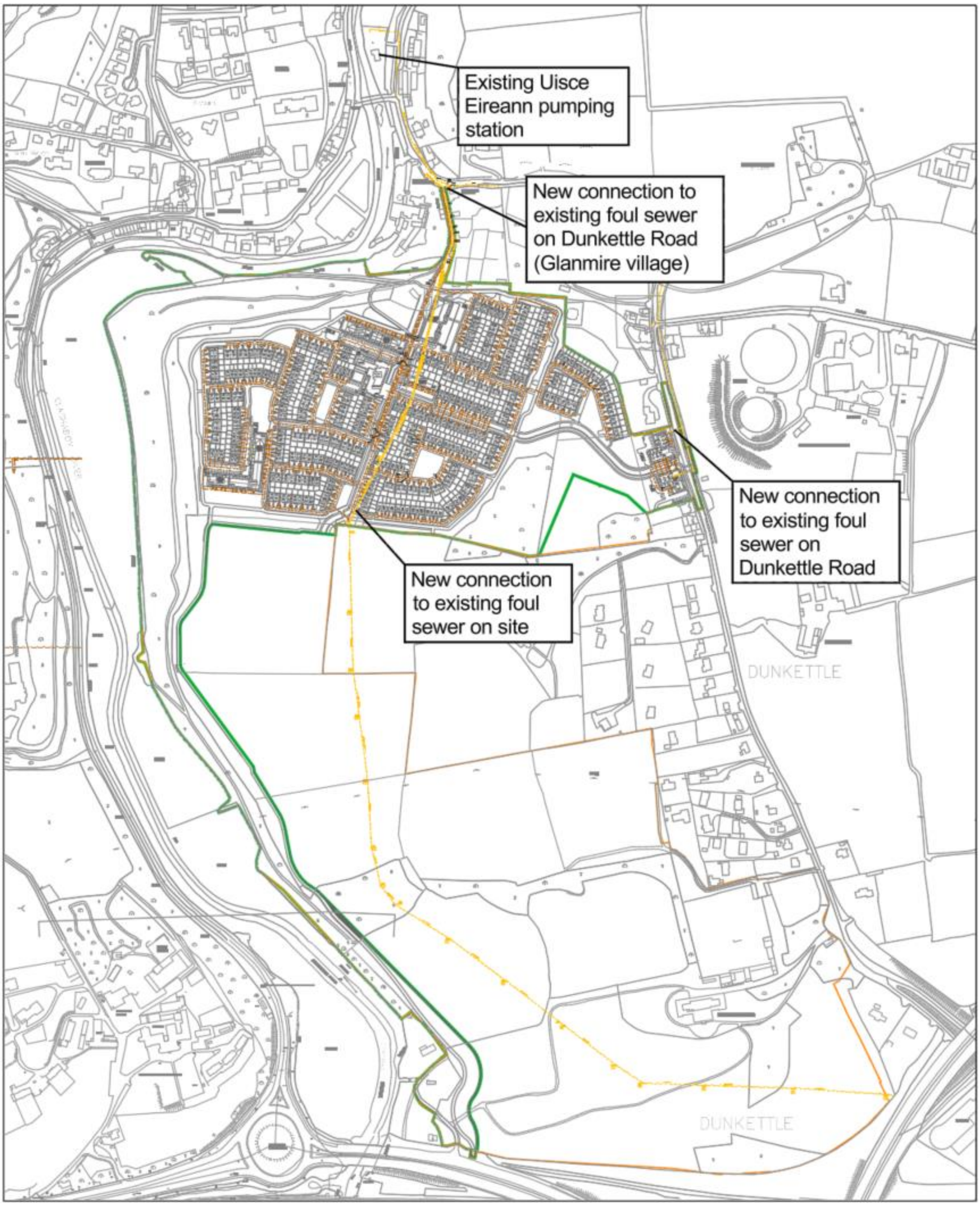

Figure 7-3 Phase 1 wastewater drainage network and connections to existing infrastructure

The wastewater will be conveyed via the existing Uisce Éireann wastewater network to the Carrigrenan Waste Water Treatment Plant for treatment.

A diversion of the existing Uisce Eireann wastewater sewer within the Phase 1 development site will be required to accommodate the Phase 1 development. Diversion of the existing sewer will be performed by Agreement with Uisce Eireann. There is no waste process or industrial waste water emissions in the development. The industrial wastewater discharge from the development is zero.

For further details of the wastewater drainage system for the Phase 1 development, refer to the *Site Civil Infrastructure Design Statement and SuDS Impact Assessment* and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application.

In respect of wastewater infrastructure for the Phase 2 development, a detailed wastewater drainage scheme has not yet been developed, however the design intent is that the Phase 2 network will be constructed and connected to the existing wastewater sewer pipe on the site via a number of new connections without the need for further upgrades of the existing network or the network installed during the Phase 1 works. This will ensure that there will be no disruption to the Phase 1 site development wastewater network as a result of the Phase 2 development works.

7.3.1.4 Water Supply services

The water demand by Phase 1 and 2 of the development has been estimated and submitted in a Pre-Connection Enquiry to Uisce Éireann. Uisce Éireann has issued a Confirmation of Feasibility in respect of the capacity of the existing water supply network to supply water to both phases of the development. At the time of writing of this document Uisce Éireann is in the process of upgrading the existing water supply infrastructure in the locality to provide for development in the study area.

A water supply network for Phase 1 has been designed in accordance with the Uisce Éireann Code of Practice for Water Infrastructure (2020) Revision 2.

The proposed water supply network consists of conventional water supply pipework and associated infrastructure laid in roads and common areas, with a connection to the existing water supply network on Dunkettle Road. Individual service connections with boundary box will be provided to each individual dwelling with a shared service connection to apartments. The creche and commercial units will have individual service connections. Hydrants for the supply of fire-fighting water will be located in accordance with the requirements of Uisce Éireann and in accordance with Building Regulations requirements.

The proposed water supply network for Phase 1 has been designed to accommodate an extension to the site network for the Phase 2 development without a need for upgrading of the Phase 1 water supply network. Therefore there will be no significant disruption to the Phase 1 site development water supply network as a result of the Phase 2 development works.

For further details of the water supply system, refer to the Infrastructure Design Report and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application.

7.3.1.5 Electrical Supply

The existing ESB infrastructure within this area is adequate to support the proposed development in this case. The design of the new electrical distribution and supply network will be carried out by ESB networks who will decide on the preferred location of sub stations, mini pillars and micro pillars. The construction of the ducting infrastructure for the site will be carried out by the developer in accordance with ESB Networks requirements and Regulations.

It is envisaged that the complete electrical distribution system within the development will be underground with the requirement for sub stations, transformers, mini pillars and micro pillars located overground in positions to be agreed with ESB Networks.

Figure 7-4 ESB Substation

Figure 7-5 ESB Mini Pillar

7.3.1.6 Telecommunications

The existing Eir telecommunications infrastructure within this area is adequate to support the proposed development in this case. There is Eir fibre broadband available both in Glanmire Village and the nearby Ballinglanna development. The design of the new telecommunications distribution and supply network will be carried out by Eir who will decide on the preferred location of distribution kiosks to serve the proposed development. The construction of the ductwork infrastructure for the site will be carried out by the developer in accordance with Eir requirements and regulations.

It is envisaged that the complete telecommunications distribution system within the development will be underground with the requirement for distribution kiosks located overground in positions to be agreed with Eir.

With the availability of high speed broadband in the area it is envisaged that telephone, broadband and digital television services will distribute through this network.

Figure 7-6 Eir Broadband Cabinet

7.3.1.7 Public Lighting

A new public lighting system shall be designed, installed and commissioned by the developer with a view to the system being taken in charge by Cork City Council on completion. The public lighting system shall be connected to the proposed electrical distribution system by way of micro pillars located adjacent to the proposed ESB mini pillars.

The design of the new public lighting system will be carried out by suitably qualified Consultants in accordance with the following:

- Cork City Council Policy Guidelines For Exterior Public Lighting
- Code Of Practice For Public Lighting ET211:2003
- National Rules For Electrical Installations
- ESB Networks National Code Of Practice For Customer Interface

The public lighting within the housing areas will be designed to Class P3 in accordance with BS 5849:2013 with the following features:

- LED low energy lighting throughout
- All light fittings will be fitted with individual photocells with 20 lux on / 20 lux off control
- All light fittings will have electronic control gear and will be Phillips or Thorn high quality manufacture
- All lighting columns shall be galvanised steel construction with minimum 3mm wall thickness in accordance with IS EN 40. Heights 6000mm/8000mm/10000mm with 400mm outreach and 5 degree tilt. All columns will have a certified design life of 25 years minimum.
- All underground mains cables will be installed in accordance with ET210:2003 Code Of Practice For Public Lighting Installations In Public Areas. All underground ducting shall be laid in public ground and all columns will be erected between the back of the footpath and the boundary on public ground.
- It is envisaged that the complete public lighting distribution system within the development will be underground with the requirement for micro pillars located overground in positions to be agreed with ESB Networks

Figure 7-7 Typical public lighting luminaire

7.3.1.8 Natural Gas

There is no Natural Gas requirement for development in the study area and therefore no further assessment is required.

7.4 Methodology

7.4.1 Desktop Study

The potential impacts to material assets as a result of the proposed development were assessed through a desktop study of available information. The following principal sources were consulted:

- Uisce Water utility plans (foul water drainage and water supply);
- Cork City Council utility drawings (surface water drainage);
- Maritime Area Regulatory Authority technical guidance for Marine Area Consent applications;
- National Parks & Wildlife Service Special Protection Areas webpages: (https://www.npws.ie/protected-sites/spa; and https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba Accessed on 4th April 2024)
- ESB Networks utility plans;
- Gas Networks Ireland (GNI) service plans;
- Eir E-Maps; and
- Virgin Media Maps.

7.4.2 Relevant Legislation and Guidance

The methodology is consistent with the following relevant guidance:

- EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- EPA (2015). Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;

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

Effects and impacts have been characterised in accordance with the criteria set out in the EPA guidelines (as reproduced in Chapter 1 Introduction of this EIAR).

Surface water run-off, foul drainage discharge and water usage designs have been performed in accordance with the following guidelines:

- Storm Water & Flood Risk Management Requirements, Cork City Council
- Greater Dublin Strategic Drainage Strategy (GDSDS) (2005);
- Uisce Éireann (2020) Code of Practice for Wastewater Infrastructure Connections and Developer Services. Design and Construction Requirements for Self-Lay Developments (Revision 2)
- Uisce Éireann (2020) Code of Practice for Water Infrastructure Connections and Developer Services. Design and Construction Requirements for Self-Lay Developments (Revision 2)

Electrical and telecommunications services designs are carried out by the service providers in accordance with their own Technical Guidance Documents and Regulations.

7.4.3 EIAR Study Boundary

For the purposes of this Chapter the EIAR study boundary is as described in Chapter 1 of this document.

7.4.4 Site Surveys / Investigations

Topographic site surveys were performed on various dates between 2004 and 2024. The site was originally surveyed in connection with a 2008 planning application for a residential development on the site. Additional topographic surveys between 2020 and 2024 were performed to update and add to the original survey.

Walkover inspections of the site were conducted by JODA Engineering Consultants on six occasions between April 2022 and April 2024. JKA were in attendance on two occasions.

A geotechnical site investigation was performed by Priority Geotechnical in March 2021 consisting of the following:

- 29 No. trial pit excavations to depths up to 3.5m;
- All associated sampling and in-situ testing;
- Associated geotechnical and environmental laboratory testing;
- Reporting of results.

Percolation testing on site has also been performed to determine the infiltration parameters of the ground.

7.4.5 Consultation

As part of the design development and planning application processes, consultations have been held with Uisce Éireann and Cork City Council in relation to utilities infrastructure. A pre-connection enquiry was submitted to Uisce Éireann in relation to the water and wastewater strategy for the Phase 1 and Phase 2 areas within the Masterplan area. A confirmation of feasibility (CoF) letter was received from Uisce Éireann in April 2024, stating the following:

> *"Water Connection – Feasible Subject to upgrades: In order to accommodate the full development demand from the existing 200mm watermain connection provided to the Development site, water network upgrades will be required in the surrounding network to provide necessary additional network capacity. Uisce Éireann has plans to undertake these works as part of a wider capital investment project, however timeframes for the estimated completion date of these upgrades are currently not known. Until the necessary network upgrades are completed, it is possible to service initial phases of Development via a separate dedicated connection to the existing 500mm trunk main from Glashaboy WTP, however due to the proximity to the WTP, adequate pressure may not be achievable for areas of the development at higher elevations. Further assessment to be completed by Uisce Éireann as part of Connection Application stage to determine permissible Development phasing and timeframes for network upgrades."*
>
> *"Wastewater Connection – Feasible without infrastructure upgrade by Uisce Éireann"*

Communication with Uisce Éireann in July 2024 subsequent to the issuing of the CoF letter has established that the upgrade works to the existing water supply network are substantially complete.

The proposed wastewater drainage scheme for Phase 1 of the development has been submitted to Uisce Éireann for Design Acceptance (Reference No. CDS23005632)

Preliminary discussions have been held with Area Engineers for both ESB & EIR to confirm adequate capacity is available in relation to this development.

7.5 Difficulties Encountered

No particular difficulties were encountered in the preparation of this chapter.

7.6 Baseline Environment

7.6.1 Surface Water Drainage

Context and Character:

The site of the proposed development is greenfield in nature in respect of surface water drainage. The natural direction of surface water flows is shown in the drainage drawings produced by JODA Engineering Consultants submitted under separate cover as part of the planning application and is also shown in Figure below.

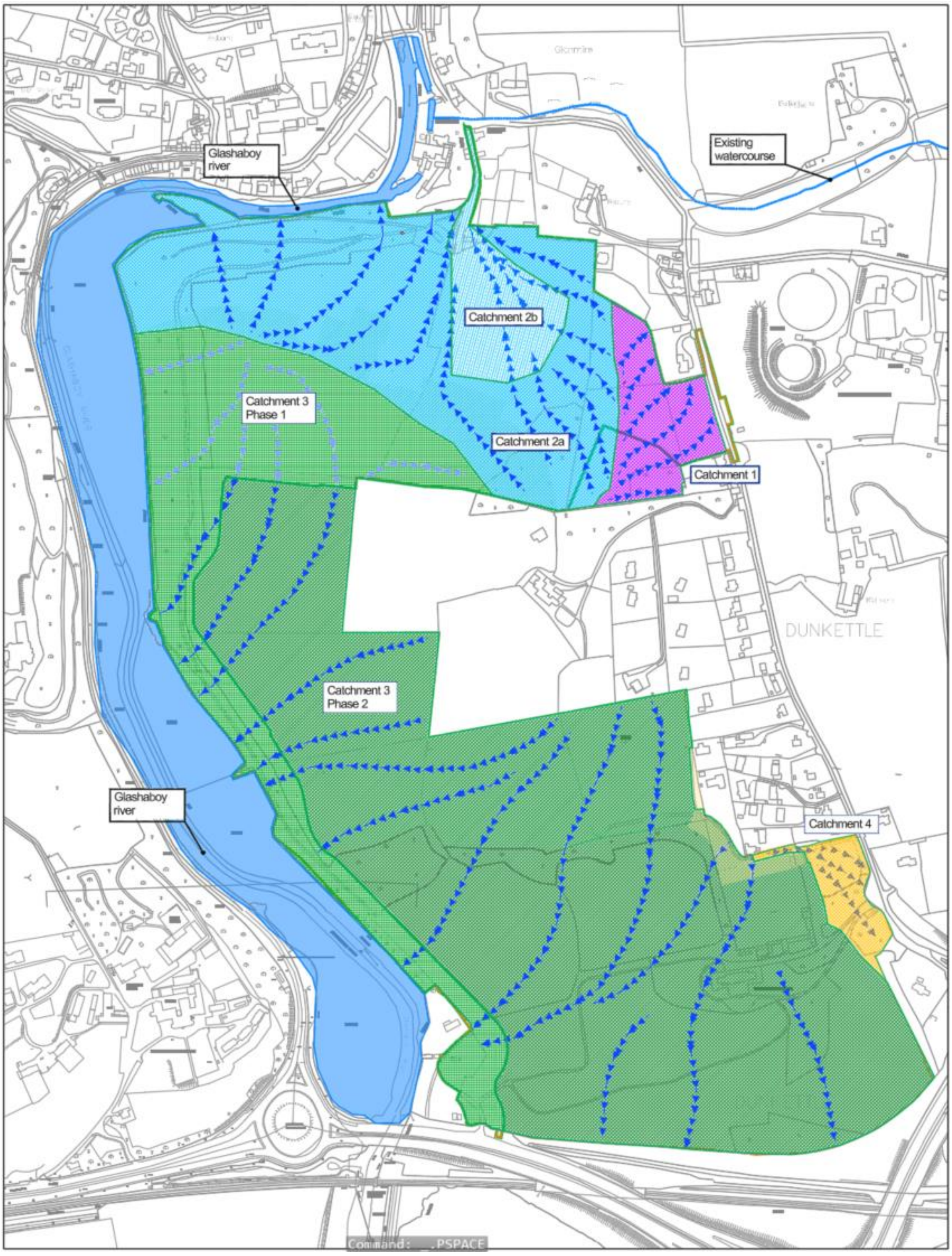

Figure 7-8 Existing site surface water drainage sub-catchments

There is no piped or built drainage system on the site, except for a minor local roof drainage system at Dunkettle House. There is no permanent or seasonal watercourse of significance on the site. Surface water drainage occurs primarily through infiltration into the underlying soils.

The majority of the site drains naturally towards the Glashaboy river adjacent to the site on the north, west and south sides. A small part of the site drains naturally eastwards towards Dunkettle Road adjacent to the eastern boundary of the site and onwards to the Glashaboy river via built drainage systems. An existing farmland access path connects the site at its north end with Glanmire village and associated excess overland surface water flows occur down this path towards Glanmire village.

The adjacent Glashaboy river forms part of the Cork Harbour Special Protection Area (Sitecode 004030).

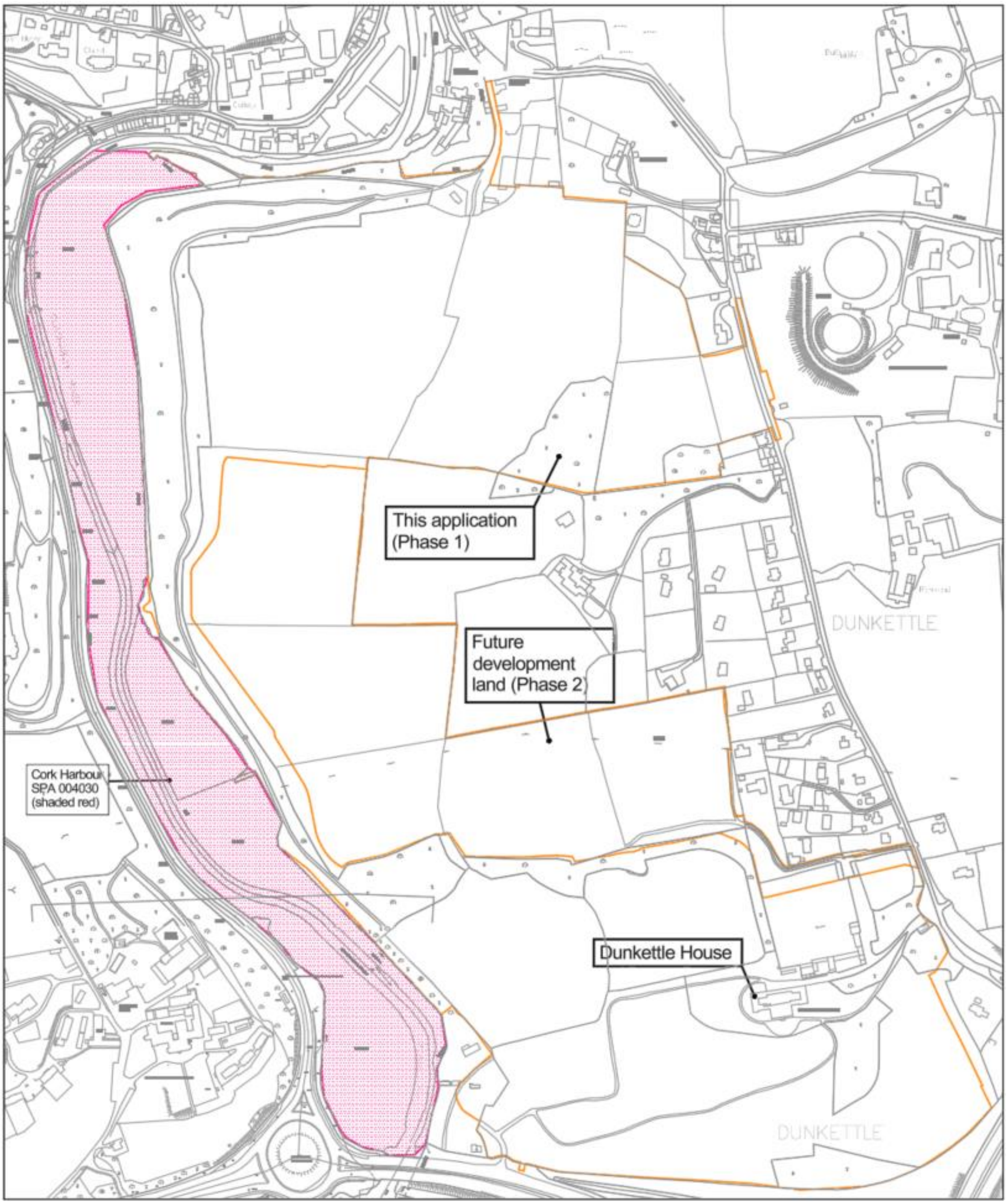

Figure 7-9 Cork Harbour SPA adjoining the development site

Sensitivity:

Surface water drainage systems generally can be sensitive to changes in their design, installation, and maintenance. Factors that can affect the sensitivity of surface water drainage systems include:

- Changes in land use, such as urbanisation, can increase the number of impervious surfaces, such as roads and buildings, which can lead to increased stormwater runoff and reduced infiltration into the soil.
- The type of soil in a particular area can affect the ability of a drainage system to manage stormwater runoff effectively. For example, soils with high clay content may have a low infiltration capacity and can cause waterlogging and flooding.
- Proper maintenance of drainage systems, such as regular cleaning of catch basins and culverts, is essential to ensure their functionality and prevent clogging and blockages
- Human errors and accidents such as excavation or equipment failure can cause damage to the system. Misconnection of wastewater drainage pipework can cause wastewater to enter the surface water drainage system.
- Climate change may cause changes in precipitation patterns and increased frequency of extreme weather events which can impact the sensitivity of surface water drainage systems

Overall, surface water drainage systems are Moderately Sensitive to changes. The Glashaboy river element of the Cork Harbour Spa adjacent to the site is a receiving environment for surface water runoff from the site and is potentially Significantly Sensitive to changes in the nature of surface water runoff from the site.

A flood risk assessment of the site has been performed. The assessment prepared by JODA and submitted with the LRD phase 1 application documentation concludes that the risk of flooding at the site is not significant and that the development of the site will not result in a significant increase in the risk of flooding at the site or elsewhere as a result of the development.

7.6.2 Waste Water Drainage

Context and Character:

According to records, an existing foul sewer traverses the study area from north to south, conveying discharge from an existing Uisce Éireann pumping station at Glanmire Bridge onwards to Carrigrenan Wastewater Treatment Plant. At the northern end of the site the sewer is pressurised and consists of twin 350mm diameter bores. There is a break-pressure chamber at a local high point on the site and the remainder of the sewer is a gravity pipe with a diameter of 525mm increasing to 600mm. There is an existing foul sewer gravity pipe on Dunkettle Road that serves houses in the locality and this pipe discharges to the Uisce Éireann pumping station at Glanmire Bridge.

Existing foul water drainage infrastructure at the proposed development site and in the vicinity is shown in the drainage drawings produced by JODA Engineering Consultant and submitted under separate cover as part of the planning application and is also shown in Figure below.

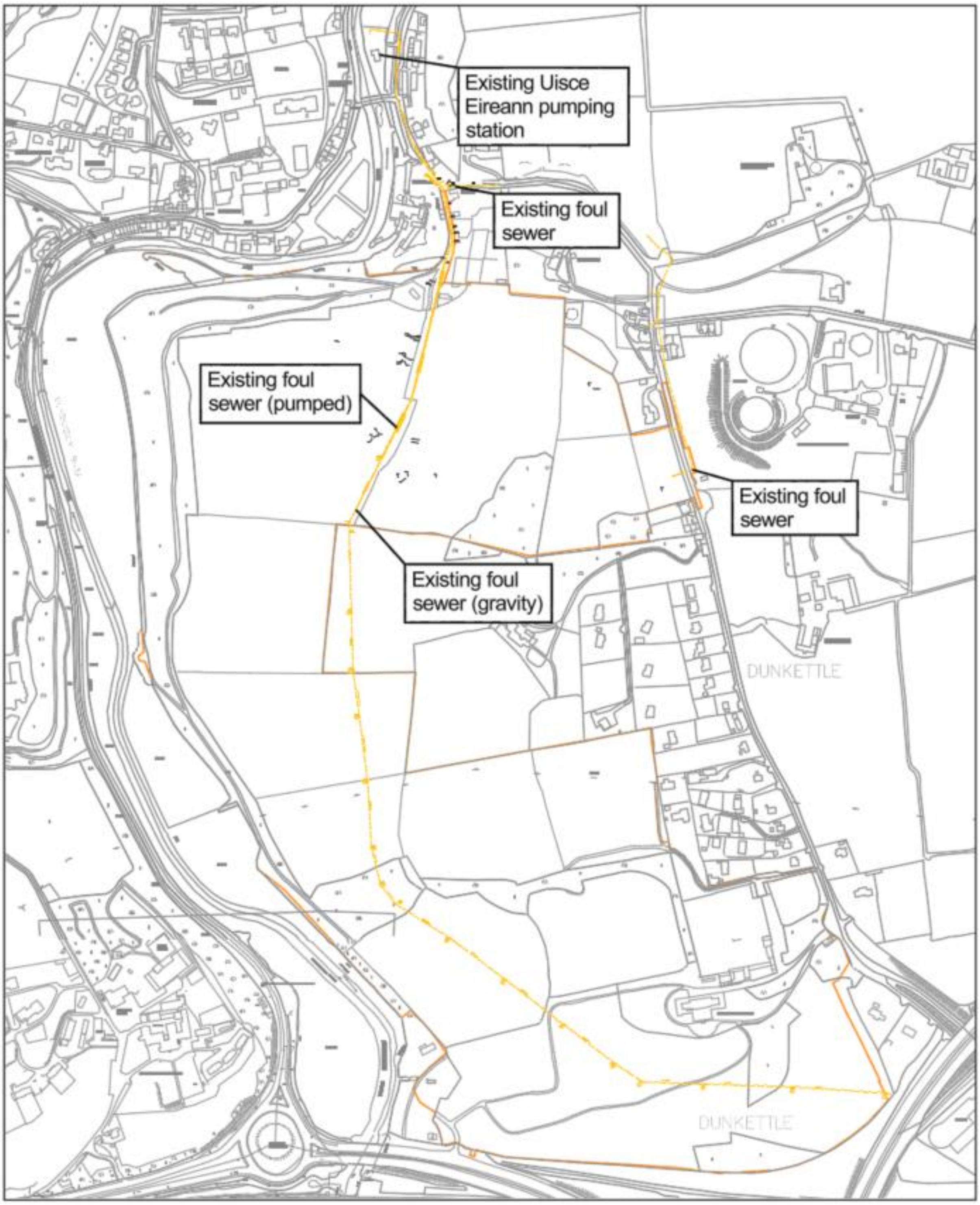

Figure 7-10 Existing Uisce Éireann wastewater drainage services

Sensitivity:

Foul drainage systems can be sensitive to changes in their design, installation, and maintenance. The performance of a foul drainage system can be affected by various factors, including:

- Damage or breakage of the existing Uisce Éireann wastewater drainage services on site has the potential to disrupt existing wastewater drainage services locally and also within the wider Glanmire area and potentially affect the existing natural environment.
- Changes in the flow rate of wastewater can impact the system's ability to transport wastewater to the treatment plant. High flow rates can cause blockages and overflows, while low flow rates can cause sedimentation and accumulation of solids. Misconnection of surface water drainage systems can cause hydraulic overloading of wastewater drainage systems in periods of heavy rainfall.
- The size and slope of the pipes can affect the velocity and capacity of the wastewater transport, which can impact the system's ability to function effectively.
- The type of pipe materials used can affect the durability and lifespan of the system. Some materials may corrode over time or be susceptible to damage from tree roots or ground movements.
- Regular maintenance of the foul drainage system is essential to prevent blockages, leaks, and other issues that can impact the system's performance.
- Human errors and accidents such as excavation or equipment failure can cause damage to the system.
- Changes in land use, such as new developments or industrial activities, can increase the volume and strength of wastewater, which can impact the system's ability to handle the additional load.
- Changes in climate conditions, such as heavy rainfall or drought, can impact the flow rates and capacity of the foul drainage system.

7.6.3 Water Supply

Context and Character:

There is an existing 250 mm diameter watermain on Dunkettle Road that is served by the existing Caherlag water supply reservoir on the L-2970 road east of the site. There is an existing 500m diameter watermain on Dunkettle Road that is supplied by the Glashaboy water treatment plant on the L-2970 road east of the site.

Sensitivity:

Water systems can be sensitive to changes in their design, installation, and maintenance.

Factors that can affect the sensitivity of water systems include:

- The quality of the water source, such as rivers, lakes, or groundwater, can affect the treatment processes required to produce safe drinking water. Changes in source water quality due to natural or human-caused factors can impact the quality of water provided to the site.
- Aging water infrastructure, such as pipes, valves, and treatment facilities, can become vulnerable to leaks, breaks, and other failures that can impact the ability to provide quality water supply.
- Human errors and accidents such as excavation damage or equipment failure can cause leaks or supply interruptions.

- Contamination incidents, such as chemical spills or microbial outbreaks, can impact the quality of water servicing systems and threaten public health.
- Increased demand for water can result in reduced water pressure for existing customers.
- Climate change can affect the quantity and quality of water resources, as well as impact the reliability of water infrastructure during extreme weather events such as floods and droughts.

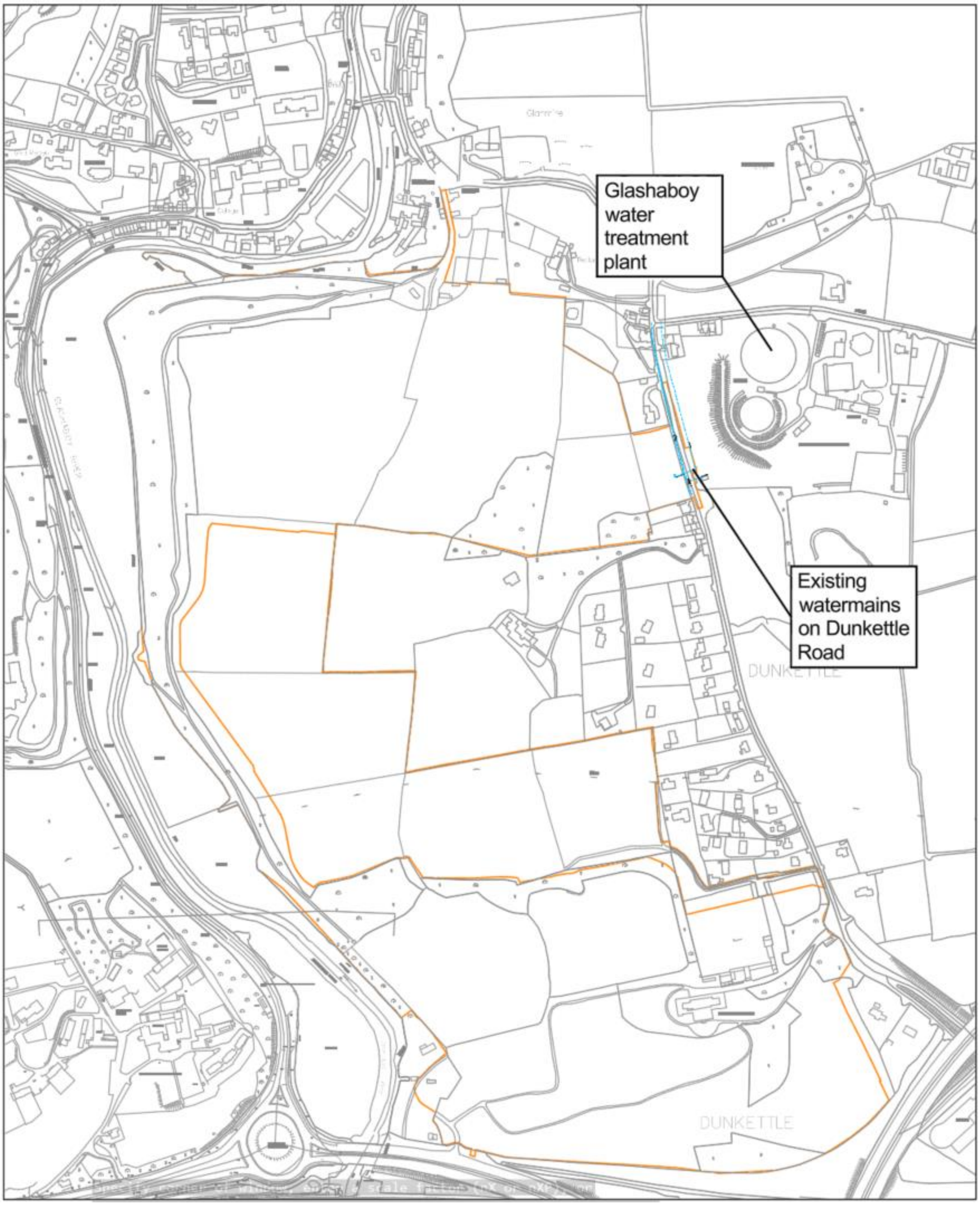

Figure 7-11 Existing water supply services

7.6.4 Electricity

Context and Character:

It is envisaged that the complete electrical distribution system within the development will be underground with the requirement for sub stations, transformers, mini pillars and micro pillars located overground in positions to be agreed with ESB Networks.

Sensitivity:

The installation will be cable based within an underground ductwork system so they have low sensitivity.

7.6.5 Telecommunications

Context and Character:

It is envisaged that the complete telecommunications distribution system within the development will be underground with the requirement for distribution kiosks located overground in positions to be agreed with Eir.

Sensitivity:

The installation will be cable based within an underground ductwork system so they have low sensitivity.

7.7 The ‘Do-Nothing’ Scenario

In the do-nothing scenario (i.e. assuming the proposed development were not progressed), the built services and infrastructure at the site of the proposed development and in the immediate vicinity would likely remain as they are at present (as described above). No likely significant effects would arise in relation to material assets in this scenario.

7.8 Potential Significant Effects

7.8.1 Construction Phase

7.8.1.1 Surface water drainage services:

New surface water drainage systems will be constructed on site to service the development, connecting to existing surface water drainage infrastructure in the receiving environment.

In addition to the construction of new on-site surface water drainage services, the following alterations to existing surface water drainage services will be performed during the construction phase:

- New connections to existing drainage systems on Dunkettle Road at the site boundary;
- New surface water drainage outlets to the Glashaboy river at the site boundary.

Potential Direct effects of the construction phase on surface water drainage systems are:

- uncontrolled and/or misdirected surface water runoff to existing watercourses and drainage systems and to adjacent lands;
- Transmission of entrained soils/turbidity, construction materials and spilt liquids including hydrocarbons and other pollutants.

In the absence of mitigation measures the **Direct** impact of the construction phase on surface water drainage services is **Negative** in quality, **Significant** significance, **Likely** probability, **Medium-term** in duration.

Potential Indirect, Secondary and Cumulative impacts of the construction phase on surface water drainage systems are:

- Loss of hydraulic performance and increased frequency of flooding caused by siltation of existing drainage systems.
- Erosion of existing watercourses and surrounding lands causing loss of soil stability and consequent further erosion.
- Reduction in Biodiversity

In the absence of mitigation measures the **Indirect, Secondary and Cumulative** impact of the construction phase on surface water drainage services is **Negative** in quality, **Significant** significance, **Likely** probability, **Medium-term** in duration.

7.8.1.2 Wastewater drainage services:

New wastewater drainage systems will be constructed on site to service the new development, connecting to existing wastewater infrastructure in the receiving environment.

In addition to the construction of new on-site wastewater drainage services, the following alterations to existing wastewater drainage services will be performed during the construction phase:

- Diversion of the existing Uisce Éireann sewer that traverses the site;
- New connections to existing Uisce Éireann wastewater drainage systems on site and on the boundary of the development at Dunkettle Road.

Potential Direct effects of the construction phase on wastewater drainage services are:

- Blockage or partial reduction in the capacity of existing wastewater drainage services;
- Breakage of existing infrastructure causing network outages and uncontrolled discharges of wastewater;
- Discharges of surface water runoff to existing wastewater drainage services;
- Uncontrolled discharge of wastewater from the construction site welfare facilities to lands and watercourses downstream of the site causing pollution, potential flooding and risk to public health;

In the absence of mitigation measures the **Direct** impact of the construction phase of wastewater drainage services is **Negative** in quality, **Significant** significance, **Likely** probability, **Medium-term** in duration.

Potential Indirect, Secondary and Cumulative effects of the construction phase on wastewater drainage services are:

- Overflowing of existing wastewater drainage systems due to reduction in capacity or blockages caused by the works;
- Increased pumping requirements and consequent increased energy demands and servicing requirements at existing wastewater drainage pumping stations due to increased flowrates;
- Reductions in efficiency of existing waste water treatment systems due to increased hydraulic loading and/or introduction of polluted waters;
- Reduction in Biodiversity.

In the absence of mitigation measures the **Indirect, Secondary and Cumulative** impact of the construction phase on wastewater drainage services is **Negative** in quality, **Moderate** significance, **Unlikely** probability, **Medium-term** in duration.

Refer to Chapter 11 – Biodiversity – in relation to Indirect, Secondary and Cumulative impact on Biodiversity.

7.8.1.3 Water supply services:

New water supply systems will be constructed on site to service the new development, connecting to existing water supply infrastructure at the boundary of the site.

In addition to the construction of new on-site water supply services, the following alterations to existing water supply services will be performed during the construction phase:

- A new connections to the existing Uisce Éireann water supply system on Dunkettle Road;

Potential Direct effects of the construction phase are:

- Breakages of existing water supply pipework causing large outflows of water and possible local flooding and reduced water supply to premises on the local water supply network;
- Closing of valves on the existing water supply network causing a loss of water supply to premises on the local network.

In the absence of mitigation measures the **Direct** impact of the construction phase on water supply services is **Negative** in quality, **Moderate** significance, **Likely** probability, **Medium-term** in duration.

Potential Indirect, Secondary and Cumulative effects of the construction phase on water supply services are:

- No likely significant effects

7.8.1.4 Electrical supply services

No likely significant effects.

7.8.1.5 Telecommunications services

No likely significant effects.

7.8.2 Operational Phase

During the operational phase, the site will contain operational surface water drainage, foul water drainage, water supply, electrical and telecommunications systems to serve the proposed development. Refer to Section 7.3 above for a description of built services for the development.

7.8.2.1 Surface water drainage services

Potential Direct effects on surface water drainage services in operation are as follows:

- Poor general maintenance causing blockage of drainage systems and overflowing with a consequent risk of flooding;
- Poor general maintenance leading to poor performance of pollution control measures in the surface water drainage system and subsequent discharges of surface water containing sediments and pollutants to existing surface water drainage systems and watercourses;
- Poor maintenance of engineered pollution reduction devices in the surface water drainage system leading to discharge of surface water containing sediments and pollutants to existing surface water drainage systems, watercourses and groundwater aquifers.

In the absence of mitigation measures the **Direct** impact of the operational phase on surface water drainage services is **Negative** in quality, **Moderate** significance, **Likely** probability, **Permanent** in duration.

Refer to Chapter 9 – Land & Soils – in relation to Indirect, Secondary and Cumulative impact on Land & Soils.

Potential Indirect, Secondary and Cumulative effects on surface water drainage services in operation are as follows:

- Reduction in biodiversity in the wider receiving environment.

Refer to Chapter 11 – Biodiversity – in relation to Indirect, Secondary and Cumulative impact on Biodiversity.

7.8.2.2 Wastewater drainage services

Potential Direct effects on wastewater drainage services in operation are as follows:

- Misconnection of surface water drainage services on site to the wastewater drainage network during the construction phase causing overloading of the wastewater network with surface water and possible resultant reduction in performance of downstream wastewater treatment activities;
- Poor quality control during the construction phase leading to partial or full blockages, overflowing and subsequent pollution of watercourses and hazard to public health.
- Poor quality control during the construction phase leading to excessive infiltration of groundwater into the wastewater drainage system and consequent increased need for conveyance, pumping and treatment of wastewater within the existing Uisce Éireann network.

In the absence of mitigation measures the **Direct** impact of the operational phase on wastewater services is **Negative** in quality, **Significant** in significance, **Likely** probability, **Permanent** in duration.

Refer to Chapter 11 – Biodiversity – in relation to Direct impact on Biodiversity.

Potential Indirect, Secondary and Cumulative effects on wastewater drainage services in operation are as follows:

- Increased need for conveyance, pumping and treatment of wastewater in the existing wastewater drainage network leading to decreased service life of existing infrastructure.

In the absence of mitigation measures the **Indirect, Secondary and Cumulative** impact of the operational phase of wastewater drainage services is **Negative** in quality with a **Slight** significance, **Likely** probability, **Permanent** in duration.

7.8.2.3 Water supply services

Potential Direct effects on water supply services in operation are as follows:

- Poor quality control during the construction phase leading to water leakage from the site network consequent increased demand on the existing water supply network;
- Poor quality control during the construction phase leading to pipe breakages, loss of water from the network and network outages during consequent repair periods.

In the absence of mitigation measures the **Direct** impact of the operational phase on water supply services is **Negative** in quality, **Moderate** in significance, **Likely** probability, **Permanent** in duration.

Potential Indirect, Secondary and Cumulative effects on water supply services in operation are as follows:

- Increased production of water necessitated by excessive pipe leakages requiring greater energy inputs and maintenance requirements of the water treatment system

In the absence of mitigation measures the **Indirect** impact of the operational phase on water supply services is **Negative** in quality, **Slight** in significance, **Likely** probability, **Permanent** in duration.

7.8.2.4 Electrical supply services

The predicted impact of the operational phase on electrical supply services is **Neutral** in quality, **Imperceptible** in significance, **Permanent** in duration and **Indirect** in type.

7.8.2.5 Telecommunications services

The predicted impact of the operational phase on telecommunications services is **Neutral** in quality, **Imperceptible** in significance, **Permanent** in duration and **Indirect** in type.

7.8.3 Cumulative Effects

7.8.3.1 Relevant other planned or permitted developments

In consideration of cumulative effects of other planned or permitted developments that may interact with the proposed development in respect of Built Services, the following developments in the vicinity of the site identified in Chapter 1 of this EIAR and other relevant Plans are considered in relation to built services.

Ballinglanna residential development (ABP Ref. SHD ABP-300543-18, Reg. Ref. No.'s 20/39179 and 23/42154)

Surface Water drainage services: Surface water runoff from this development partially discharges to the existing watercourse that flows along Dunkettle Road. This watercourse was partially piped during the upgrading of Dunkettle Road as part of the Ballinglanna development and as part of a previous phase of the Glanmire Road Improvement Scheme. The Ballinglanna development surface water drainage system discharges to this watercourse at the equivalent of greenfield runoff rates.

Wastewater drainage services: Waste water generated by this development discharges to the Uisce Eireann pumping station via a gravity sewer along Dunkettle Road that was partly upgraded and partly newly constructed as part of the Ballinglanna development, all with Uisce Eireann consent. The gravity sewer along Dunkettle Road will also be partly utilised by the proposed development.

Water supply services: Water supply to this development will be via a supply pipe from the Caherlag reservoir. This supply system will also supply the development within the study area.

Nursing home and childcare facility at the former Glanmire Rectory (Reg. Ref. No.'s 19/38980 and 21/40423)

Surface Water drainage services: Surface water runoff from this development will discharge to an existing piped system on Dunkettle Road. This piped system is also the proposed receptor of surface water discharge from the north end of the development within the study area. The surface water drainage system for this development will include engineered attenuation to reduce discharge to greenfield runoff rates and hydrocarbon interceptor.

Wastewater drainage services: Waste water generated by this development will discharges to the Uisce Eireann pumping station via a gravity sewer along Dunkettle Road that was partly upgraded and partly newly constructed as part of the Ballinglanna development, all with Uisce Eireann consent. The gravity sewer along Dunkettle Road will also be partly utilised by the development within the study area.

Water supply services: Water supply to this development will be via a supply pipe from the Glashaboy reservoir. This is a different local network to that serving the development within the study area, however ultimately both networks are supplied from the Glashaboy water treatment works.

Residential development at Glanmire Lodge, Glanmire (Reg. Ref. No. 20/39719)

Surface Water drainage services: Surface water runoff from this development will discharge to an existing piped system on Dunkettle Road. This piped system is also the proposed receptor of surface water discharge from the north end of the development within the study area. The planning permission granted for this site includes conditions regarding attenuation of surface water discharge to greenfield runoff rates.

Wastewater drainage services: Waste water generated by this development discharges to the Uisce Eireann pumping station via a gravity sewer along Dunkettle Road that was partly upgraded and partly newly constructed as part of the Ballinglanna development, all with Uisce Eireann consent. The gravity sewer along Dunkettle Road will also be partly utilised by the development within the study area.

Water supply services: Water supply to this development will be via a supply pipe from the Glashaboy reservoir. This is a different local network to that serving the development within the study area, however ultimately both networks are supplied from the Glashaboy water treatment works.

Glanmire Roads Improvement Scheme:

Surface Water drainage services: Surface water runoff from this road improvement will discharge to an existing piped system on Dunkettle Road. This piped system is also the proposed receptor of surface water discharge from the south-east end of the development within the study area.

Waste Water drainage services: Wastewater drainage services to development in the study are not connected to wastewater drainage services in this project.

Water supply services: Water supply to development within the study area are not connected to water supply services in this project.

Glanmire to City Centre Cycle Route:

Surface Water drainage services: Surface water drainage services to development within the study area are not connected to surface water drainage in this project.

Waste Water drainage services: Waste water drainage services to development in the study area are not connected to waste water drainage services in this project.

Water supply services: Water supply to development within the study area are not connected to water supply services in this project.

Glashaboy Flood Relief Scheme:

Surface Water drainage services: Surface water drainage services to development within the study area discharges to the Glashaboy River downstream of Glanmire Bridge. Glashaboy Flood Relief Scheme Works to the Glashaboy River downstream of Glanmire Bridge consists of channel maintenance only.

Waste Water drainage services: Waste water drainage services to development in the study area do not interact with the Glashaboy river.

Water supply services: Water supply services to development within the study area are not connected directly to the Glashaboy River. The Glashaboy River is a source of supply water to the Glashaboy

Water Treatment works that supplies the Glanmire area, including development in the study area, with potable water.

Glashaboy Catchment Flood Risk Management Plan:

The study area is within the Glashaboy catchment. The surface water drainage scheme for development in the study area interacts with the Glashaboy river.

The Water Frameworks Directive (Directive 2000/60/EC of the European Parliament)

The Water Framework Directive (WFD) requires 'Good Water Status' for all European waters to be achieved by 2015 through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In April 2018 the National River Basin Management Plan for Ireland 2018-2021 was published. In the National River Basin Management Plan, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD and include a programme of measures to address and alleviate these pressures.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- Statutory Instrument (SI) No. 293 of 1988, European Communities (Quality of Salmonid Waters) Regulations 1988, Local Government (Water Pollution) Acts 1977-1990
- SI No. 258 of 1988, Water Quality Standards for Phosphorus Regulations, 1998
- SI No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations, 2009
- SI No. 386 of 2015, European Communities Surface Water Regulations (Amendment)
- S.I. No. 9 of 2010, European Communities Environmental Objectives (Groundwater) Regulations, 2010
- S.I. No. 722 of 2003 - European Communities (Water Policy) Regulations 2003

Surface Water Drainage Services: Surface water runoff from development in the study area will discharge to the Glashaboy river. Refer to Chapter 10: Water & Hydrology and Chapter 11: Biodiversity in relation to cumulative effects on quality of surface waters. Surface water runoff from development in the study area will infiltrate into the ground. Refer to Chapter 9: Land & Soils and Chapter 10: Water & Hydrology in relation to cumulative effects on groundwater.

Wastewater Drainage Services: Wastewater generated by development in the study area will not discharge to surface waters or into the ground. Refer to Chapter 10: Water & Hydrology and Chapter 11: Biodiversity in relation to cumulative effects on quality of surface waters. Refer to Chapter 9: Land & Soils and Chapter 10: Water & Hydrology in relation to cumulative effects on groundwater.

Water supply services: Water supply to the development within the study area will not be sourced directly from surface water or groundwater sources.

7.8.3.2 Construction Phase

The proposed development and the other identified developments require site clearance, excavations and levelling which will generate localised requirement for soil removal and/or import, water supply and wastewater discharge, surface water drainage systems, electrical power supply and telecommunications services supply.

7.8.3.2.1 Surface water drainage services

In the context of an orderly development of other consented sites the cumulative impact of the construction phase on surface water drainage services is likely to be **Direct** in type, **Negative** in quality, **Not significant** in significance, **Medium-term** in duration.

7.8.3.2.2 Wastewater drainage services

In the context of an orderly development of other consented sites the cumulative impact of the construction phase on waste water drainage services is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, **Medium-term** in duration.

7.8.3.2.3 Water supply services

In the context of an orderly development of other consented sites the cumulative impact of the construction phase on water supply services is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, **Medium-term** in duration.

7.8.3.2.4 Electrical supply services

In the context of an orderly development of other consented sites the cumulative impact of the construction phase on water supply services is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, **Medium-term** in duration.

7.8.3.2.5 Telecommunications services

In the context of an orderly development of other consented sites the cumulative impact of the construction phase on water supply services is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, **Medium-term** in duration.

7.8.3.3 Operational Phase

The proposed development and all permitted developments considered are required to engage with Uisce Éireann and Cork City Council to ensure that there is sufficient capacity to cater for the increase in water and wastewater drainage services and water supply services.

In developing long term plans for security of supply, the Statutory Authorities for water and energy supply are required to develop resources in compliance with sustainable environmental planning.

7.8.3.3.1 Surface water drainage services

In the context of other consented developments operating in accordance with the conditions of planning consent, the cumulative impact of the operational phase on surface water drainage is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, Permanent in duration.

7.8.3.3.2 Wastewater drainage services

In the context of other consented developments operating in accordance with the conditions of planning consent and with appropriate Uisce Éireann connection agreements, the cumulative impact of the operational phase on surface water drainage is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, Permanent in duration.

7.8.3.3.3 Water supply services

In the context of other consented developments operating in accordance with the conditions of planning consent and with appropriate Uisce Éireann connection, the cumulative impact of the operational phase on surface water drainage is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, Permanent in duration.

7.8.3.3.4 Electrical supply services

In the context of other consented developments operating in accordance with the conditions of planning consent and with appropriate Uisce Éireann connection, the cumulative impact of the operational phase on surface water drainage is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, **Permanent** in duration.

7.8.3.3.5 Telecommunications services

In the context of other consented developments operating in accordance with the conditions of planning consent and with appropriate Uisce Éireann connection, the cumulative impact of the operational phase on surface water drainage is likely to be **Direct** in type, **Neutral** in quality, **Imperceptible** in significance, **Permanent** in duration.

7.8.4 Summary

The following Table summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 7-1 Summary of Construction Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Surface water drainage services	Negative Negative	Significant Significant	Extent 1 Extent 1	Likely Likely	Medium-term Medium-term	Direct Indirect
Wastewater drainage services	Negative Negative	Significant Moderate	Extent 2 Extent 2	Likely Unlikely	Medium-term Medium-term	Direct Indirect
Water supply services	Negative	Moderate	Extent 3	Likely	Medium-term	Direct

In respect of Extent listed in Table 7-1 above, the following meanings apply:

Extent 1 – Lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge

Extent 2 - Lands and premises within the Glanmire and Little Island areas served by existing wastewater infrastructure downstream of the site

Extent 3 - Lands and premises served by the Caherlag water supply reservoir and lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge.

The following Table summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 7-2 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Surface water drainage services	Negative	Moderate	Extent 4	Likely	Permanent	Direct
Wastewater drainage services	Negative Negative	Significant Slight	Extent 5 Extent 5	Likely Likely	Permanent Permanent	Direct Indirect
Water supply services	Negative Negative	Moderate Slight	Extent 6 Extent 7	Likely Likely	Permanent Permanent	Direct Indirect
Electrical supply services	Neutral	Imperceptible	N/A	Likely	Permanent	Indirect
Telecommunications Services	Neutral	Imperceptible	N/A	Likely	Permanent	Indirect

In respect of Extent listed in Table 7-2 above, the following meanings apply:

Extent 4 – Development site, Lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge and Glashaboy river to the west of the site

Extent 5 - Lands and premises within the Glanmire and Little Island areas served by existing wastewater infrastructure downstream of the site

Extent 6 - Lands and premises served by the Caherlag water supply reservoir and lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge.

Extent 7 - Uisce Éireann water treatment and storage at Glashaboy and Caherlag

7.9 Mitigation Measures

7.9.1 Incorporated Design Mitigation

The surface water drainage services, wastewater drainage services and water supply services for the development includes measures to mitigate by design and the likely effects listed in Section 7.9 above allow for mitigation by design. Refer to Section 7.3 above for a description of the proposed services to be provided to accommodate the development.

7.9.2 Construction Phase

Construction of the proposed development will require connections to water supply and drainage infrastructure, power and telecommunications supply services. Ongoing consultation with Cork City Council, Uisce Éireann, EirGrid and ESB Networks and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will provide for a minimal disruption to existing infrastructural services. The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to existing utilities unless this has been agreed in advance.

7.9.2.1 General mitigation measures

The following measures shall be implemented:

- Works shall be performed in accordance with Statutory requirements, including Health, Safety and Welfare at Work (Construction) Regulations 2013 (S.I. no. 291 of 2013).
- The works shall be supervised by suitable competent personnel responsible for delivery of the built services as per the permitted development.
- Works in existing roads shall be performed in accordance with *Guidelines for Managing Openings in Public Road*, Dept of Transport Tourism and Sport, Second Edition (Rev 1), April 2017.
- Works in existing public roads and pedestrian paths shall be performed in accordance with Cork City Council requirements for the management and control of roadworks in Cork city.
- The Construction Environmental Management Plan (CEMP) prepared to accompany the planning application shall be updated with any and all additional requirements included in a Grant of Permission from the Planning Authority and shall be adopted and executed with updating as necessary to reflect changes in the construction phase.
- The Resource and Waste Management Plan (RWMP) prepared to accompany the planning application shall be updated with all additional requirements included in a Grant of Permission from the Planning Authority and shall be adopted and executed with updating as necessary to reflect changes in the construction phase.
- The locations of all existing on-site services (underground and overhead) shall be confirmed prior to the commencement of works and suitable protection measures put in place to minimise the risk of damage to existing services.
- The precise routing of electricity and telecommunications infrastructure on the site are to be agreed with the relevant service providers prior to the commencement of on-site works.
- Consultation with the relevant services providers shall be undertaken in advance of works. This will ensure all works are carried out to the relevant standards and ensure safe working practices are implemented.
- All reasonable precautions shall be taken to avoid unplanned disruptions to any services / utilities during the proposed works.
- There will be an interface established between the contractor(s) and the relevant utilities service providers / authorities during the construction phase of the proposed development. This interface will be managed in order to ensure a smooth construction schedule with no / minimal disruption to the local community.

7.9.2.2 Surface Water drainage services:

In addition to the General Mitigation Measures listed above, the following measures shall be implemented in relation to surface water drainage services:

- A quality management plan shall be created and implemented to ensure that the works are executed to deliver the permitted surface water drainage system free of significant defects.

7.9.2.3 Wastewater drainage services

In addition to the General Mitigation Measures listed above, the following measures shall be implemented in relation to wastewater drainage services:

- Uisce Éireann shall be consulted prior to commencement of works.
- Existing wastewater drainage infrastructure shall be protected in accordance with Uisce Éireann requirements.
- Wastewater drainage services to be adopted by Uisce Éireann shall be constructed in accordance as per the permitted development and in accordance with the following:
    - *Code of Practice for Wastewater Infrastructure, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 2);
    - *Wastewater Infrastructure Standard Details, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 2)
    - *Quality Assurance (QA) Field Inspection Requirements Manual, Connections and Developer Services (A Guide for Self-Lay Developers)*, Uisce Éireann, August 2020 (Revision 3)
- In respect of wastewater drainage services not to be adopted by Uisce Éireann, including temporary wastewater drainage, a quality management plan shall be created and implemented to ensure that the works are executed to provide a suitable wastewater drainage system free of significant defects and in accordance with the recommendations of Building Regulations Technical Guidance Document H – *Drainage and Waste Water disposal* (published 2010, re-printed 2016)

7.9.2.4 Water supply services

In addition to the General Mitigation Measures listed above, the following measures shall be implemented in relation to water supply services:

- Uisce Éireann shall be consulted prior to commencement of works
- Existing water supply infrastructure shall be protected in accordance with Uisce Éireann requirements.
- Water supply services to be adopted by Uisce Éireann shall be constructed in accordance as per the permitted development and in accordance with the following:
    - *Code of Practice for Water Infrastructure, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 2);

    - *Water Infrastructure Standard Details, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 4)
    - *Quality Assurance (QA) Field Inspection Requirements Manual, Connections and Developer Services (A Guide for Self-Lay Developers)*, Uisce Éireann, August 2020 (Revision 3)
- In respect of water supply services not to be adopted by Uisce Éireann, including temporary water supply, a quality management plan shall be created and implemented to ensure that the works are executed to provide a suitable water supply system free of significant defects and in accordance with the recommendations of Building Regulations Technical Guidance Document G – *Hygiene* (published 2008, Reprinted July 2011)

7.9.2.5 Electrical supply services

The following measures shall be implemented in relation to Electrical Supply services:

- ESB Networks will be consulted prior to commencement of the works
- A quality management plan shall be created and implemented to ensure that the works are executed to deliver the permitted Electrical Supply System free of significant defects.

7.9.2.6 Telecommunications services

The following measures shall be implemented in relation to Telecommunication Supply services:

- Openeir will be consulted prior to commencement of the works
- A quality management plan shall be created and implemented to ensure that the works are executed to deliver the permitted Telecommunications Supply System free of significant defects.

7.9.3 Operational Phase

7.9.3.1 Surface water drainage services

The surface water services include various components to control and ensure the quantity and quality of surface water runoff in accordance with design requirements. Inspection and maintenance of components of the system shall be performed on a regular and scheduled basis to ensure the effective functioning of the system and the mitigation of risk to the receiving environment, for both adoptable and non-adoptable parts of the system.

A maintenance plan for the surface water drainage system is included in the *Site Civil Infrastructure and Design Report* and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application. The maintenance schedule is also enclosed in Appendix 7.1 to this document for reference – *Surface Water drainage Scheme with SuDS Elements – Maintenance Plan*.

7.9.3.2 Wastewater drainage services

The overall wastewater discharge associated with the proposed development has previously been the subject of a Pre-connection Enquiry to Uisce Éireann and Confirmation of Feasibility from Uisce

Éireann by letter dated 10th April 2024 confirming that there are no upgrades required to the network by Uisce Éireann or operational mitigation requirements (Ref CDS23005632).

The network when completed will be vested to Uisce Éireann who will have responsibility for the on-going maintenance and operation of the services generally.

Wastewater drainage services not to be vested to Uisce Éireann consist of drainage systems within individual premises upstream of each Customer Connection Chamber to each premises. Wastewater drainage systems within individual premises are designed to operate without the need for maintenance. However this depends on individual good practices. To this end, the following information and educational material will be distributed to purchasers at handover:

- *A guide to Managing Your Household Waste & Domestic Water Usage*, produced by the Environmental Awareness & Research Unit of Cork County Council.
- *Think Before You Flush* information leaflet produced by thingbeforeyouflush.org, supported by Uisce Éireann and An Taisce.
- *Think Before You Pour* information leaflet produced by thingbeforeyouflush.org, supported by Uisce Éireann and An Taisce.
- *The Dirty Dozen* information leaflet produced by thingbeforeyouflush.org, supported by Uisce Éireann and An Taisce.

The sale or lease of commercial premises that generates grease and oil and food residue as part of its commercial output will include a requirement to install grease traps in accordance with EN 1825-1:2004 *Grease separators Principles of design, performance and testing, marking and quality control* and to enter an agreement with a suitably licenced operator to maintain and clean the grease traps on an appropriate maintenance schedule.

7.9.3.3 Water supply services

The operational water demand of the proposed development has previously been the subject of a Pre-connection Enquiry to Uisce Éireann and Confirmation of Feasibility from Uisce Éireann by letter dated 10th April 2024 confirming that upgrades to the existing water supply services are required in order to supply the full development. Connection to the Uisce Éireann water supply network will be controlled by the normal Connection Application process which will ensure that the Uisce Éireann network is not disrupted and that no operational mitigation measures are required.

The network when completed will be vested to Uisce Éireann who will have responsibility for the on-going maintenance and operation of the service.

Water supply services not to be vested to Uisce Éireann consist of water supply pipework within individual premises downstream of the Customer Connection and Boundary Box to each premises. Water supply systems within individual premises are designed to operate without the need for maintenance. Each purchaser or lease holder will be informed of the location of the shutoff valve at the connection to each premises so that the user may shut off the water supply should the need arise.

7.9.3.4 Electrical supply services

The operational electricity demand of the proposed development has already been calculated and agreed at 12KVa per unit. The connection to the existing network to supply the site will form part of the customer Agreement with ESB Networks. ESB Networks will take charge of their system on completion and will be responsible for the ongoing maintenance and operation of the service.

7.9.3.5 Telecommunications services

The operational telecommunications requirement of the proposed development has already been calculated and agreed. The connection to the existing network to supply the site will form part of the customer Agreement with Openeir. Openeir will take charge of their system on completion and will be responsible for the ongoing maintenance and operation of the service.

7.10 Residual Impact Assessment

Assuming the full and proper implementation of the mitigation measures set out herein; and given that the design, construction and operation of utilities infrastructure are strictly controlled by the respective utility provider and authorities (i.e. Uisce Water, ESB, GNI and so on); the residual impact of the proposed development is as described below.

7.10.1 Construction Phase

7.10.1.1 Surface water drainage services:

Potential Direct effects of the construction phase on surface water drainage systems are:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the construction phase on surface water drainage services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

Potential Indirect, Secondary and Cumulative impacts of the construction phase on surface water drainage systems are:

- No likely significant effects

With the implementation of mitigation measures the **Indirect, Secondary and Cumulative** impact of the construction phase on surface water drainage services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

Refer to Chapter 11 – Biodiversity – in relation to Direct impact on Biodiversity.

7.10.1.2 Wastewater drainage services:

Potential Direct effects of the construction phase on wastewater drainage services are:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the construction phase of wastewater drainage services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

Potential Indirect, Secondary and Cumulative effects of the construction phase on wastewater drainage services are:

- No likely significant effects

With the implementation of mitigation measures the **Indirect, Secondary and Cumulative** impact of the construction phase on wastewater drainage services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

Refer to Chapter 11 – Biodiversity – in relation to Indirect, Secondary and Cumulative impact on Biodiversity.

7.10.1.3 Water supply services:

Potential Direct effects of the construction phase are:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the construction phase on water supply services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

Potential Indirect, Secondary and Cumulative effects of the construction phase on water supply services are:

- No likely significant effects

7.10.1.4 Electrical supply services

Potential Indirect, Secondary and Cumulative effects of the construction phase on electrical supply services are:

- No likely significant effects
- With the implementation of mitigation measures the **Direct** impact of the construction phase on electrical supply services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

7.10.1.5 Telecommunications

Potential Indirect, Secondary and Cumulative effects of the construction phase on electrical supply services are:

- No likely significant effects
- With the implementation of mitigation measures the **Direct** impact of the construction phase on telecommunications services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Medium-term** in duration.

7.10.2 Operational Phase

7.10.2.1 Surface water drainage services

Potential Direct effects on surface water drainage services in operation are as follows:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the operational phase on surface water drainage services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Permanent** in duration.

Refer to Chapter 9 – Land & Soils – in relation to Indirect, Secondary and Cumulative impact on Land & Soils.

Potential Indirect, Secondary and Cumulative effects on surface water drainage services in operation are as follows:

- No likely significant effects

Refer to Chapter 11 – Biodiversity – in relation to Indirect, Secondary and Cumulative impact on Biodiversity.

7.10.2.2 Wastewater drainage services

Potential Direct effects on wastewater drainage services in operation are as follows:

- No likely significant effects

  With the implementation of mitigation measures the **Direct** impact of the operational phase on wastewater services is **Neutral** in quality, **Insignifican*t*** in significance, **Likely** probability, **Permanent** in duration.

Refer to Chapter 11 – Biodiversity – in relation to Direct impact on Biodiversity.

Potential Indirect, Secondary and Cumulative effects on wastewater drainage services in operation are as follows:

- No likely significant effects

With the implementation of mitigation measures the **Indirect, Secondary and Cumulative** impact of the operational phase of wastewater drainage services is **Neutral** in quality, **Insignificant** significance, **Likely** probability, **Permanent** in duration.

7.10.2.3 Water supply services

Potential Direct effects on water supply services in operation are as follows:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the operational phase on water supply services is **Neutral** in quality, **Insignificant** in significance, **Likely** probability, **Permanent** in duration.

Potential Indirect, Secondary and Cumulative effects on water supply services in operation are as follows:

- No likely significant effects

With the implementation of mitigation measures the **Indirect** impact of the operational phase on water supply services is **Neutral** in quality, **Insignificant** in significance, **Likely** probability, **Permanent** in duration.

7.10.2.4 Electrical supply services

Potential Direct effects on electrical supply services in operation are as follows:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the operational phase on electrical supply services is **Neutral** in quality, **Insignificant** in significance, **Likely** probability, **Permanent** in duration.

7.10.2.5 Telecommunications

Potential Direct effects on telecommunication services in operation are as follows:

- No likely significant effects

With the implementation of mitigation measures the **Direct** impact of the operational phase on telecommunications services is **Neutral** in quality, **Insignificant** in significance, **Likely** probability, **Permanent** in duration.

7.10.3 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 7-3 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Surface water drainage services	Neutral Neutral	Insignificant Insignificant	Extent 8 Extent 8	Likely Likely	Medium-term Medium-term	Direct Indirect
Wastewater drainage services	Neutral Neutral	Insignificant Insignificant	Extent 9 Extent 9	Likely Likely	Medium-term Medium-term	Direct Indirect
Water supply services	Neutral	Insignificant	Extent 10	Likely	Medium-term	Direct

In respect of Extent listed in Table 7-3 above, the following meanings apply:

Extent 8 –	Lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge

Extent 9 - Lands and premises within the Glanmire and Little Island areas served by existing wastewater infrastructure downstream of the site

Extent 10 - Lands and premises served by the Caherlag water supply reservoir and lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge.

The following Table summarises the identified likely residual significant effects during the operational phase of the proposed development post mitigation.

Table 7-4 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Surface water drainage services	Neutral	Insignificant	Extent 11	Likely	Permanent	Direct
Wastewater drainage services	Neutral Neutral	Insignificant Insignificant	Extent 12 Extent 12	Likely Likely	Permanent Permanent	Direct Indirect
Water supply services	Neutral Neutral	Insignificant Insignificant	Extent 13 Extent 14	Likely Likely	Permanent Permanent	Direct Indirect

In respect of Extent listed in Table 7-4 above, the following meanings apply:

Extent 11 – Development site, Lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge and Glashaboy river to the west of the site

Extent 12 - Lands and premises within the Glanmire and Little Island areas served by existing wastewater infrastructure downstream of the site

Extent 13 - Lands and premises served by the Caherlag water supply reservoir and lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge.

Extent 14 - Uisce Éireann water treatment and storage at Glashaboy and Caherlag

7.10.4 Cumulative Residual Effects

The following Table 7-5 summarises the identified likely significant cumulative residual effects during the construction phase of the proposed development following the application of mitigation measures to the development and on the basis of the implementation of similar quality control procedures at other development sites:

Table 7-5 Summary of Cumulative Residual Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Surface water drainage services	Neutral Neutral	Insignificant Insignificant	Extent 15 Extent 15	Likely Likely	Medium-term Medium-term	Direct Indirect
Wastewater drainage services	Neutral Neutral	Insignificant Insignificant	Extent 16 Extent 16	Likely Likely	Medium-term Medium-term	Direct Indirect
Water supply services	Neutral	Insignificant	Extent 17	Likely	Medium-term	Direct

In respect of Extent listed in Table 7-5 above, the following meanings apply:

Extent 15 –	Lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge
Extent 16 -	Lands and premises within the Glanmire and Little Island areas served by existing wastewater infrastructure downstream of the site
Extent 17 -	Lands and premises served by the Caherlag water supply reservoir and lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge.

The following Table 7-6 summarises the identified likely significant cumulative residual effects during the operational phase of the proposed development following the application of mitigation measures to the development and on the basis of the implementation of similar quality control procedures at other operational sites:

Table 7-6 Summary of Cumulative Residual Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Surface water drainage services	Neutral	Insignificant	Extent 18	Likely	Permanent	Direct
Wastewater drainage services	Neutral Neutral	Insignificant Insignificant	Extent 19 Extent 19	Likely Likely	Permanent Permanent	Direct Indirect
Water supply services	Neutral Neutral	Insignificant Insignificant	Extent 20 Extent 21	Likely Likely	Permanent Permanent	Direct Indirect

In respect of Extent listed in Table 7-6 above, the following meanings apply:

Extent 18 –	Development site, Lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge and Glashaboy river to the west of the site
Extent 19 -	Lands and premises within the Glanmire and Little Island areas served by existing wastewater infrastructure downstream of the site

Extent 20 -	Lands and premises served by the Caherlag water supply reservoir and lands and premises north and east of the site along Dunkettle Road and lands and premises in Glanmire Village south of Glanmire Bridge.
Extent 21 -	Uisce Éireann water treatment and storage at Glashaboy and Caherlag

7.11 Risk of Major Accidents or Disasters

7.11.1 Overview

The proposed development has been designed and will be constructed in line with best practice and, as such, major accidents and / or natural disasters will be low. The identification, control, and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle.

The following major accidents or disasters involving surface water drainage services, wastewater drainage services, water supply services, electrical supply services, telecommunications services could potentially occur:

- Landslides and major earth movements or burial under earthfalls;
- Flooding;
- Major damage and disruption/outages to existing services;
- Major outage of existing
- Electrocution by contact or proximity to electrical supply services;
- Release of chemicals constituting a risk to health and safety or constituting a hazard to the environment;
- Lightning strike;
- Fire;
- Explosion;
- Accidents involving vehicles or machinery;

7.11.2 Construction Phase

Measures to mitigate risks associated with the Construction Phase activities are described in Section 7.9 above and in consideration of such mitigation measures, the risk of major accidents or disasters is considered not to be significantly increased as a result of construction phase activities.

7.11.3 Operational Phase

The proposed development has been designed in line with best practice and, as such, major accidents and / or natural disasters will be low. The identification, control, and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle.

Measures to control risks associated with Operational Phase activities are described in Section 7.9 above and in consideration of such mitigation measures, the risk of major accidents or disasters is considered not to be significantly increased as a result of operational phase activities.

7.12 Worst Case Scenario

7.12.1 Construction Phase

In the construction phase the following are credible worst case scenarios involving material assets that may occur:

- Breakage of existing Uisce Eireann wastewater sewer pipe causing large overland flows of wastewater and major disruption to Uisce Eireann services and customers;
- Breakage of existing Uisce Eireann water supply services causing large overland flows of water and major disruption to Uisce Eireann services and customers;
- Release of chemicals into the surface water drainage network or wastewater drainage network with the potential for widespread chemical contamination, risk to human health and risk to the natural environment;
- Breakage and/or outage of existing electrical distribution services that cross the site causing electrical outages and major disruption to customers.

7.12.2 Operational Phase

In the operational phase, either in normal operation or during maintenance, the following are credible worst case scenarios involving material assets that may occur:

- Breakage of large diameter wastewater sewer pipe causing large overland flows of wastewater and major disruption to Uisce Eireann services and customers;
- Breakage of large diameter water supply services causing large overland flows of water and major disruption to Uisce Eireann services and customers;
- Breakage and/or outage of electrical distribution services that cross the site causing electrical outages and major disruption to customers.

7.13 Interactions

Interactions associated with material assets: built services with other aspects of the environment are listed below.

7.13.1 Population and Human Health

The following activities may result in an impact on population and human health.

Construction Phase activities:

- Uncontrolled release of surface water resulting overland flows of surface water, flooding, disruption and risk to health and safety;
- Blockage of existing surface water drainage systems resulting in overflowing of existing drainage systems, overland flows and flooding, disruption and risk to health and safety;
- Uncontrolled release of wastewater resulting in overland flows, flooding, disruption and risk to health and safety;

- Blockage or breakage of existing wastewater drainage systems resulting in blockage of existing drainage systems, overland flows and flooding, disruption and risk to health and safety.
- Disruption to existing electrical supply services causing electrical supply outages to premises and consequent disruption and risk to health and safety.

Operational Phase activities:

- Blockage of surface water drainage systems resulting in overflowing of existing drainage systems, overland flows and flooding, disruption and risk to health and safety;
- Blockage or breakage of wastewater drainage systems resulting in blockage of existing drainage systems, overland flows and flooding, disruption and risk to health and safety;
- Interruption of existing electrical supply services causing electrical supply outages to premises and consequent disruption and risk to health and safety.

Refer to Chapter 4: Population & Human Health for an assessment of associated impacts.

7.13.2 Land & Soils

The following activities may result in an impact on Land & soils:

Construction Phase activities:

- Trench excavations for service installation resulting in exposure of subsoils and bedrock to potential erosion and subsequent sediment generation and movement, including entrainment in surface water and dust emissions.

Operational Phase activities:

- Ground opening activities for maintenance of services resulting in exposure of sub subsoils and bedrock to potential erosion and subsequent sediment generation and movement, including entrainment in surface water and dust emissions.

Refer to Chapter 9: Lands & Soils for an assessment of associated impacts.

7.13.3 Water & Hydrology

The following activities may result in an impact on Water & Hydrology:

Construction Phase activities:

- Uncontrolled discharges of surface water to existing watercourses causing flooding;
- Surface water discharge to existing watercourses containing sediments, concrete, construction detritus, hydrocarbons, construction chemicals.

Operational Phase activities:

- Incorrect disposal of liquids and chemicals resulting in discharges to the surface water drainage system and ultimately to existing watercourses.

Refer to Chapter 10: Water & Hydrology for an assessment of associated impacts.

7.13.4 Biodiversity

The following activities may result in an impact on Biodiversity:

Construction Phase activities:

- Discharge to watercourses of surface water containing sediments, concrete, construction detritus, hydrocarbons, construction chemicals.

Operational Phase activities:

- Incorrect disposal of liquids and chemicals resulting in discharges to the surface water drainage system and ultimately to existing watercourses.

Refer to Chapter 11: Biodiversity for an assessment of associated impacts.

7.14 Monitoring

The following specific monitoring measures over and above expected normal construction and operational practices for such a development are proposed:

Construction Phase:

- Surface Water drainage services – no specific measures proposed
- Wastewater drainage services – no specific measures proposed
- Water supply services – no specific measures proposed
- Electrical supply services – no specific measures proposed
- Telecommunications services – no specific measures proposed

Operational Phase:

- Surface Water drainage services – implement the Maintenance plan outlined in outlined Appendix 7.1: *Surface Water drainage Scheme with SuDS Elements – Maintenance Plan*
- Wastewater drainage services – no specific measures proposed
- Water supply services – no specific measures proposed
- Electrical supply services – no specific measures proposed
- Telecommunications services – no specific measures proposed

7.15 Summary of Mitigation and Monitoring

The following Table summarises the Construction Phase mitigation and monitoring measures.

Table 7-7 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Surface Water drainage services; Wastewater drainage services; Water supply services	Implement the Construction Environmental Management Plan (CEMP)	Normal monitoring in accordance with the CEMP
Surface Water drainage services; Wastewater drainage services; Water supply services	Implement the Resources and Waste Management Plan (RWMP)	Normal monitoring in accordance with the RWMP
Surface Water drainage services; Wastewater drainage services; Water supply services	Liaise with all relevant Statutory Authorities and Service Providers prior to commencement of construction	No particular requirements
Surface Water drainage services;	Create and implement a surface water drainage construction quality control system	Inspection and checking in accordance with the implemented quality control system
Wastewater drainage services; Water supply services	Implement the Uisce Eireann Quality Assurance system for construction of wastewater and water supply services	Inspection and checking in accordance with the requirements of the QA system
Electricity Supply Services	Implement the ESB Quality Assurance system for construction of electrical services infrastructure	Normal monitoring in accordance with the ESB
Telecommunication Supply Services	Implement the Openeir Quality Assurance system for construction of telecommunication services infrastructure	Normal monitoring in accordance with Openeir

The following Table summarises the Operational Phase mitigation and monitoring measures.

Table 7-8 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Surface Water drainage services	Implement the Maintenance Plan outlined in Appendix 7.1: *Surface Water drainage Scheme with SuDS Elements – Maintenance Plan*	Implement the Scheduled monitoring as part of the Maintenance Plan outlined in Appendix 7.1: *Surface Water drainage Scheme with SuDS Elements – Maintenance Plan*
Electricity Supply Services	Implement the ESB Quality Assurance system for construction of electrical services infrastructure	Normal monitoring in accordance with the ESB
Telecommunication Supply Services	Implement the Openeir Quality Assurance system for construction of telecommunication services infrastructure	Normal monitoring in accordance with Openeir

7.16 Conclusion

The construction and operation of Built Assets: Services has the potential to result in environmental impacts on surface water drainage systems, wastewater drainage systems, water supply systems, electrical supply systems, telecommunications systems. Mitigation measures as described in this chapter shall be implemented during the construction phase and during the operational phase to minimise the risk of impact on the environment.

7.17 References and Sources

- JODA (2024) Site Civil Infrastructure Design Statement and SuDS Impact Assessment (submitted with the Phase 1 LRD planning application).
- EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.
- EPA (2015). Draft Advice Notes on Current Practice in the Preparation of Environmental Impact
- Statements.
- NRA (2008). Environmental Impact Assessment of National Road Schemes – A Practical Guide.
- CIRIA publication C753 The SuDS Manual
- Dublin Drainage Consultancy (2005). Greater Dublin Strategic Study.
- Uisce Éireann Code of Practice for Water Infrastructure – Connections and Developer Services: Design and Construction Requirements for Self-Lay Developments July 2020 (Revision 2)
- Uisce Éireann Code of Practice for Wastewater Infrastructure – Connections and Developer Services: Design and Construction Requirements for Self-Lay Developments July 2020 (Revision 2)
- National Parks & Wildlife Service Special Protection Areas webpages:
  - landing page https://www.npws.ie/protected-sites/spa;
  - map page - NPWS Designations Viewer - https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba)
- U.S. Department of Transportation Hydraulic Engineering Circular No. 14, Third Edition Hydraulic Design of Energy Dissipators for Culverts and Channels
- HAS (2016) Code of Practice for Avoiding Danger from Underground Services.
- ESB Networks & Health and Safety Authority (2019) Code of Practice for Avoiding Danger from
- Overhead Electricity Lines.

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 8

Material Assets: Waste

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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8 Material Assets: Waste

8.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of waste created by the proposed development on the receiving environment. Chapter 2 of this EIAR includes a detailed description of the proposed development.

This Chapter has been prepared having regard to the information contained in the *Outline Construction Environmental Management Plan*, *Resource and Waste Management Plan* and *Operational Waste Management Plan* prepared for the proposed development by JODA Consulting Engineers.

8.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Laura Griffin of Enviroguide Consulting.

Laura holds a Master of Science (Hons) degree in Climate Change from Maynooth University and a Bachelor of Arts (Hons) degree in English and Geography from Maynooth University. Laura has been working as an Environmental Consultant with Enviroguide since 2021 and has 5 years of professional experience. Laura has carried out air quality and climate, noise and vibration and material assets (waste and utilities) assessments and has been involved in the preparation of EIARs for the following projects:

- Kiltiernan Village Large Scale Residential Development;
- Athlone Large Scale Residential Development;
- St. Teresa's Gardens Large Scale Residential Development.

This chapter was reviewed and approved by Catherine Keogan, Technical Director and EIA Lead at Enviroguide. Catherine is an environmental consultant with 20 years' experience in consultancy, specialising in EIAs for a wide range of infrastructure developments.

8.3 Proposed Development

A comprehensive description of the proposed development is presented in Chapter 2 of this EIAR.

8.3.1 Aspects Relevant to this Chapter

The waste management objectives for the proposed development are as follows, and will facilitate material reuse and recycling, where possible, and seek to divert waste from landfill:

- Prevention: The Principal Contractor will prevent and minimise waste generation where possible by ensuring large surpluses of construction materials are not delivered to the site through coordination with the suppliers, operating a 'just-in-time' delivery scheme and ensuring sub-contractors conform to the outline Construction and Environmental Management Plan (oCEMP);

- Reuse: Reusing wastes and surplus materials where feasible and in as many high value uses as possible;
- Recycle: Recycling wastes where possible such as introducing on site crushers to produce waste derived aggregates which, subject to appropriate testing and approvals, may be re-used in the Proposed Development; and
- Disposal: Where disposal of waste is unavoidable, this will be undertaken in accordance with the Waste Management Act 1996, as amended.

8.4 Methodology

8.4.1 Relevant Legislation and Guidance

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

- Environmental Protection Agency (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR);
- EPA (2021) Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects;
- Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste) as amended by Directive (EU) 2018/851;
- European Union (Waste Directive) Regulations 2020, S.I. No. 323 of 2020
- Waste Management Acts 1996 (as amended);
- The National Waste Management Plan for a Circular Economy 2024-2030;
- Cork City Council Bye-laws; and
- Cork City Development Plan 2022-2028.

The scope of the work undertaken for the impact assessment included desk-based study of waste management services within the defined study area. The desk study involved collecting all the relevant data for the Proposed Development site and surrounding area including published information and details pertaining to the proposed development provided by the Applicant and design team. Information on waste management in the vicinity of the site of the proposed development will be assembled by reviewing the following information:

- Resource and Waste Management Plan (JODA Engineering Consultants, 2024);
- Outline Construction Environmental Management Plan (JODA Engineering Consultants, 2024);
- Operational Waste Management Plan (JODA Engineering Consultants, 2024); and
- http://mywaste.ie

8.4.2 Description and Assessment of Potential Impacts

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this chapter is as described in Chapter 1 of this EIAR.

8.4.3 Local and National Waste Action Plans

The *National Waste Management Plan for a Circular Economy* (NWMPCE) 2024 -2030, sets out the framework for the prevention and management of waste across Ireland. This document is a statutory document underpinned by national and EU waste legislation, and reflects the targets set out for C & D waste in the Waste Framework Directive (WFD).

The strategic vision of the Plan is to rethink the approach to managing waste, and to move towards a 'circular economy' approach where resources are reused or recycled as much as possible, and the overall generation of waste is minimised.

In order to achieve this vision, the Plan has set out a number of specific and measurable performance targets in relation to construction and demolition waste:

- Achieve a 2% reduction per annum is proposed for total construction and demolition waste to achieve a cumulative 12% reduction by 2030 (baseline is 9 million tonnes); and
- Achieve 70% C & D waste sent for reuse, recycling and other recovery of construction and demolition waste (excluding natural soils and stones and hazardous wastes).

The Plan aims to *"prioritise waste prevention and circularity in the construction and demolition sector to reduce the resources that need to be captured as waste".* In order to achieve the objectives, set out in NWMPCE, it is imperative that robust resource and waste management plans are developed for and designed into the pre-construction, Construction and Operational Phases of the proposed development.

8.4.4 Article 27 of the European Communities (Waste Directive) Regulations 2011

Under Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27), uncontaminated soil and stone free from anthropogenic contamination which is excavated during the construction phase of a development can be considered a by-product and not a waste, if (a) further beneficial use of the material is certain, (b) it can be used directly without any further processing, (c) it is produced as an integral part of the development works and (d) the use is lawful and will not have any adverse environmental or human health impacts (EPA, 2019).

For Article 27 to apply, the beneficial use mentioned in point (a) above must be identified for the entirety of the excavated soil from the proposed development prior to its production, with that use taking place within a definite timeframe, for it to be regarded as certain.

8.5 Difficulties Encountered

No difficulties were encountered while compiling this chapter.

8.6 Baseline Environment

8.6.1 Soils

The soil is classified as sandstone till (Devonian), and the subsoil is sandstone till (Devonian) for most of the site and for a small portion of the site there is bedrock at or close to the surface (EPA, 2024).

8.6.2 Bedrock Geology

Based on the GSI database (2024) the bedrock beneath the site is mapped as Green Formation (Stratigraphic Code: GY; New Code: DUGYLE). The formation is described as sandstone with mud and siltstone.

The aquifer type within the site boundary is a Locally Important (LI) aquifer on bedrock which is moderately productive only in Local Zones. The level of vulnerability of the site to groundwater contamination via human activities ranges from High to Extreme, and in some areas of the site there is no groundwater data available as there is rock at the surface.

8.6.3 Invasive Species

Invasive species surveys were incorporated into the ecological walkovers carried out at the site. During the ecological walkovers conducted by Enviroguide on the 28th of August 2023. The invasive plant species survey primarily focused on plant species that are listed on Schedule III of the European Communities (Birds and Habitats) Regulations and considered to be ‘High impact’ invasive species e.g., Japanese Knotweed (*Reynoutria japonica*). Incidental observations of other terrestrial plant species known to be potentially invasive, such as Butterfly Bush (*Buddleja davidii*), were also recorded, where found.

A total of two invasive plant species were recorded on the site, namely Sycamore (*Acer pseudoplatanus)* and Travellers Joy (*Clematis vitalba*). Both were observed in small quantities at the southern edge of the proposed development.

Field surveys carried out in August 2023 also recorded a number of invasive species within the landholding of the applicant, (O’Flynn Group) off -site. These include those listed below:

- **Cherry Laurel** (*Prunus laurocerasus*) - High Impact Invasive (Third Schedule, SI. 477)– c. 470m east of Phase 1 site boundary in the surrounds of Dunkettle House. It has been established also, that Cherry Laurel is present in areas within Glanmire Wood pNHA, at the northern edge of the site bordering the Glashaboy Estuary and Cork Harbour SPA.
- **Rhododendron** (*Rhododendron ponticum*) - High Impact Invasive (Third Schedule, SI. 477)– c. 470m east of Phase 1 site boundary in the surrounds of Dunkettle House.
- **Travellers Joy** (*Clematis vitalba*) – Medium Impact Invasive – c. 30m south of site boundary and also c. 470m east of Phase 1 site boundary in the surrounds of Dunkettle House.
- **Butterfly Bush** (*Buddleja davidii*) - Medium Impact Invasive – c. 30m south of site boundary.

8.7 The ‘Do Nothing’ Scenario

In the ‘Do Nothing’ scenario, the proposed development does not proceed and there would be no excavation, construction or operational waste generated at the site. There would, therefore, be no additional demand or loading on waste management infrastructure locally or nationally and thus there would be a neutral effect on the environment in terms of waste.

8.8 Potential Significant Effects

8.8.1 Demolition and Construction Phase

This is a greenfield site with no buildings or structures to be demolished except for the demolition / removal of existing ruins/structures (including a former dwelling) on the northern part of the site.

The Construction Phase will give rise to the requirement to remove and bring quantities of various materials to and from the site. Construction and excavation related wastes will be created during the Construction Phase, and this has the potential to impact on the local waste management network.

An outline Construction Environmental Management Plan (CEMP) (JODA, 2024) and a Resource and Waste Management Plan (RWMP) (JODA, 2024) have been prepared for construction phase of the proposed development and will be submitted with the planning application.

There will be bulk excavation cut and fill required throughout the site in order to facilitate the finished levels of the developed site. Cut and fill depths will generally be limited to less than 2m with the exception of certain specific parts of the site where substantially deeper excavation depths will be required.

Existing topsoil and subsoil onsite are uncontaminated and naturally occurring and thus, is in accordance with the regulatory regime for by-products as enshrined in Article 5 of the Waste Framework Directive and as transposed into Irish legislation by Article 27 of the European Communities (Waste Directive) Regulations 2011 and are considered suitable for re-use in the proposed development.

Excavated topsoil and subsoils required for re-use on site will be temporarily stored on site for re-use, otherwise it will be exported. Rock excavated on site will be crushed and re-used on site for filling where suited. Topsoil will be stored in an appropriate manner on site for the duration of the construction works.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the site boundary of the extraction and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off-site or will be reused in other areas of the site as fill.

Excavated materials in excess of those required for the site development works will be treated as a by-product (production residue) and exported off-site to be re-used at another suitable site in the first instance in accordance with the Waste Framework Directive (2008/98/EC, as amended by Directive (EU) 2018/851) and as transposed in Ireland by the European Union (Waste Directive) Regulations 2011-2020. These regulations provide for uncontaminated excavated soil and stone and other naturally occurring materials (used on sites other than the one from which they were excavated) to be considered in accordance with the definition of waste and the provisions on by-products and on end-of-waste status. The Directive and Article 27 of those Regulations sets out the requirements and conditions for a material to be regarded as a by-product and not as a waste. The conditions for a material to be regarded as a by-product and not a waste are outlined in Section 8.4.4.

During the demolition and construction phase, excavations and exposed subsoils in open cuts will be blinded and protected with clean broken stone as soon as possible after exposing the subsoil to prevent erosion by surface water runoff.

Waste will also be generated from construction workers e.g., organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the Construction Phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Table 8-1 shows the composition of C and D waste types produced on construction sites in 2020 based on data from the EPA National Waste Statistics (EPA, 2022. National Waste Statistics Summary Report for 2020).

Table 8-1 Composition of C and D Waste Collected in Ireland in 2020 (Source: EPA, 2022)

Materials/Waste Types	Tonnage	Percent of Total
Soils, stones and dredging spoil	6,946,632	84.4%
Concrete, brick, tile and gypsum	524,605	6.4%
Mixed CandD waste	377,963	4.6%
Metal	199,392	2.4%
Bituminous mixtures	127,681	1.6%
Segregated wood, glass and plastic	52,131	0.6%
Total	**8,228,404**	**100%**

An inventory has been presented in the RWMP (JODA Engineering Consultants, 2024) and is detailed in Table 8-2. This inventory provides a post-design resource and waste inventory of all residual resources listing the following:

- Description of each residual resource stream predicted;
- The List of Waste (LoW) Code for each stream;
- The predicted quantity of material generated (in tonnes); and
- The identified resource management route options for prevention, reuse, recycling, recovery and disposal for each material.

Table 8-2 Resource Waste Inventory

LoW Code	Description	Waste Composition	Generated Quantity (Tonnes	Prevention (Tonnes Non-Waste	Reuse Rate (%)	Reused Quantity (Tonnes)	Recycling Rate (%)	Recycled Quantity (Tonnes)	Recovery Rate (%)	Recovered Quantity (Tonnes)	Disposal Quantity (Tonnes)
17 01 01 17 01 02 17 01 03	Concrete Brick Tiles and Ceramics	40	1478	-	55	813	40	591	0	-	74
17 02 01 17 02 02 17 02 03	Wood Glass Plastic	4	148	-	0		80	118	18	27	3
17 03 02	Bituminous Material	10	369	-	40	148	60	222	0		0
17 04 01	Copper, Bronze, Brass	0		-							
17 04 02	Aluminium	0		-							
17 04 03	Lead	0		-							
17 04 04	Zinc	0		-							
17 04 05	Iron and Steel	0		-							
17 04 06	Tin	0		-							
17 04 07	Mixed Metals	15	554	-	0		100	554	0		
17 04 11	Cables	0	-	-							-
17 05 04	Soil and Stone	-	651,174	-		163,637					487,537
17 06 04	Insulation Material	0		-							
17 08 02	Gypsum	0		-							
17 09 04	Mixed C&D	30	1,108	-	30	332	40	443	20	222	111
17 01 06*	Mix of concrete, bricks, tiles etc containing or contaminated with hazardous substances	0		-							
17 02 04*	Glass, plastic and wood containing or contaminated with hazardous substances	0		-							

LoW Code	Description	Waste Composition	Generated Quantity (Tonnes	Prevention (Tonnes Non-Waste	Reuse Rate (%)	Reused Quantity (Tonnes)	Recycling Rate (%)	Recycled Quantity (Tonnes)	Recovery Rate (%)	Recovered Quantity (Tonnes)	Disposal Quantity (Tonnes)
17 03 01*	Bituminous mixtures containing coal tar	0		-							
17 04 09*	Metal waste contaminated with hazardous substances	0		-							
17 05 03*	Soil and stones containing hazardous substances	0		-							
17 06 05	Construction materials containing asbestos	0		-							
	Other resources (non-waste materials) – specify as needed										
13 07 01*	Fuel Oils and Diesel	0		-							
20 01 05*	WEEE	0		-							
20 01 08	Biodegradable Canteen Waste	0.25	9	-	0		0		0		9
20 03 01	Mixed Municipal Waste	0.75	28	-	0		0		0		28
	Other wastes (specify as needed)	0		-							
Note - *Denotes waste containing hazardous substances											

The potential impact from the Construction Phase on waste recovery and disposal is likely to be medium-term, negative, direct and slight in nature.

8.8.2 Operational Phase

The Operational Phase of the proposed development will result in an increase in the production of municipal waste in the region and will increase demand on waste collectors and treatment facilities, however, as the surrounding area is urban in nature, waste collection is commonplace. Anticipated wastes arising from the day-to-day operations at the proposed development are summarised in Table 8-3.

Table 8-3 Typical Waste Types and Generated List of Waste (LoW) Codes

Waste Description	List of Waste Codes	Hazard Level	
		Non-Hazardous	Hazardous
Paper and Cardboard	20 01 01	▪	
Glass	20 01 02	▪	
Biodegradable Kitchen Waste	20 01 08	▪	
Textiles	20 01 11	▪	
Solvents	20 01 13		▪
Pesticides	20 01 19		▪
Oils and Fats	20 01 25	▪	
Printer Toner/Cartridges (Hazardous)	20 01 27		▪
Printer Toner/Cartridges (Non-Hazardous)	20 01 28	▪	
Detergents (Hazardous)	20 01 29		▪
Detergents	20 01 30	▪	
Batteries and accumulators	20 01 33 20 01 34		▪
Waste electrical and electronic equipment (WEEEs)	20 01 35 21 01 36		▪
Plastics	20 01 39	▪	
Metals	20 01 40	▪	
Green Waste	20 02 01	▪	
Mixed Non-Recyclable Waste	20 03 01	▪	
Bulky wastes	20 03 07	▪	

Municipal waste is made up of household waste and commercial waste that is compositionally comparable to household waste. It includes residual, recyclables, organic, bulky, and waste electrical and electronic equipment. An Operational Waste Management Plan (OWMP) has been prepared by Engineering Consultants (2024) and is included as a standalone report with this planning application.

The potential impact from the Operational Phase on municipal waste disposal is likely to be long-term, negative, direct and slight in nature.

8.8.3 Cumulative Effects

Cumulative Impacts can be defined as "*impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project*". Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor.

A review of other off-site developments was completed as part of this assessment. Chapter 1 of this EIAR details the existing, proposed and granted planning permissions on record in the area, a review of these planning permissions has been completed as part of this assessment.

With regard to the other developments under construction and proposed in the vicinity of the site of the proposed development, there will be a greater demand on existing local waste management services and on regional waste acceptance facilities.

The capacity of waste collection companies and waste management facilities in Cork City have been designed with forward planning and expansion in mind to cater for a growing population. It is necessary that all the developments provide the infrastructure and services to assist residents to segregate domestic waste at source, in order to reduce the generation and disposal of non-recyclable mixed waste. Existing waste collections currently take place in the local area and during the Operational Phase, the proposed development will be added to an existing collection route. The likely effect will be neutral and not significant on waste management facilities in the area in the long term.

8.8.4 Summary

The following Table summarises the identified likely significant effects during the Demolition and Construction Phase of the proposed development before mitigation measures are applied.

Table 8-4 Summary of Demolition and Construction Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Generation of construction waste and additional demand on surrounding waste collection facilities	Negative	Slight	Cork City Area	Likely	Medium	Direct

The following Table summarises the identified likely significant effects during the Operational Phase of the proposed development before mitigation measures are applied.

Table 8-5 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Generation of operational waste and additional demand on surrounding waste collection facilities	Negative	Slight	Cork City Area	Likely	Long-term	Direct

8.9 Mitigation Measures

8.9.1 Incorporated Design Mitigation

The following measures have been incorporated into the design:

- Buildings have been designed with material efficiency in mind. This involves reducing the amount of materials used in the building fabric and minimising the waste during construction;
- Opportunities to achieve on-site and off-site reuse and recycling of waste have been identified; and

8.9.2 Demolition and Construction Phase Mitigation

The waste management objective will be to prevent waste arising in the first place, and to re-use, recycle or recover waste materials where possible. The following mitigation measures are recommended for the Construction Phase of the proposed development regarding waste management:

- Dedicated, secure waste segregation areas have been selected for the duration of the enabling works. The dedicated waste storage areas within the waste segregation points will house all bins and skips for the storage of segregated construction waste generated. All containers will be marked with clear signage which will identify which waste types are to be placed into each container.
- Waste materials will be separated at source and will follow the Resource and Waste Management Plan (RWMP) and Construction Environmental Management Plan (CEMP);
- Prior to the commencement of the Construction Phase detailed calculations of the quantities of topsoil, subsoil and green waste will be prepared, and soils will be tested to confirm they are clean, inert or non-hazardous;
- A policy of 'as needed' ordering and strict purchasing procedures will be implemented to prevent waste arisings as far as possible;
- The Contractor will vet the source of aggregate, fill material and topsoil imported to the site in order to ensure that it is of a reputable origin and that it is "clean" (i.e., it will not contaminate the environment).
- The Contractor and/or Council will implement procurement procedures to ensure that aggregate, fill material and topsoil are acquired from reputable sources with suitable environmental management systems as well as regulatory and legal compliance;
- The waste materials generated during the Construction Phase will be stored in suitably size receptables and transferred offsite for appropriate processing, recycling and recovery;
- Waste materials generated from the Construction Phase that are unsuitable for reuse or recovery will be separately collected;
- Disposal of construction generated wastes will be considered a last resort and only after recycling or recovery options have been ruled out;
- A suitably competent and fully permitted waste management company will be employed to manage waste arising for the Construction Phase. The appointed waste contractor must have the relevant authorisations for the collection and transport of waste materials, issued by the National Waste Collection Permit Office (NWCPO);
- All waste materials will be transported to an appropriately authorised facility, which must have the relevant authorisations for the acceptance and treatment of the specific waste streams, i.e., a Certificate of Registration (COR) or a Waste Facility Permit (WFP) as granted by a Local Authority, or a Waste/Industrial Emission Licence as granted by the Environmental Protection Agency;

- It is not envisaged that there will be any hazardous waste generated throughout the construction works however, in the event that hazardous soil, or historically deposited waste is encountered during the site bulk excavation phase, the contractor will notify Cork City Council and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s). Only authorised facilities will be used and as a result of this, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures;
- Waste generated by construction workers will be stored in wheelie bins on site and it will be collected by an appropriately authorised waste collector.
- All wastes generated on site will be sent for recycling, recovery, or disposal to a suitably licensed or permitted waste facility; and
- All waste quantities and types will be recorded and quantified, and records will be retained onsite for the duration of the Construction Phase.

These mitigation measures will ensure that the waste arising from the Construction Phase of the proposed development is dealt with in compliance with provisions of the Waste Management Act 1996, as amended, associated Regulations and Litter Pollution Act 1997, and The National Waste Management Plan for a Circular Economy 2024-2030. The mitigation measures will also ensure optimum levels of waste reduction, reuse, recycling and recover are achieved and will promote more sustainable consumption of resources.

The Contractor will have the responsibility to record resource and waste management at the site in line with the Resource and Waste Management Plan (RWMP). Some of the principal duties and responsibilities of this role include:

- Report to Project Manager on the management of resources and waste at the site;
- Identify all destinations for resources taken off-site;
- Address end-of-waste and by-product notifications with the EPA, where applicable;
- Maintain full records of all resources (both wastes and other resources) for the duration of the project;
- Delegate responsibility to sub-contractors, where necessary;
- Coordinate with suppliers, service providers and sub-contractors; and
- Prioritise waste prevention and resource salvage.

In terms of invasive species, an IAS Specialist will be contracted to treat and eradicate the Travellers Joy and Sycamore on site per TII Technical Guidance on ‘Management of Invasive Plant Species on National Roads’ published in December 2020.

The following measures will be adhered to, to avoid the introduction or dissemination of invasive species to and from the site.

- For the construction phase, the contractor will prepare a project specific Invasive Alien Plant Species (IAPS) standard operating procedure document, in advance of work commencement. The document should be prepared by an IAPS specialist and should cover the bio-security measures to be taken, including the maintenance of records, to screen for the introduction of

IAPS on-site, and to enable their tracing if such an introduction occurs; and to ensure no transmission of IAPS offsite. The measures include:

- Validation that all machinery / vehicles are free of IAPS, prior to their first introduction to site;
- Certification from the suppliers that all imported soils and other fill/landscaping materials are free of IAPS;
- A regular schedule of site inspections across the IAPS growing seasons, for the duration of the construction works programme;
- Validation that all machinery / vehicles are free of IAPS, prior to leaving the site; and
- Appropriate and effective site biosecurity hygiene to ensure that no IAPS are transmitted off-site for the duration of the proposed works.

8.9.3 Operational Phase Mitigation

As previously stated, an Operational Waste Management Plan has been prepared by JODA Engineering Consultants (2024) for the LRD Phase 1 development. The OWMP details the waste segregation and storage capacity requirements, as well as the plan which will be adopted to manage the residential and commercial waste arising from the proposed development, one operational. The OWMP has reviewed policy alongside best practice guidance and recommendations for sustainable waste and recycling management arrangements for the proposed development and ensures a high level of recycling, reuse and recovery at the development and also ensures that waste management is carried out in accordance with the requirements of the Cork City Development Plan 2022 – 2028, Cork City Council Bye-laws and Ireland’s National Waste Policy.

Implementation of the OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus contributing to the targets set out in the National Waste Management Plan for a Circular Economy (NWMPCE) 2024 -2030.

The waste storage and collection strategy outlined in the OWMP will provide adequate storage capacity for the estimated quantity of segregated waste. Designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details outlined in the OWMP.

The layout of the proposed development facilitates access for refuse vehicle collection of waste throughout the site.

A separate Outline Operational Waste Management Plan will be developed for the subsequent phases of development at Dunkettle, as described in Chapter 2. These Plans will also include mitigation measures to ensure a high level of recycling, reuse and recovery at the proposed development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in The National Waste Management Plan for a Circular Economy 2024-2030.

8.10 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

8.10.1 Demolition and Construction Phase

The residual effects on waste management are considered slight, neutral, direct and medium-term, this is due to:

- The prevention and mitigation measures proposed within this and other chapters of the EIAR;
- Compliance with national legislation and the allocation of adequate time and resources dedicated to efficient waste management practices; and
- Continued use of permitted/licensed waste hauliers and facilities. Waste removed from the facility will be managed appropriately and will avoid environmental impacts or pollution. In addition, the correct management and storage of waste will avoid litter or pollution issues at the site.

8.10.2 Operational Phase

Waste materials will be generated on an ongoing basis during the Operational Phase; these will for the most part consist of municipal waste and recyclable materials. Careful management of these, including segregation at source, will help to ensure a high level of waste recycling, reuse, and recovery at the development. Given the provision of appropriate facilities, and their correct use by residents, environmental impacts (e.g. litter, contamination of soil or water, etc.) arising from operational waste storage and removal are expected to be minimal. The use of suitably licensed waste contractors will ensure compliance with relevant legal requirements and appropriate off-site management of waste. With the implementation of the proposed operational waste management measures, the proposed development is not expected to have a significant environmental impact with respect to operational waste. The likely effect of the Operational Phase on waste management will be neutral, direct and slight in the long-term.

8.10.3 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the Construction Phase of the proposed development following the application of mitigation measures.

Table 8-6 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Generation of construction waste and additional demand on surrounding	Neutral	Slight	Cork City Area	Likely	Medium	Direct

waste collection facilities						

The following Table summarises the identified likely residual significant effects during the Operational Phase of the proposed development post mitigation.

Table 8-7 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Generation of operational waste and additional demand on surrounding waste collection facilities	Neutral	Slight	Cork City Area	Likely	Long-term	Direct

8.10.4 Cumulative Residual Effects

The capacity of waste collection companies and waste management facilities in Cork City have been designed with forward planning and expansion in mind to cater for a growing population. It is necessary that all the developments provide the infrastructure and services to assist residents to segregate domestic waste at source, in order to reduce the generation and disposal of non-recyclable mixed waste. Existing waste collections currently take place in the local area and during the Operational Phase, the proposed development will be added to an existing collection route. The likely effect will be neutral and not significant on waste management facilities in the area in the long term.

8.11 Risk of Major Accidents or Disasters

Not relevant to waste management.

8.12 Worst Case Scenario

A worst-case scenario would be where a previously unclassified hazardous waste stream arose on the site during excavations, which was not identified and segregated appropriately and resulted in the contamination of a non-hazardous waste stream, such as soil and stones, resulting in a large volume of hazardous waste that would require specialist removal and treatment. Additionally, the contaminated soil and stones would no longer be fit for use for fill and landscaping and would need to be replaced with imported materials.

8.13 Interactions

8.13.1 Population and Human Health

The improper removal, handling and storage of hazardous waste could negatively impact on the health of construction workers. Potential impacts on population and human health are addressed in Chapter 4 of this EIAR.

8.13.2 Biodiversity

The improper handling and storage of waste during the Construction and Operational Phases could negatively impact on biodiversity. Potential impacts on biodiversity are addressed in Chapter 11 of this EIAR (Biodiversity).

8.13.3 Land & Soils

Improper handling and segregation of hazardous or contaminated wastes could lead to the contamination of soil and stones excavated from the Site. Potential impacts on land and soils are addressed in Chapter 9.

8.13.4 Material Assets: Traffic & Transport

The proposed development will require the removal of excavated soil and transportation to appropriate waste facilities during the construction phase. This has the potential to negatively affect the surrounding road network. Potential impacts on traffic are addressed in Chapter 6 of this EIAR.

8.14 Monitoring

8.14.1 Demolition and Construction Phase

The site control measures to manage and minimise waste include:

- Signage on the site office/welfare bins to separate them as environmental/domestic waste bins; and
- Briefing for all sub-contractors via induction handouts.

The Resource Manager (RM) will be responsible for conducting ongoing resource audits at the site during the Construction Phase. The audit protocol will be risk based and focus on key issues of concern but will include as minimum:

- Adequacy of site signage and need for any repairs or upgrades;
  - Adequacy of storage infrastructure and need for any repairs or upgrades;
  - Compliance with resource segregation protocols and observed contamination in any resource streams;
  - Assessment of observed Contractor and Sub-Contractor work practices for compliance with the RWMP;

- The RM will undertake a review of all records of wastes and resources generated on-site and transported off-site periodically through the Construction Phase. If waste movements are not accounted for, the reasons for this are to be established to understand why the record keeping system has not been maintained and implement corrective actions if needed;
- The resource records will be compared with established targets for the site (e.g., reuse of resource target or recycling waste target);
- Examining material management on-site to determine where the largest percentage of residual waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how project contract targets can be achieved; and
- Issue corrective actions (training, penalties, etc.) as required to site operatives where deviations of the RWMP are observed.

8.14.2 Operational Phase

The building management company and future residents will be required to maintain the bins and storage areas in good condition as required by the Cork City Council Waste Bye-Laws. The waste strategy presented in the OWMP will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.

8.15 Summary of Mitigation and Monitoring

The following Table summarises the Demolition and Construction Phase mitigation and monitoring measures.

Table 8-8 Summary of Demolition and Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Generation of construction waste and additional demand on surrounding waste collection facilities	CEMP, RWMP, Authorised waste contractor and National Waste Collection Permit	Resource Manager to be appointed.
Invasive Species	An invasive species specialist will be contracted to treat and eradicate and prepare a project specific Invasive Alien Plant Species (IAPS) standard operating procedure document.	IAPS Specialist / Contractor to maintain records

The following Table summarises the Operational Phase mitigation and monitoring measures.

Table 8-9 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Generation of operational waste and additional demand on surrounding waste collection facilities	OWMP	Maintenance of bins and storage areas in good condition as required by the Cork City Council Waste Bye-Laws

8.16 Conclusion

The implementation of the mitigation measures outlined in Section 8.9 will ensure that high rates of reuse, recovery and recycling are achieved at the site during the Construction and Operational Phases. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for management of waste are achieved.

The residual effects on waste management are considered to be considered slight, neutral, direct and medium-term for the Construction Phase and neutral, direct and slight in the long-term for the Operational Phase.

8.17 References and Sources

- Department of Communications, Climate Action and Environment (DCCAE) (2021) A Waste Action Plan for a Circular Economy – Ireland’s National Waste Policy 2020-2025
- Cork City Development Plan 2022-2028.
- Cork City Council Segregation, Storage and Presentation of Household and Commercial Waste Bye-laws, 2019.
- Environmental Protection Agency, 2022, Guidelines on the Information to Be Contained in Environmental Impact Assessment Reports.
- Environmental Protection Agency, 2021, Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects
- Environmental Protection Agency, 2019, Guidance on Soil and Stone By-products in the context of article 27 of the European Communities (Waste Directive) Regulations 2011, Version 3.
- Environmental Protection Agency, 2003, Advice Notes on Current Practice in the preparation of Environmental Impact Statements.
- Environmental Protection Agency, 2002, Guidelines on the information to be contained in Environmental Impact Statements.
- Litter Pollution Act 1997.
- Local Government Ireland (2024) The National Waste Management Plan for a Circular Economy 2024-2030.
- Operational Waste Management Plan, JODA Engineering Consultants, 2024.
- Outline Construction Environmental Management Plan, JODA Engineering Consultants, 2024.
- Resource Waste Management Plan, JODA Engineering Consultants, 2024.
- Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste) as amended by Directive (EU) 2018/851.
- Waste Management Acts 1996-2011 (as amended).

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 9

Land & Soils

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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9 Land and Soils

9.1 Introduction

Viridus Consulting Ltd., (VCL) prepared this chapter of the EIAR to assess the potential significant effects of the proposed development on the Land and Soils (Geology) attributes of the project.

It should be read in conjunction with Chapter 2 (Proposed Development), Chapter 6 (Traffic), Chapter 7 (Built Services), Chapter 10 (Water) and Chapter 15 (Interactions of the Foregoing) of the EIAR.

9.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Mr. Darragh Musgrave, a senior Geo-Environmental Consultant with VCL. Darragh holds an honours degree in Earth Science/Geology from the National University of Ireland Galway (1992) and a Diploma in Environmental Protection from the Atlantic Technological University Sligo, (2006). He has over 30 years of experience working in the geological, geo-technical, contaminated land, and soil/surface water/groundwater environmental assessment sector as a Geo-Environmental Scientist and been involved over the last few years in the preparation of a number of EIARs including the following related to similar large residential projects:

- Ballinglanna, Glanmire & Lakeview, Midleton, Co. Cork – O'Flynn Group,
- Marybourough Ridge, Douglas, Cork & The Paddocks, Waterford City – Glenveagh Homes
- Coolcarron, Fermoy, Co. Cork – Cumnor Construction

9.3 Proposed Development

The EIAR site boundary is presented in Chapter 1 – Introduction. Chapter 2 of this EIAR provides a full description of the proposed development.

Aspects of the proposed development relevant to this chapter relate to the land take, soil and bedrock type, ground conditions such as drainage, stability and karst risk, proposed site levels, potential cut and fill required to obtain these levels and the potential effects of the geology on the proposed development.

9.3.1 Activities Associated with the Proposed Development

As per Step 4 of the Institute of Geologists of Ireland (IGI) Guidelines, a range of Generic Activities that can potentially interact and effect with the geological/hydrogeological environment are presented in the Activities/Environment Matrix identified as Figure 2 of the IGI Guidelines. A copy of this Matrix is presented in Appendix.9.9.

The activity which is associated with the initial construction phase of the proposed Dunkettle development relates to:

EARTHWORKS AND EXCAVATION OF MATERIALS ABOVE THE WATER TABLE.

This activity will be completed in a Type A (passive) geological environment.

As recommended by the IGI Activities/Environments Matrix invasive site investigations in the form of trial holes has been undertaken to characterise the nature and thickness of the soil/subsoils and depth to bedrock around the site. The completed trial pit survey report is presented in Appendix 9.5.

It is proposed to complete the earthworks and construction of the Phase 1 area in three distinct phases. This will enable an orderly and structured site development. Refer to the construction phases described in Chapter 2.

9.3.2 Construction Phase Cut and Fill Activities

In order to achieve the requirements of the Design Manual for Urban Roads and Streets and to fulfil the requirements for access to buildings in accordance with the building regulations, some cut and fill earthworks will be required for the development in some areas of the site.

Based on the site topography and the data from the trial pit investigation calculations on the volume of Cut and Fill have been made for the three stages of the Phase 1 development and preliminary calculations made for the Phase 2 development area.

Allowing for a general site strip of about 0.4m to remove the topsoil then the calculations indicate that, after a 21,756m3 re-use in landscaping, there will be an excess of 23,693m3 of Topsoil for the three Phase 1 areas and with 7,981m3 re-used in landscaping an excess of 30,035m3 of Topsoil will arise from Phase 2 area.

In areas where cut and fill is needed the JODA modelling indicates that the vast majority of the site area will only require relatively minor, (+3m to -3m), cut and fill activities. Given the undulating nature of the natural topography some deeper areas of cut are required at the northern and eastern boundaries of the Phase 1 area. Excavations from -5m to -9m are required in an area of about 6,795m and while the minimum elevation is given at -11.4m, only a very small area (123m) is required to be at this depth. These deepest excavations are needed for the construction of the access road on the east side of the Phase 1 area but this excavation is actually the widening of one side of an existing slope to enable the access road to be constructed and the final ground heights won’t need supporting structures. A topographical detail drawing of this area of the site is included in Appendix 9.8.

Estimates of subsoil and rock excavations for the two Phases indicate 149,774m3 of suitable fill and 123,985m3 of unsuitable fill will be excavated along with 159,536m3 of rock material. With earthwork fill of 241,333m3 needed, it shows that while some material from Phase 1 could be used in the Phase 2 area, there is an excess of about 191,963m3 of material to be removed off site over the duration of the proposed construction earthworks.

Where deeper excavations are required the volume of either subsoils or bedrock to be excavated will increase depending on the depth of subsoil in those areas. It is expected that the majority of the total rock volume will be excavated using normal tracked excavators while some of the deeper excavation areas may require heavier excavators or rock hammers to break out the bedrock prior to its removal.

Generally the work phases have been designed to match the amount of cut and fill material needed. For example the Phase 1 housing site development will create about 23,000m^3 of rock and fill material suitable for re-use while the Phase 1 development of the internal through roads will require about the same volume (~23,000m^3) of fill material to achieve the required ground levels and design gradients.

It is expected that some of the excavated rock material will be suitable for re-used as fill on site but a large volume of engineering aggregate (clause 808 or similar) material will need to be imported for use as fill material under roads and the residential areas. Aggregate material will also be needed for under the storm and foul drainage network around the site.

A breakdown of the estimated Cut and Fill volumes for the proposed phases for the site development are included in the Appendix 9.8.

9.3.3 Operational Activities

There will be no operational phase activities as there will be no interaction with the land and soil (geology) elements once the site area is fully constructed.

9.4 Methodology

The assessment methodology involved the completion of a Desk Study and Walkover observational survey of the study area which included the collation and review of available information pertaining to the study area, including any relevant land use or geological data, including the following:

- Dunkettle Project Description and EIAR Briefing Notes – MHP July & September 2024
- Tailte Éireann, On-line Maps and Aerial Photographs, (www.geohive.ie),
- Geological Survey of Ireland (GSI) On-line Geological Datasets, (www.gsi.ie/mapping.htm),
- Teagasc/Cranfield Soil Mapping On-line Data sets, (www.teagasc.ie/soils),
- Environmental Protection Agency (EPA) web based mapping, (www.epa.ie),
- "Geology of South Cork Sheet 25" 1:100,000 Scale Geology Map & Booklet (GSI 1995),
- Geo-technical Investigation, Factual Report. Priority Geotechnical Ltd., (PGL August 2021).
- Dunkettle Construction Environmental Management Plan, (CEMP), (JODA 2nd Oct 2024).

The Site Walkover recognisance survey enabled the physical examination of the geological, geomorphological and land use characteristics of the site and its setting in the locality.

In this chapter the existing baseline conditions and character of the land, soil and geological characteristics of the site are presented and the potential effects anticipated from the development are identified and discussed. Mitigation measures are proposed, residual effects are assessed, and any relevant monitoring options are considered.

9.4.1 Relevant Legislation & Guidance

The Land and Soils (Geology) Chapter for the EIAR follows the guidelines outlined by the EPA guidance document, Guidelines on the information to be contained within an EIAR from May 2022, in Directive 2014/52/EU and Annex IV amendments, as well as the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

The work also is cognisance of the previous EPA EIAR Draft Guidelines and the Environmental Impact Statement (EIS), EPA draft guidelines, from September 2015, which outline the process of preparation and the content required for an EIS.

The assessment work also follows the Institute of Geologists of Ireland (IGI) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of EISs, (IGI April 2013), and National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology & Hydrogeology for National Road Schemes, (NRA 2008).

9.4.2 Site Surveys/Investigations

As well as a detailed topographical survey, a site specific Geotechnical Investigation, completed in 2021, comprising of the excavation of 28 shallow trial pits to a maximum depth of 3.5m, and all associated soil sampling, geotechnical and environmental laboratory testing and related reporting was issued by Priority Geotechnical Ltd. (PGL) in Augst 2021. See section 9.6.3 and Appendix 9.5.

The trial pits were completed throughout the Phase 1 and Phase 2 areas and while they tended to be excavated along the field boundaries there was a good special distribution across the site.

A site specific cut/fill assessment was completed by the project engineers JODA for the Phase 1 area and they have also completed a Construction Environmental Management Plan (CEMP) for the site.

A senior scientist from VCL completed an observational walkover of the site on Friday 27th September.

9.4.3 Potential Effect Assessment Methodology

The EPA 2022 Guidance (Section 3.7) requires the EIAR to focus on the effects that both likely and significant and the description of effects that are accurate and credible.

An analysis of the predicted effects of the proposed Development on the land and soils/geology during and after the construction phase is presented below. (This been completed as per the EPA Guidance notes (2022 & 2015) and Appendix C of the IGI EIS Preparation Guidelines (IGI 2013).

The description and assessment of the effects was undertaken using the EPA terminology outlined in Chapter 1

The rating of the potential magnitude and significance of impacts/effects at EIAR stage are defined by the NRA guidance (2008), which includes typical examples, as outlined in Table 9.1.

Table 9-1 Criteria for rating land/soil impact magnitude at EIS stage, (NRA Guidance Box 5.1)

MAGNITUDE	CRITERIA	TYPICAL EXAMPLE
Large Adverse	Results in loss of attribute and/or quality and integrity of attribute	Irreversible loss of high proportion of local high fertility soils Removal of entirety of geological heritage feature Requirement to excavate and replace a high proportion of peat, organic soils and/or soft mineral soils
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Irreversible loss of moderate proportion of local high fertility soils Removal of part of geological heritage feature Requirement to excavate and replace a moderate proportion of peat, organic soils and/or soft mineral soils
Small Adverse	Results in minor impact on integrity or attribute or loss of small part of attribute	Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Removal of small part of geological heritage feature Requirement to excavate and replace a small proportion of peat, organic soils and/or soft mineral soils
Negligible	Results in an impact on attribute but insignificant magnitude to affect either use or integrity	No measurable changes in attributes.

9.4.4 Cumulative Impact

Directive 2014/52/EU requires that the EIAR examine the interaction between all the differing existing and/or approved projects in the same areas as the proposed project. A number of other projects have been identified in the locality which could have a cumulative effect on the Dunkettle development.

In particular;

- Ballinglanna Residential Development located to the north-east of Dunkettle. The final phase of this project is currently under construction by the O'Flynn Group and all major earthworks traffic are expected be completed by the time the Dunkettle project might commence.
- Glanmire Rectory Nursing Home and Child Care Facility located on an adjacent site this development is partly completed but is currently paused. It is understood that no major earthworks are required for this project.
- Glanmire Lodge Residential Development of 30 dwellings currently under construction on a site adjacent to the northern part of the study area. No major earthworks are expected to be needed for this project by the time the Dunkettle project might start.
- Glanmire Roads Improvement Scheme – some elements of this scheme are adjacent to the Dunkettle study area and, depending on timing, the construction of some of these works may overlap with some of the initial Dunkettle works.
- Glashaboy Flood Relief Scheme – Construction of this scheme commenced in 2023 and is due for completion in mid to late 2026. While the main focus is on the Northern side of Glanmire, away from the study area, depending on timing, the construction of some of these works may overlap with some of the initial Dunkettle works.

9.5 Difficulties Encountered

No difficulties were encountered in accessing information during the preparation of this chapter.

9.6 Baseline Environment

The following provides a description of the receiving environment, with a focus on land use, soils and geology.

9.6.1 Site Location, Setting & History

The Dunkettle study area is located on a broad hill about five kilometres east of Cork City Centre.

It is an undulating green field site, comprising of a number of open agricultural fields divided by mature hedge rows, areas of mature woodland bounded by the Glashaboy River Estuary to the West, some residential housing to the East and the developed urban area of Glanmire Village to the North.

Dunkettle House is located in the southern part of the land holding, including its outbuildings and attendant grounds.

The history of the site is one of agricultural use and the field pattern evident today is seen on the old OSI 1840's 6" and early 1900's 25" Map Surveys. Woodville House and its associated woodlands are located to the east of the study area.

While the study area has remained undeveloped the general locality has become much more urban with residential building on the grounds of Woodville House and in the agricultural fields along the public road to Glanmire (L2998) located to the east of the study area, as well as the expansion of Glanmire Village to the north, between the mid 1900's to the present.

Refer to the old OSI maps and aerial photographs of the locality presented in Appendix 9.1.

9.6.2 Land Use and Topography

The primary land use in the study area is agricultural farmland, under tillage and/or grass pasture, with two large and one smaller open fields occupying the Phase 1 land area. The fields are bounded to the north, west and east by areas of native deciduous woodland and are separated by mature hedge rows, orientated North -South. Refer to the aerial photos included in Appendix 9.1.

This EIAR is based on the overall study area of 62.83 hectares with the Phase 1 having a gross area of 26.64 and a nett land take of 13.08 Ha. The main building works are primarily on the open agricultural land, with the old woodland areas left in-situ and with 1.56 Ha of open space included.

The study area is situated on a broad hill that has a number of peaks which results in relatively steep ground sloping down from the high ground at about 50m OD to the Glashaboy River at 0m OD on the northern, western and south western areas of the site. A small peak of high ground at 50m OD located on the west side of the Phase 1 area creates a small SW-NE orientated valley in between the higher ridge of ground at about 60m OD located on the east side of the site. The eastern side of the Phase 1 area slopes eastwards towards the public road which is at a height of about 40m OD. Refer to the GSI topographical map presented in Appendix 9.2

There are no drainage features, such as streams, drains or ditches identified in the site area.

At the time of the observational site walkover completed at the end of September all the tillage crops in the fields had been harvested and there were no animals present. The mature woodlands, which are not part of the development area, tend to occupy the steeper sloped ground between the open fields and the Glashaboy River. There is also an area of steep ground in the south eastern part of the Phase 1 area that is occupied by the remnant woods associated with the old Woodville House estate to the South. Refer to the VCL site walkover photographs included in Appendix 9.3.

9.6.3 Soils and Subsoils

Topsoils and Subsoils (Quaternary sediments) in the South/Southeast of Ireland were deposited during or after the last ice age that effected this part of the country, (the Munsterian), which reportedly occurred over 100,000 years ago, and essentially comprise the unconsolidated natural mixes of clay, silt and sand with gravel and cobble stone materials overlying the bedrock.

Subsoils in Ireland are dominated by natural glacial tills with more segregated outwash deposits of sands and gravels, deposits of peat, river alluvial and coastal sediments occurring in particular environmental settings.

The old An Foras Talúntais soils mapping for the Soil Map of Ireland, (1980), indicates that this part of Cork is defined by Rolling Lowland Physiography and the whole site area is underlain by very common Acid Brown Earths and Brown Podzolics with sandstone and shale parent material.

Acid Brown Earths are described as mature well drained soils with a uniform brown horizon capable of high fertility while Brown Podzolics tend to be poorer acidic soils formed in hilly areas with a good mix of mineral and organic matter towards the surface layer.

More recent (2013) mapping presented in the online EPA/Teagasc/Cranfield Database identify that the soil association is called Clonroche (1100a) and is described as “fine loamy drift with siliceous stones”. This soil association is widespread, and a map of its local extent is presented in Appendix 9.4.

Mapping of the Teagasc Soils the On-line GSI database describes the subsoils in the study area as comprising of “Deep Well Drained Mineral Soils – mainly acidic” derived chiefly from non-calcareous parent material and are described as Glacial Tills derived from Devonian sandstone bedrock. Refer to the Topsoil and Subsoils Maps in Appendix 9.4.

These soil deposits are very extensive across County Cork.

A total of 28 trial holes were completed across the study area by PGL in 2021 and the findings of these excavations are summarized in Table 9.2.

Table 9-2 Summary of 2021 trial hole logs dug in the Dunkettle Study area by PGL

Trial Hole ID	Depth(m)	Subsoils	Base of Trial Pit
Trial Hole TP01	1.7	Orangey brown sandy gravelly silt	Angular silty gravels
Trial Hole TP02	2.0	Brown to beige sandy gravelly silt	Angular silty gravels
Trial Hole TP03	1.2	Orange to brown sandy silty gravel	Gravelly large cobbles
Trial Hole TP04	1.4	Brown to orange sandy gravelly silt	Sandy gravelly silt
Trial Hole TP05	1.4	Orange to beige sandy gravelly silt	Gravelly sandy silty
Trial Hole TP06	3.0	Orange/beige sandy gravelly silt/clay	Very sandy gravels
Trial Hole TP07	1.1	Brown to orange sandy gravelly silt	with cobbles & boulders
Trial Hole TP08	3.5	Brown to orange sandy gravelly silt	with cobbles & boulders
Trial Hole TP09	1.4	Brown clay on orange gravelly sand	Cobbles & boulder/rock
Trial Hole TP10	3.5	Orange/beige sandy gravelly silt/clay	Gravelly sandy cobbles
Trial Hole TP11	3.5	Orange beige sandy gravelly silt	Sandy gravel & cobbles
Trial Hole TP12	1.5	Orange brown sandy gravelly cobble	Angular gravels - rock
Trial Hole TP13	1.2	Dk brown sandy gravelly cobbles	Angular gravels - rock
Trial Hole TP14	1.9	Orange to beige gravelly sand	Grey gravels - rock
Trial Hole TP15	1.9	Orange to beige gravelly silt & sand	Clayey gravels cobbles
Trial Hole TP16	3.0	Orange to beige sandy silt & gravels	Sandy gravels cobbles
Trial Hole TP17	3.5	Orange to beige sandy gravelly silt	Sandy clay with cobble
Trial Hole TP18	3.5	Orange brown sandy gravelly silt	Grey gravelly silty sand
Trial Hole TP19	1.3	Orange brown sandy gravelly silt	Gravelly boulders - rock
Trial Hole TP20	2.0	Orange brown sandy gravelly silt	Beige clay gravels/rock
Trial Hole TP21	1.9	Orange brown sandy gravelly silt	Silty sandy gravels/rock
Trial Hole TP22	0.7	Brown sandy gravelly silt & cobbles	Grey sandstone rock
Trial Hole TP23	1.5	Orange beige sandy gravelly silt	Gravelly clay with cobbles
Trial Hole TP24	1.6	Orange slightly sandy gravelly silt	Sandy gravels on rock
Trial Hole TP25	1.8	Orange beige sandy gravelly silt	Sandy cobbles on rock
Trial Hole TP27	1.6	Orange beige gravelly silt and sand	Sandy gravelly cobbles
Trial Hole TP28	3.5	Orange grey gravelly silt and sand	Sandy gravelly cobbles
Trial Hole TP29	1.7	Orange beige sandy gravelly silt/clay	Sandy gravelly cobbles

A brown organic topsoil layer of typically 200mm to 400mm thickness was identified by the trial hole survey which would be typical in this type of agricultural grassland. The soil profile transitioned from sandy very gravelly stoney (cobbles and boulders) material into the top of the bedrock which was found to be shaley. Conditions were dry and no groundwater was encountered in any of the trial holes.

A few excavations (TP03, TP11 and TP12), reported made ground of sandy gravelly silt with cobbles.

Environmental Waste Acceptance Criteria (WAC) testing was completed on soil samples from seven locations, (TP02, TP03, TP08, TP10, TP21, TP24 and TP25), with no evidence of potentially polluting materials or contamination identified. The original PGL report is presented in Appendix 9.5.

9.6.4 Bedrock Geology

The whole study area of the proposed Dunkettle development is identified, by the on-line GSI mapping and the regional GSI 1:100,000 scale Geology of South Cork Bedrock Map (GSI Sheet 25 - 1994) and more local 1:40,000 scale Geology of the Cork District Map (UCC/Ivor MacCarthy - 1988), as being underlain by the Upper Devonian aged Gyleen Formation/Member (GY).

This bedrock is described as 'thinly bedded and interlaminated alternating sequences of red, grey and green sandstones and purple, red and green siltstone and mudstone'. These inter-bedded sedimentary sequences have an east–west strike (alignment), are folded and tend to have a steeply dipping (50 to 70 degrees) orientation to the north, as shown on the GSI geology mapping. Refer to the GSI Geology Map presented in Appendix 9.6.

These geological units have an East-West bedding trend which can be off-set by North-South orientated faults. A couple of faults are mapped by the GSI on the south western boundary and to the north of the site which would correspond to the steep topography and the position of the Glashaboy River Valley.

The regional geological setting is one of large scale East-West trending upward (anticline) and downward (syncline) fold features which create both variability and repeating geological sequences in the underlying bedrock, especially as you travel North-South across this part of County Cork.

The low lying valleys, such as in the Cork City area, are created by large syncline folds, such as the Cork Syncline and typically contain younger Carboniferous Limestone Formations. The upland hills and broad ridges to the north and south of the Cork Syncline are formed by large anticline fold structures such as Caherlag and Great Island Anticlines which tend to be underlain by the older Devonian inter-bedded sandstone, siltstone and shales. The study area is part of an anticline fold feature.

The General Geology Map also shows the areas of bedrock outcrop as identified by the GSI mapping. This shows an area of outcrop along the western boundary with the river. One area of outcrop was identified during the site walkover. Refer to the site walkover photographs presented in Appendix 9.3.

Typically the upper horizons of this type of stratified bedrock, which is extensively encountered in the Cork area, are slightly weathered and very fractured and are diggable and/or rippable by heavy construction machinery. If areas of less weathered, more massive sandstone units are encountered then these are typically broken out by rock breakers and removed by normal construction equipment.

9.6.5 Groundwater

The GSI classify the aquifer potential of a locality primarily based on the bedrock type and the Devonian aged Gyleen Formation present under the Dunkettle study area is classified as a Locally Important Aquifer, which is moderately productive only in local zones.

The groundwater (hydrogeology) and aquifer assessment of the site is included in the EIAR Water Chapter (Chapter 10).

9.6.6 Groundwater Vulnerability

The vulnerability of a groundwater body is the term used to describe the ease with which the groundwater in the area can be contaminated by human activities. The vulnerability is determined by many factors including the speed at which the contamination can enter the aquifer, the quantity of contaminants and the capacity of the deposits overlying the bedrock to attenuate contaminants.

These factors in turn are based on the type, thickness and permeability of the subsoils, e.g. groundwater in bedrock which has a thick cover of low permeability clay is less vulnerable than the groundwater in bedrock which is exposed at the surface.

The criteria for determining groundwater vulnerability, as developed by the GSI and Department of Environmental and Local Government (DoELG), are shown in Table 9.3.

Table 9-3 GSI Groundwater Vulnerability Mapping Guidelines (DoELG 1999)

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) & Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate permeability (e.g. sandy subsoil)	Low permeability (e.g. clayey subsoil, clay, peat)	(sand/gravel aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 – 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable
(2) Precise permeability values cannot be given at present
(3) Release point of contaminants is assumed to be 1-2m below ground surface

Regional Groundwater Vulnerability Maps have been produced for the country by the GSI, (in association with the local county councils), and these have six classifications. ‘Extreme’ and ‘Extreme rock near surface’ or ‘karst’ are those areas most at risk from contamination and mitigation measures should be put in place for their protection. Areas classified as having ‘High’ or ‘Moderate’ vulnerability are less vulnerable to groundwater contamination; however they still need a certain measure of protection. ‘Low’ vulnerability areas have natural protection in place and mitigation measures do not normally need to be put in place here. In areas which have been classified as ‘High-Low’ only an interim study has taken place and the site specific depth of overburden is not known.

The GSI has identified a High to Extreme (E) Vulnerability (H) rating over the Dunkettle study area with the High vulnerability occurring in parts of the central and eastern areas and the Extreme vulnerability occurring along the high ground in the east and the northern and westerns sides of the study area.

This indicates a generally thin subsoil cover with thicknesses of less than 3m to a maximum of about 5m depth across the site. This interpretation is supported by the trial hole survey results from the 2021 site investigation where, of the 28 excavations only seven reached depths of more than 3m.

The areas GSI Vulnerability Map, from the GSI On-Line Database, is presented in Appendix 9.6.

9.6.7 Soft or Unstable Ground and Geohazards

There are no karst features present in the Devonian sedimentary bedrock and there is no risk of subsidence or swallow holes, that are associated with limestone bedrock, occurring.

There is no evidence that potentially soft or unstable materials such as peat, lacustrine clays or alluvial sand/gravel deposits are present in any part of the proposed development area. Gravel deposits are identified by the GSI mapping to the south of the study area and areas of 'rock close' are identified near the hill tops and on the steeper slopes around the site.

The glacial tills and sandstone bedrock underlying the site tend to be very suitable for building on once the thin topsoil horizon has been removed.

The GSI has developed a database of historical landslides and landslide susceptibility in Ireland. This database indicates that no recorded landslide events lie within or in the general locality of the study area. The sites proposed development areas are shown to have a generally low landslide susceptibility apart from a small portion of the eastern side of the Phase 1 area which is given a moderately low classification. The areas of steeper topography, where the mature woodland is located, in the central, northern and western areas are identified as having a moderate to high landslide susceptibility. Refer to the GSI Landslide Susceptibility Map in Appendix 9.6.

No steep soil or bedrock exposures are present within the site area or are proposed to be created by the construction works. Any excavation works resulting in exposed cuttings of subsoil and bedrock will be supported by adequately designed and engineered retaining walls as necessary.

The EPA identify that the locality is in a High Radon Area. Radon is a naturally occurring radioactive gas coming from the soil/geology and which can cause ill health if there is long exposure. All modern buildings are fitted with radon barriers to eliminate the risk of radon entering a property.

9.6.8 Legacy Landfills and Contaminated Sites

In 1996 the Environmental Protection Agency (EPA) began licensing certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities. It has been determined, from the EPA website, that there are no waste licensed facilities within the study area or within the general locality around the site.

Information from Cork County Council also indicates that there are no 'Legacy Landfills' or contaminated sites situated within the study area or in the general locality of the site.

There are no reports of foreign soil material being imported to the site or of any backfilling activities. Three of the trial pit excavations (TP03, TP11 and TP12), recorded thin, (0.2m to 0.3m), horizons of natural sandy, gravelly, silty subsoil fill material but this seems to be clean locally sourced soils that have been used to improve the gradient of steep portions of the field.

No heaps of imported soil were encountered and the potential for extensive or historic soil contamination to be present on the site is considered to be extremely low.

9.6.9 Economic Geology and Geological Heritage Sites

A review of the on-line GSI and EPA web mapping indicates that there are no other active or historical quarries or mines in the locality (within 2km) and there are no Geological Heritage Sites identified in this part of Cork. Refer to the GSI Geological Heritage Site Mapping presented in Appendix 9.6.

9.6.10 EPA Industrial Emission (IE) Licensed Facilities

The EPA has been licensing certain large-scale industrial and agriculture activities since 1994 and since 2003 this had been done under the Integrated Pollution Prevention Control (IPPC) Directive and more recently the Industrial Emission (IE) Licencing system.

A review of the EPA On-line mapping resource shows that there are no EPA licensed facilities within about 0.75km of the study area. Refer to the EPA map search for the Dunkettle area presented in Appendix 9.7.

9.6.11 Areas of Scientific Interest

A review of the National Park & Wildlife Service (NPWS) database has shown that there are two proposed National Heritage Area (pNHA) called Glanmire Wood (Site Code 001054) and Dunkettle Shore (site code 001082) in the woods on the eastern side of the Glashaboy River.

The tidal reaches of the Glashaboy River and Lough Mahon located to the west and south west of the study area are part of the Cork Harbour Special Protection Area (SPA), (site code 004030).

These woodland and foreshore areas form the western and northern edges of the Study area but no works or construction activities are proposed to be undertaken in these areas.

These sites of scientific interest are discussed in more detail in the Chapter 11 – Biodiversity.

9.6.12 Conceptual Site Model

As per the IGI EIA Guidance recommendations a Conceptual Site Model (CSM) has been developed for the site area examining the interaction of the project with the geological environmental. The main interaction is the need for the cutting and in-filling of various parts of the site to enable building works.

The JODA engineering team have modelled an Earthworks Cut and Fill Layout for the Phase 1 area, and completed indicative cut & fill calculations for the phase 2 area, which indicate some areas that will need to be either reduced or raised in ground level in order to enable the construction works to proceed within the required design parameters.

The Earthworks Cut and Fill Layout Plan and related calculation are included in Appendix 9.8.

9.6.13 Type of Land and Soil/Geological Environment

As per Step 3 of the IGI Guidelines the baseline information and CSM enables the type of soil/geological and hydrogeological environment to be determined for the development.

From the range of generic environments outlined in the IGI document (Types A to E) the Dunkettle development areas are interpreted to have a:

Type A - Passive geological/hydrogeological environment.

This is based on the fact that the area is underlain by a locally important aquifer, which is generally moderately productive only in local zones, in an area with a historically stable geological environment.

The site does not represent any aspect of a Type B groundwater discharge area with a regionally important aquifer, Type C Man-Made Dynamic Hydrogeological Environment with mining or quarrying below the water table, or with nearby waste discharges to ground or a Type D Sensitive Geological/Hydrogeological environment with karst limestone or water supply SPAs or a Type E Groundwater Dependent Ecosystem or wet land with a river with a high base flow of groundwater.

For rating the Site Importance of Geological Features the relevant guidance follows the NRA use of four importance criteria – Very High, High, Medium and Low depending on the quality of the attribute, The site importance criteria, with the NRA examples, are applied to the Dunkettle site in Table 9.4.

Table 9-4 Criteria for rating Site Importance for Soil/Geology at EIS stage

IMPORTANCE	CRITERIA	TYPICAL EXAMPLE	DUNKETTLE SITE
Very High	Attribute has a high quality, significance or value on a regional or national scale.	Geological Feature is rare on a regional or national scale	No – very common soil and geological features occur.
High	Attribute has a high quality significance or value on a local scale	Geological feature of high value on a local scale (County Geological Site) Well drained and/or high fertility soils.	No very common acidic soil and no special geological features occur.
Medium	Attribute has a medium quality significance or value on a local scale	Moderately drained and/or moderate fertile soils.	YES – moderately drained and fertile soils at a local scale.
Low	Attribute has a low quality significance or value on a local scale	Poorly drained and/or low fertility soils.	No – moderate fertility soils

9.7 The 'Do Nothing' Scenario

The 'Doing Nothing' Scenario would result in no residential development at the site and the continued use of the land for agricultural tillage and pastoral grassland.

Given the proximity of the lands to Cork City and Glanmire, their zoning and suitability for residential development, it is probable that they will be built on at some stage in the future.

9.8 Potential Significant Effects

9.8.1 Construction Phase

The most significant effect of the proposed development on the land and soils/geology attribute is the change from residential to urban land use with the removal of the topsoil cover and in some areas the excavation of the underlying subsoils and as necessary the excavation of the bedrock down to the required design levels.

The removal of the existing unconsolidated soils/subsoils – these comprise of the Glacial Brown Earth Tills, (Clonroche soil association), described as fine loamy drift with siliceous stones. These are very common and extensive soils and no particular agricultural or geological importance or heritage value is attributed to them. This change would be PERMANENT in areas of the site where it is done but given the size of the study area and extensive abundance of this type of soil and subsoil, it would be considered to be a SMALL ADVERSE to NEGLIGIBLE significance with a NEUTRAL quality effect.

The excavation of the underlying bedrock – the interbedded siltstones and sandstones of the Gyleen Formation are not an unusual geological unit and no geological importance or heritage value has been attributed to them or occurs locally. This effect would be PERMANENT in areas of the site where it is done but given the extensive abundance of this type of soil and subsoil would be considered to have a NEUTRAL quality with NEGLIGIBLE significance.

In other areas the ground level will be raised by the infilling of excavated subsoils and rock material. The excavation works and backfilling/raising of the ground levels in some areas of the site will change the local topography taking out some of the steeper slopes and shallow valleys. This will have a PERMANENT effect but one which would not be considered to alter the overall landscape character of the general area and would be considered to have a NEUTRAL quality with NEGLIGIBLE significance. (This is discussed in more detail in Chapter 5 - landscape and visual assessment).

The potential occurrence of unstable soil or rock faces following excavations. Temporary retaining structures will be used during the construction phase as necessary to mitigate this effect. No high retaining structures are proposed for the site and any retaining walls would be constructed promptly ensuring that the exposure of soil and rock faces would have a BRIEF to short term TEMPORARY and NEUTRAL effect on the site with NEGLIGIBLE significance.

Activity of plant and machinery and plant equipment operating in the development area which could result in small scale fuel spills to the ground surface. This would be a potential TEMPORARY to SHORT-TERM NEGATIVE effect if a small accidental spill was to occur, but with NEGLIGIBLE significance.

Potential occurrence of dust generation and suspended sediments in rainfall runoff from work areas would be a potential BRIEF to TEMPORARY NEGATIVE effect if uncontrolled fine sediment runoff was to occur, but with a NEGLIGIBLE significance.

The vulnerability of the bedrock may increase in some areas of the site with the removal of the overlying soils and subsoils. This would generally be a SHORT TERM to TEMPORARY change and NEUTRAL effect, with NEGLIGIBLE significance, as impermeable hard surfaces, such as houses and roads will be constructed over these areas that will limit the surface water percolation. Changes in the site profile will not change the overall GSI vulnerability classification of the study area.

9.8.2 Operational Phase

There will be no operational phase activities as there will be no interaction with the land and soil/geology elements once the site areas are fully developed.

9.8.3 Cumulative Effects

A potential cumulative effect is the change of land use from agricultural to urban, with the removal of soil, subsoil or rock material required in order to develop the site with its housing and related infrastructure. A similar change in land use has occurred for the Ballinglanna residential development site and to a lesser extent some of the other residential developments in the Glanmire area, so there is less agricultural land-use on a local level. This cumulative change in land use is as per the Cork City Council land zoning and is not a significant effect on agricultural land use on a wider county level.

There is a potential cumulative dust generation and/or sediment runoff from adjacent sites that could effect local residences or the Glashaboy River system. Refer to section 9.4.4.

9.8.4 Summary

The following Table summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 9-5 Summary of Construction Phase Likely Significant Effects in the absence of mitigation.

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Top-Soil Removal	Negative	Small Adverse	~ 10 Ha	High	Permanent	Irreversible
Subsoil Removal	Neutral	Negligible	~ 5 Ha	High	Permanent	Irreversible
Bedrock Removal	Neutral	Negligible	~2 Ha	Moderate	Permanent	Irreversible
Changes to ground level	Neutral	Negligible	~10 Ha	High	Permanent	Irreversible
Unstable ground	Negative	Small Adverse	Very small	Low	Brief	Worse Case
Ground Contamination	Negative	Negligible	Very small	Low	Temporary	Worse Case
Sediment/Dust Generation	Negative	Negligible	Small	Moderate	Brief to Temporary	Worse Case

9.8.5 Criteria for Rating Site/Attribute Importance – Land/Soil (Geological) Features

Based on the NRA 2008 matrices (Tables C2 of the IGI Guidelines) the importance of the land and soil/geological attributes of the Dunkettle development site are rated in Table 9.6 below.

Table 9-6 Rating of Land/Geological Site Attribute Importance

ATTRIBUTE	CRITERIA	TYPICAL EXAMPLE	IMPORTANCE
Topsoils/Subsoils	Attribute has medium significance or value on a local scale	Moderately drained and/or moderate fertility soils	Medium
Bedrock Resource	Attribute has a low quality significance or value on a local scale	No existing quarry – very common bedrock unsuitable for economic extraction	Low
Geological Heritage	Attribute has a low quality significance or value on a local scale	Common soil/geology with no geological heritage or features of importance	Low

Based on the rating of the site attributes the soil profile is identified as having a medium importance as it represents a reasonably large area of medium quality, moderately fertile soils on a local scale. All the other attributes are considered to be of low importance.

Based on Table C4 of the IGI 2013 Guidelines, Assessing the Criteria for Rating Impact Significance at EIS Stage – Estimation of the Magnitude of Impact on the Geological Attributes, (after NRA 2008), would be considered to be 'Small Adverse' for land/soils as there would be a loss of some of the attribute on a local scale, however on a regional scale the magnitude of impact could be considered to be 'Negligible' as the Dunkettle development would 'result in an impact on the attribute but of insufficient magnitude to effect either use or integrity', as the soil and bedrock types are so extensive on both a County and National level.

Based on Table C6 of the IGI Guidelines, Rating of Significant Environmental Impacts at EIS Stage (after NRA 2008), with the Importance of the land and soils/geology attribute's being 'Medium to Low' and the Magnitude of Impact as 'Negligible' then the Impacting Rating is considered to be 'Imperceptible'.

9.9 Mitigation Measures

While the magnitude of the potential long term effect on the land and soil/geology from the development are considered slight to negligible there are potential brief to temporary or short term construction effects that may arise during the development/construction stage which could cause environmental risks and there are a number of mitigation measures that would help eliminate and/or reduce the occurrence of these potential effects.

9.9.1 Incorporated Design Mitigation

The design seeks to mitigate potential negative effects with all new-build infrastructure to be designed in accordance with the Technical Guidance Documents of the Building Regulations and associated codes of practice, which require due cognisance of the receiving environment. Design depths of proposed infrastructure are to be optimised so that excessive excavations are avoided where possible, and by association a reduction in resultant waste and machinery operation time.

Any deep excavations will be designed in such a way as to be supported both during the construction and operational phases of the site development. The site layout design has kept the extent and depth of retaining walls and supporting structures to a minimum.

9.9.2 Construction Phase Mitigation

- The planning, timing and scheduling of the earth works across the site is important in limiting, as far as possible, the extent of ground being worked, as reducing the surface area of exposed soil will reduce the potential for the generation of dust and or sediment runoff.
- Control of Soil Excavation and Export from Site using the reduce, reuse and recycle approach with any excavation arisings to be reused on site where possible with the implementation of an appropriate earthworks handling protocol to be used, as per the sites CEMP.

- The areas where the excavation of unconsolidated soil and subsoils is required within each building phase will be kept to a minimum and only extended as already stripped ground has been built over. Keeping the surface area of exposed soils in the construction areas to a minimum is the most effective way of preventing the release of dust in dry weather and suspended sediments in wet conditions. Potential effects are therefore avoided.
- Limiting activities to designated work areas, thereby not allowing machinery or construction activity in proposed future green, open space and/or undeveloped areas will ensure that there is no dust or sediment runoff generated and no soil compaction will occur in those areas.
- Designated roadways and internal access/construction routes will be clearly designated and fenced off in order to prevent uncontrolled tracking of construction vehicles across the site. This will help reduce the surface area of disturbed ground which will limit the potential for soil compaction, sediment runoff or dust generation.
- Dust can be reduced by damping down of the works areas and especially along roads and access tracks where vehicle activity increases the generation of dust and fine particulates. Vehicle wheel washes, road sweeping and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.
- A number of designated contractor compounds, located in areas of level ground, will be established for the site. These compounds will enable the safe storage of building materials, car parking, waste skips and will include a designated refueling station and wash down areas.
- Designated stockpile areas for the temporary storage of topsoil, subsoils and rock material required for site use will be established in areas where the ground level is flat and well away (>20m) from surface water features and steep slopes.
- Sand and gravel stockpiles will be kept to a minimum, stored on leave ground, away (>20m) from water courses and covered if necessary.
- Shallow berms, silt fences and/or cut-off trenches can be established around compound, work and stockpile areas which will prevent clean surface water runoff from flowing across these areas and will also help contain any impacted runoff flowing away from these parts of the site.
- Any sediment laden runoff will be channeled through silt traps and ponds to allow, as far as possible, the settlement of suspended solids. The discharge of silty water over grass field areas will be considered if necessary.
- Runoff from machine service and/or concrete mixing areas will not be allowed to discharge to ground or enter watercourses. Dedicated service and concrete wash down bunded areas will be established.
- Any finished construction, landscaped and green areas will be finished and re-grassed as soon as possible to limit the potential for dust and surface water generation from those areas.
- Activity of plant equipment and machinery operating in the construction area could result in small scale fuel spills to ground - mitigating against accidental leaks and spillages during the development will involve implementing good practices including regular plant maintenance, use of drip trays, adequate bunding for storage containers, refuelling in designated areas etc.

- All fuel storage areas on the site are sufficiently bunded and any mobile bowsers used on site will be double skinned. Bunds sufficiently large to fully contain accidental spills will be provided around all tanks/storage areas containing harmful substances.
- Spill kit materials will be maintained on site and site staff trained in the response to accidental spills and the use of clean up materials.
- Good housekeeping (site clean-ups, use of disposal bins, etc.) around the site and proper use of storage and disposal facilities for lubricants fuels and oils will be used.
- The construction contractor and design team will work to the Construction Environmental Management Plan (CEMP) prepared for the development works and this will be reviewed during the construction phase and be augmented with additional controls as required.

9.9.3 Operational Phase Mitigation

There are no operational phase mitigation measures recommended for land and soil/geology elements as there will be no operational phase activities once the site areas are fully developed.

9.10 Residual Impact Assessment

The potential residual impacts are those that will occur after the proposed mitigation measures have taken effect. No significant residual effects are predicted for land and soils/geology aspects of the proposed development.

The mitigation measures described reduce the potential for any significant brief to temporary or short-term impacts occurring during construction.

All identified impacts have a residual environmental impact rating of Imperceptible.

There are no operational phase impacts identified and therefore no residual impacts to assess.

9.10.1 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 9-7 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Effect Rating
Removal of topsoil	Negative	Negligible	Site wide	High	Permanent	Imperceptible
Removal of subsoil	Neutral	Negligible	~50% of site	High	Permanent	Imperceptible
Removal of bedrock	Neutral	Negligible	~20% of site	High	Permanent	Imperceptible
Dust/Runoff	Negative	Negligible	small	Moderate	Brief	Imperceptible
Fuel Spill	Negative	Negligible	small	Low	Brief	Imperceptible

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Effect Rating
Excavation slope failure	Negative	Negligible	small	Very Low	Brief to temporary	Imperceptible

9.11 Risk of Major Accidents or Disasters

The risk of Major Accident or Disasters arising from the soil/land (geology) attributes are very unlikely as the scale of the earth works is manageable and would be normal for a large scale residential construction development. While there are some areas of deeper excavations proper planning and structural support design, as necessary, would ensure the likelihood of a major accident or disaster occurring would be extremely unlikely.

9.12 Worst Case Scenario

In terms of land and soils/geology the 'Worse Case Scenario' Environmental Effect would relate to the accidental loss of fuel from active machinery in the development or the spillage of hydrocarbons during the re-fueling of construction machinery. This would effect on the soil quality which could, if left unmanaged, effect the water quality of the aquifer under the site and may result in surface water runoff being contaminated. In either case the potential volume of fuel loss would be relatively small, in the 10's rather than 100's of liters, and the duration of the effect would be temporary to short term.

The other potential worst case environmental scenario would involve the collapse of soil from a stockpile or exposed excavation face which could pose a human health risk or if weather conditions were bad, result in the runoff of sediment to the Glashaboy River and away from the site to the local estuary. It is considered that this scenario would be very unlikely once stockpile heights and locations are managed and any steep excavations are properly supported, again the duration of any effect would be brief to temporary.

9.13 Interactions

The main interaction of the land/soil (geology) attribute is on Traffic and Transport (Chapter 6) and Waste (Chapter 8) as unsuitable subsoil and bedrock is removed from site and required aggregate material is brought to site. Potentially there could be interactions with Air Quality (Chapter 13) from dust generation and/or Water & Hydrology (Chapter 10) with sediment runoff.

9.14 Monitoring

All topsoil, soil and rock excavation work will be observed by a banks man. While there is no evidence of foreign fill or waste material on the site this operative will be instructed to lookout for any physical evidence, (discolouration, odour, sheen etc,), of potential contamination in the excavations.

Runoff from works, stockpile and compound areas will be observed to ensure that it is not impacting on the local watercourse. Both hydrocarbons and silt cause discolouration so are easy to visually monitor for their presence. If necessary water sampling and monitoring of the Glashaboy River can be completed to test for Total Suspended Solids (TSS) and Hydrocarbon concentrations.

In areas where temporary retaining structures are required then observations of the exposed face will help monitor for potential collapse. Ideally any retaining wall structures will be constructed promptly after the excavations are completed to ensure good ground stability.

There are no operational phase monitoring recommendations for land and soil/geology elements as there will be no operational phase activities once the site areas are fully developed.

9.15 Summary of Mitigation and Monitoring

The following Table summarises the Construction Phase mitigation and monitoring measures.

Table 9-8 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Removal of Top/Subsoil & bedrock	Design cut & fill to reduce volumes as much as possible	Banks-person to observe all excavation works
Slope stability of deep or steep excavations	Deep cuts designed out of layout & retaining structures used as necessary	Engineering works on deep or steep excavations and observation of stability.
Sediment runoff or dust	No stockpiles on slopes or need watercourses. Used silt fencing and damping down as required.	Visual inspections and/or water and dust sampling as necessary.

9.15.1 Operational Phase Mitigation and Monitoring

No Operational Phase mitigation and monitoring measures are proposed for the land/soil (Geology) attributes.

9.16 Conclusion

There are no likely Significant Land and Soils (Geology) effects associated with the proposed Dunkettle Residential Development.

9.17 References and Sources

- EPA *"Guidelines on the information to be contained within an EIAR",* (EPA May 2022).
- Priority Geotechnical Limited (PGL) Geotechnical Investigation, Factual Report, (31st August 2021).
- EPA *"Draft Guidelines on the information to be contained within an EIAR",* (EPA 2017).
- Directive 2014/52/EU of the European Parliament and of the Council of April 2014
- Geological Survey of Ireland National Bedrock/Aquifer/Vulnerability Maps – (online).
- EPA. "*Advice Notes on Current Practice in the preparation of Environmental Impacts Statements*", (EPA 2015).

- EPA. “*Guidelines on the Information to be Contained in Environmental Impact Statements*” (EPA 2015).
- CIRIA Environmental Good Practice on Site 4th Edition, (C741), (CIRIA Publications, 2015).
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements, IGI, (April 2013).
- Working at Construction & Demolition Sites; Pollution Prevention Guidelines (PPG 6) UK EA 2012.
- National Roads Authority (NRA) Environmental Impact Assessment for National Road Schemes A Practical Guide, (NRA 2008).
- National Roads Authority (NRA) Guidelines in Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, (NRA 2008).
- The Institute of Geologists of Ireland publication on Geology in EIS: A Guide (IGI, 2002).
- EPA Envision Environmental Maps - Subsoil Data (online).
- Geology of South Cork - Bedrock Map Series, scale 1:100,000, Sheet 25 (GSI, 1995).
- Geological Map of Cork District, scale 1:40,000, (Ivor MacCarthy/UCC 1988).
- Ordnance Survey of Ireland (Tailte Eireann) - Discovery Series Map No 86 - 1:50,000 Scale.
- Tailte Eireann On-Line Geohive Web Based Mapping, (www.geohive.ie).

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 10

Water & Hydrology

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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10 Water & Hydrology

10.1 Introduction

Viridus Consulting Ltd., (VCL) were appointed to assess for this chapter of the EIAR, the potential significant effects of the proposed development on the Water (hydrology and hydrogeology) attributes of the study area.

It should be read in conjunction with Chapter 2 (Development Description), Chapter 6 (Material Assets: Traffic and Transport), Chapter 7 (Material Assets: Built Services), Chapter 9 (Land & Soils) and Chapter 16 (Interactions) of the Foregoing of the EIAR.

10.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Mr. Darragh Musgrave, a senior Geo-Environmental Consultant with VCL. Darragh holds an honours degree in Earth Science/Geology from the National University of Ireland Galway (1992) and a Diploma in Environmental Protection from the Atlantic Technological University Sligo, (2006). He has over 30 years of experience working in the hydrological, hydrogeological, geological, and soil/surface water/groundwater environmental assessment sector as a Geo-Environmental Scientist and has been involved in the preparation of a number of EIARs including the following related to similar large residential projects:

- Ballinglanna, Glanmire & Lakeview, Midleton, Co. Cork – O'Flynn Group,
- Marybourough Ridge, Douglas, Cork & The Paddocks, Waterford City – Glenveagh Homes
- Coolcarron, Fermoy, Co. Cork – Cumnor Construction

10.3 Proposed Development

The EIAR site boundary is presented as Figure 1-1 in Chapter 1 – Introduction. Chapter 2 of this EIAR provides a full description of the proposed development.

Aspects of the proposed development relevant to this chapter relate to the any local hydrological features, the sites catchment area, site drainage and groundwater classification. Relevant studies related to this attribute include the use of Sustainable Urban Design (SuDS) in drainage design as well as an Assessment of the Flooding Risk for the development.

10.3.1 Activities Associated with the Proposed Development

As per Step 4 of the IGI *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of EISs* (See Section 10.4.1), a range of Generic Activities that can potentially interact and effect with the geological/hydrogeological environment are presented in the Activities/Environment Matrix identified as Figure 2 of the IGI Guidelines. A copy of this Matrix is presented in Appendix.9.9.

The activity which is associated with the construction phase of the Dunkettle development relates to:

EARTHWORKS AND EXCAVATION OF MATERIALS ABOVE THE WATER TABLE.

This activity will be completed in a Type A (passive) geological environment.

The potential impact of the proposed construction activity associated with the development on the hydrological regime is primarily the removal of the topsoil/subsoil cover and in some areas the excavation of shallow bedrock or build-up of material to achieve the required design levels. The Site Investigation information indicates that all excavations should be completed above the water table.

Combined with the construction of roads, housing, paving and drainage of all hard surface areas, the excavations/infilling works will impact the nature of the sites surface water runoff. The excavation work and soil/subsoil removal will create on-site transport and sediment management issues in terms of potential dust generation and suspended sediment runoff from the site to local drainage systems.

It is proposed to complete the earthworks and construction of the Phase 1 area in three distinct phases. This will enable an orderly and structured site development. The construction phases are described in Chapter 2 and in the JODA Construction Environmental Management Plan (CEMP).

The main operational impact of the development on the water attributes relates to the buried drainage infrastructure designed to discharge the storm water runoff and waste-water from the site.

Surface water drainage from the development is proposed to be discharged to a number of locations depending on the site catchment area. The small catchments on the eastern and NE areas of the site will discharge to the existing piped drainage network located on the eastern and northern boundaries while the larger catchments on the northern, western and south western areas of the site will discharge stormwater directly to the Glashaboy River Estuary at a number of different locations.

Where necessary stormwater will be controlled via a number of percolation/attenuation systems on the different surface water drainage networks, as designed for the phased development of the site.

Sewage will be piped directly to the existing Uisce Eireann Waste Water Treatment infrastructure on the site. A description of storm and waste water infrastructure is presented in the JODA engineering reports, such as the Site Civil Infrastructure Design Statement and SuDS Impact Assessment document, (File Reference 3442-JODA-01-XX-RP-C-0001, dated 6th November 2024) and in Chapter 7 Material Assets: Built Services of the EIAR.

Operational phase activities will include the discharge of surface stormwater and waste water from the site. No interaction with the groundwater table is anticipated for the site's operation.

The use of domestic Air to Heat systems rather than kerosene oil burners in the houses heating systems will greatly reduce the risk of oil spillages impacting the soils, underlying bedrock and aquifer. Proper construction of the sewage network will help ensure no groundwater pollution occurs.

10.4 Methodology

The assessment methodology involved the completion of a Desk Study and Walkover observational survey of the study area that included the collation and review of available information pertaining to the study area, including any relevant water features or hydrological data, including the following:

- Dunkettle Project Description and EIAR Briefing Notes – MHP July & September 2024.

- Tailte Eireann, On-line Maps and Aerial Photographs, (www.geohive.ie).
- Geological Survey of Ireland (GSI) On-line Geological Datasets, (www.gsi.ie/mapping.htm).
- Environmental Protection Agency (EPA) (www.epa.ie).
- Water Framework Directive (WFD) On-line maps, (www.wfdireland.ie).
- Office of Public Works (OPW) National Flood Hazard Mapping Web site (www.floodinfo.ie).
- Geotechnical Investigation, Factual Report. Priority Geotechnical Ltd., (PGL August 2021).
- JODA Site Civil Infrastructure Design Statement & SuDS Impact Assessment, (Nov 2024).
- JODA Dunkettle Construction Environmental Management Plan, (CEMP), (Oct 2024).
- JODA Dunkettle Site Flood Risk Assessment, (Oct 2024).

The Site Walkover recognisance survey enabled the physical examination of the hydrological, geomorphological, topography and land use characteristics of the site and its setting in the locality.

In this chapter the existing baseline conditions and character of the hydrological and hydrogeological characteristics of the site are presented and the potential effects anticipated from the development are identified and discussed. Mitigation measures are proposed, residual effects are assessed, and any relevant monitoring options are considered.

10.4.1 Relevant Legislation & Guidance

The main legislation relating to Water in Ireland are grouped under the Water Framework Directive (2000/60/EC) (WFD) which requires all Member States to protect and improve water quality in all waters so that good ecological status can be achieved by 2015 or, at the latest, by 2027. It was given legal effect in Ireland by *inter alia* the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) (as amended), European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended) and (Groundwaters) Regulations 2010. It applies to all rivers, lakes, groundwater, and transitional coastal waters.

The Water (Hydrology and Hydrogeology) Chapter for the EIAR follows the guidelines outlined by the EPA guidance document, *Guidelines on the information to be contained within an EIAR* from May 2022, in Directive 2014/52/EU and Annex IV amendments, as well as the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

The work also is cognisance of the previous EPA EIAR Draft Guidelines and the Environmental Impact Statement (EIS), EPA draft guidelines, from September 2015, which outline the process of preparation and the content required for an EIS.

The assessment work also follows the Institute of Geologists of Ireland (IGI) *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of EISs,* (IGI April 2013), and National Roads Authority (NRA) Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology & Hydrogeology for National Road Schemes, (NRA 2008).

10.4.2 Site Surveys/Investigations

As well as a detailed topographical survey, a site specific Geotechnical Investigation, completed in 2021, comprising of the excavation of 28 shallow trial pits to a maximum depth of 3.5m, and all associated soil sampling, geotechnical and environmental laboratory testing and related reporting was issued by Priority Geotechnical Ltd. (PGL) in Augst 2021. See Chapter 9 section 9.6.3 and Appendix 9.5.

The trial pits were completed throughout the Phase 1 and Phase 2 areas and while they tended to be excavated along the field boundaries there was a good special distribution across these two areas.

No water or groundwater or evidence of same, was encountered by any of the trial pit excavations.

10.4.3 Potential Effect Assessment Methodology

The EPA 2022 Guidance (Section 3.7) requires the EIAR to focus on the effects that both likely and significant and the description of effects that are accurate and credible.

An analysis of the predicted effects of the proposed development on the Water Attributes during and after the construction phase is presented in the following section. (This been completed as per the EPA Guidance notes (2022 & 2015) and Appendix C of the IGI EIS Preparation Guidelines (IGI 2013).

The description and assessment of the effects was undertaken using EPA terminology outlined in Chapter 1. The rating of the potential magnitude and significance of impacts at EIAR stage are defined by the NRA guidance (2008 – Boxes 5.5 & 5.3), including typical examples, as outlined in Table 10-1.

Table 10-1 Criteria for rating Water Impact Magnitude at EIS stage, (NRA Guidance Box 5.1)

IMPACT MAGNITUDE	CRITERIA	TYPICAL EXAMPLE
Large Adverse	Results in loss of attribute and/or quality and integrity of attribute	Loss or extensive change to a water body or dependent habitat. Increase of predicted flood level >100mm. Removal of large proportion of aquifer, or changes to aquifer resulting in extensive change to existing water supply or river base flow. Extensive loss of fishery or high risk of pollution to surface or groundwater from routine runoff.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Moderate loss or change to a water body or dependent habitat. Increase of predicted flood level >50mm. Removal of moderate proportion of aquifer, or changes to aquifer resulting in moderate change to existing water supply systems or river base flow. Moderate loss of fishery or medium risk of pollution to surface or groundwater from routine runoff.
Small Adverse	Results in minor impact on integrity or attribute or loss of small part of attribute	Small loss or change to a water body or water dependent habitat. Increase of predicted flood level >10mm. Removal of small proportion of aquifer, or changes to aquifer resulting in small change to existing water supply systems or river base flow. Minor loss of fishery or potential low risk of pollution to surface or groundwater from routine runoff.
Negligible	Results in an impact on attribute but insignificant magnitude to affect either use or integrity	No measurable changes in attributes. Negligible change in predicted peak flood level. Risk of serious pollution incident <0.5% annually.

The rating of potential environmental impacts on the hydrological and hydrogeological water environment can also be assessed based on the matrix presented in Table 10-2, which takes account of both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed development on it. The criteria apply to potential impacts during the demolition, construction and operational phases of the development.

Table 10-2 Criteria Rating of Significant Environmental Impacts at EIA Stage***

		Magnitude of Impact (Table 5.5)			
		Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Importance of Attribute (Table 7.2)	**Extremely High**	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Moderate/ Significant	Significant/Profound	Profound
	High	Imperceptible	Slight/Moderate	Moderate/Significant	Significant/Profound
	Medium	Imperceptible	Slight/Not Significant	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

(***Based on NRA Guidelines (2009) – Box 5.4 Page 106).

The magnitude of each impact was considered from negligible to large. Negligible impacts are effects that result in an impact on an attribute but of insufficient magnitude to affect either its use or integrity. A major impact results in the significant loss of an attribute and/or quality and integrity of an attribute.

10.4.4 Cumulative Impacts

Directive 2014/52/EU requires that the EIAR examine the interaction between all the differing existing and/or approved projects in the same area as the proposed project. A number of other projects have been identified in the locality which could have a cumulative effect on the Dunkettle development.

In particular;

- Ballinglanna Residential Development located to the north-east of Dunkettle. The final phase of this project is currently under construction by the O'Flynn Group and all the surface water drainage and waste water infrastructure is installed.
- Glanmire Rectory Nursing Home and Child Care Facility located on an adjacent site this development is partly completed but is currently paused. This is a relatively small site with low surface water runoff potential.
- Glanmire Lodge Residential Development of 30 dwellings currently under construction on a site adjacent to the northern part of the study area. This is a relatively small site with low surface water runoff potential.
- Glanmire Roads Improvement Scheme – some elements of this scheme are adjacent to the Dunkettle study area and, depending on timing, the construction of some of these works may overlap with some of the initial Dunkettle works.
- Glashaboy Flood Relief Scheme – Construction of this scheme commenced in 2023 and is due for completion in mid to late 2026. While the main focus is on the Northern side of Glanmire, away from the study area, depending on timing, the construction of some of these works may overlap with some of the initial Dunkettle works.

10.5 Difficulties Encountered

No difficulties were encountered in accessing information during the preparation of this chapter. While there are no site specific monitoring boreholes available for groundwater level measurements, given the generally shallow nature of the excavations required for the development it is considered that the risk of encountering the natural water table would be very low.

10.6 Baseline Environment

The following provides a description of the receiving environment, with a focus on the Water Attributes.

10.6.1 Site Setting and Topography

The Dunkettle study area is located on top of a broad hill about five kilometres east of Cork City Centre. It comprises an undulating green field site, comprising of a number of large open agricultural fields divided by mature hedge rows, and with some areas of mature woodland, especially on the steeper Northern and Western boundaries and in the central area of the site.

There are no water features such as streams, springs or drains on the site but the tidal reaches of the Glashaboy River Estuary flows along the northern and western boundaries of the study area.

The broad hill setting means that the topography undulates across the site with some local high-ground points and steeper slopes, especially along the northern, western and eastern sides. Gradients are particularly steep, (up to 1:4 or 14 degrees) towards the east end of the site near the Dunkettle Road (L2998) and at the west side of the site (up to 1:3.1 or 17.5degrees). Ground levels vary from a high of about 68m in the east to a low of 7m at the west corner of the site and onwards to sea level (0m) at the adjacent edge of the Glashaboy River.

A site specific topographical survey has been completed and is included in a number of the planning documents. A general Talite Eireann topographical map is presented in Chapter 9 - Appendix 9.2.

No boreholes or wells are identified by the GSI mapping and none were identified during the site walkover. Images of the site setting are presented in the VCL site walkover photographs included in Chapter 9 - Appendix 9.3.

10.6.2 Hydrology

10.6.2.1 WFD Catchments

The site is located at the very southern end of, and on the eastern side of, the lower reaches of the Glashaboy River. The Glashaboy River is located in the South Western River Basin District, (SWRBD), as defined by the Water Framework Directive (WFD), in an area identified as Hydrometric Area 19, which includes all the catchments flowing into the River Lee, Cork Harbour and Youghal Bay.

In order to present water quality information on the status, objectives and measures for more manageable geographical areas Hydrometric Area 19 is divided into 18 Sub-Catchments, that includes the Hydrometric Sub-Catchment Area 19_11, identified as the Glashaboy (L.Mahon)_SC_010.

The Glashaboy WFD Sub-Catchment starts in the Nagle Mountains in north Cork and flows, through an undulating low hill-valley topography, in a southerly direction before entering the upper part of Cork Harbour at Lough Mahon, just downstream of Glanmire Village. The river is about 22km long and has a catchment of 141km^2 at its tidal limit. Refer to the EPA Catchment Maps and SWRBD Glashaboy Sub-catchment Map presented in Appendix 10.1.

The catchment area is predominately underlain by sandstone bedrock overlain by free draining acid brown earth tills and is drained by a number of watercourses, the dominant one being the Glashaboy River which drains the land to the west of the catchment, while the Butlerstown Stream and Glenmore Stream form the eastern part of the catchment, before joining the Glashaboy River north of Glanmire.

There are six water bodies (river sub-basins) identified in the Glashaboy (L.Mahon)_SC_10 and the lowest catchment, covering an area of 19.67 km^2 , is located on the west side of Glanmire Village including the lands around the study area, is the WFD River Glashaboy (Lough Mahon)_030, (Ref IE_SW_19_1G010600). Refer to the EPA Catchment Maps presented in Appendix 10.1.

10.6.2.2 Glashaboy River Estuary

The Dunkettle study area is located adjacent to the lower reaches of the Glashaboy River tidal estuary, just before it enters Cork Harbour at Lough Mahon and this is identified as a transitional waterbody, (Ref IE_SW_060_0800). See the EPA Catchment Maps in Appendix 10.1.

The proposed development site forms the east side of the estuary and is heavily wooded, (Glanmire Wood pNHA_1054), while the west side is bound by the main Glanmire Road (R639). The estuary covers an area of about 0.12km^2, has a predominant bed type of a thin mud layer over gravels and is influenced mainly by the river environment.

Previous studies of the estuary indicate that the tidal exchange i.e. the volume of tidal water change per tide in the estuary between Dunkettle Railway Bridge and Glanmire village is reportedly of an order of magnitude of 400,000m^3 per average tidal cycle between high and low water. This is equivalent to 400,000,000 litres of tidal water.

These tidal waters are classified in the EPA Glashaboy Estuary, (IE_SW_060_0800) Transitional Water Body WFD 2016 to 2021 Water Quality Status Report as having a “bad” water quality, and its WFD Risk Status is deemed as being ‘at risk’. Refer to the Glashaboy (L.Mahon)_SC_010 WFD Cycle 2 Assessment (Sept 2022) in Appendix 10.2.

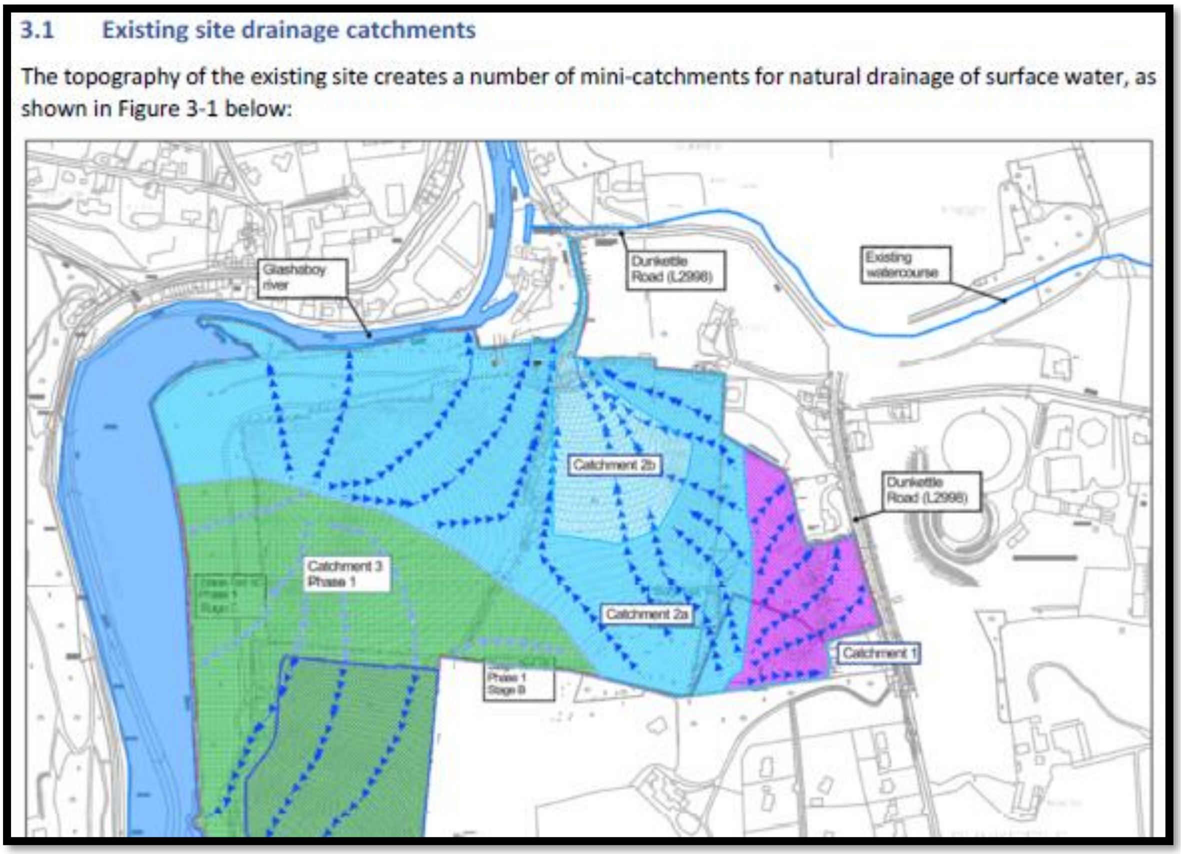
The EPA identify that main pollution pressures are from Urban Runoff and Agricultural activities.

The Glashboy River Estuary flows into the upper part of Cork Harbour and the River Lee Estuary as Lough Mahon, (SW_060_750), which is also classified as a Transitional Water. Estuarine waters tend to be less sensitive to sediment than freshwater as they are typically naturally more muddy and silty environments. Any brief or temporary siltation effects in the estuary would not necessarily have a significant negative effect impact on the local flora or fauna as siltation can occur due to tidal flows.

These transitional waters form part of the Cork Harbour Special Protection Area (SPA) for wintering birds, which is considered in more detail in Chapter 11 - Biodiversity.

10.6.2.3 Site Drainage

As outlined in detail in the JODA Site Civil Infrastructure Design Statement and SuDS Impact Assessment document, (File Ref 3442-JODA-01-XX-RP-C-0001 dated November 2024), prepared for the developments planning application, the topography of the existing side creates a number of catchments for the natural drainage of surface water including (1) a small catchment area on the east side, (2a) a northern catchment area, (2b) pedestrian access area and (3) west SW catchment area.



3.1 Existing site drainage catchments

The topography of the existing site creates a number of mini-catchments for natural drainage of surface water, as shown in Figure 3-1 below:

Figure 10-1 Phase 1 Catchments, (Extract of Figure 3-1 of the JODA SuDS Assessment).

The small Catchment 1, (purple colour in Figure 10-1), is on the eastern slope of the broad hill occupies the area where the new site access road will be constructed. Currently any runoff in this catchment area would percolate to ground and/or overflow to the roadside drainage on the Dunkettle Road (L2996) and flow northwards to the small existing water course to the north of the site.

The Catchment 2 area covers the northern end of the site and drains northwards. There are no established seasonal drains or watercourses in this area so drainage is predominately by infiltration.

The majority of this catchment drains naturally towards the Glashaboy River, shown as Catchment 2a. A small part of it drains naturally towards the existing farm access laneway connecting with Dunkettle Road, shown in light blue in Figure 10-1 as Catchment 2b.

Catchment 3 (green) is located in the south western part of the Phase 1 area and drains to the river.

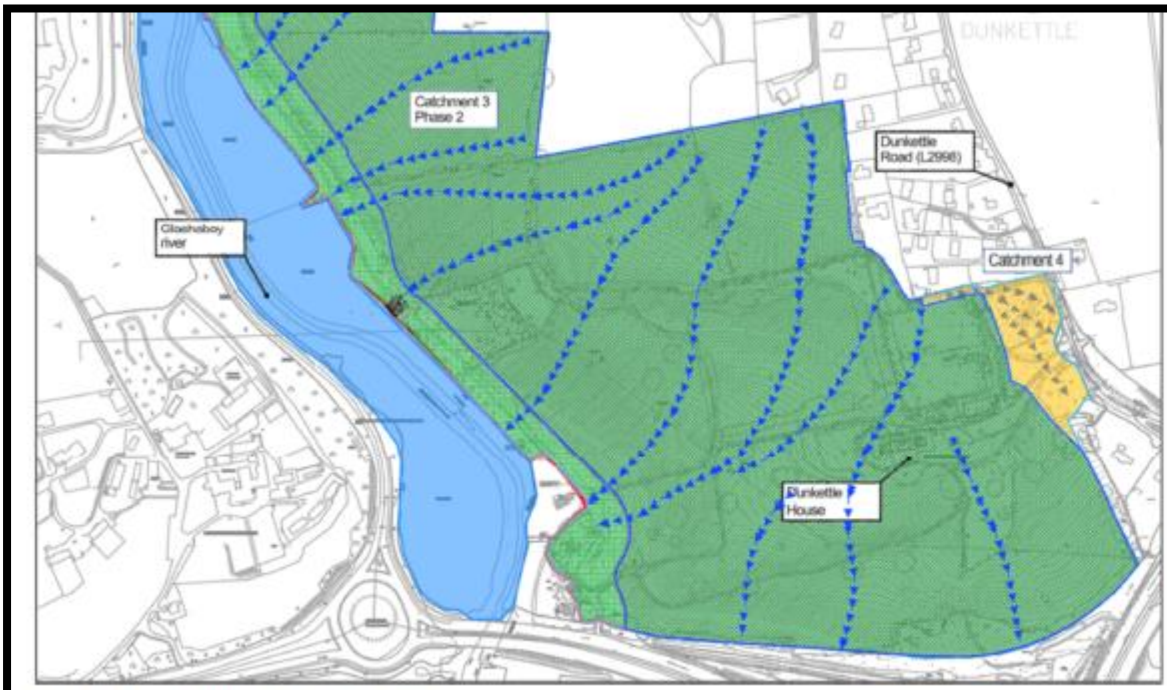


Figure 3-1 Existing Site mini-catchments

Figure 10-2 Site Catchments 3 & 4, (Extract of Figure 3-1 of the JODA SuDS Assessment)

The Catchment 3 area covers the western and southern end of the study area and drains westwards. There are no established or seasonal drains or watercourses in this area so drainage is predominately by infiltration. Any over land flow would go directly to the Glashaboy River Estuary.

Catchment 4 (yellow) consists of a very small area of land adjacent to Dunkettle Road at the south-east of the study area, but is outside of the current application area. There are no established or intermittent (seasonal) watercourses or artificial drainage systems on this catchment.

While the proposed application area is drained by three separate hydrological catchments ultimately all surface water runoff from the site enters the tidal section of the Glashaboy Estuary below Glanmire Village. Therefore the whole study area drains to the upper part of the tidal Glashaboy River Estuary hydrological system rather than the non-tidal Glashaboy River system.

10.6.2.4 Flood Risk

The project engineers JODA have completed a detailed site specific Flood Risk Assessment (FRA) for the lands within the proposed LRD Phase 1 and 2 developments, (JODA Site FRA and the reader is advised to refer to this document for the details behind the conclusions of the FRA).

The JODA FRA report has been prepared in accordance with Chapter 11 of the Cork City Development Plan 2022 – 2028 and with the principles and mechanisms for managing flood risk, as set out in the document “The Planning System and Flood Risk Management – Guidelines for Planning Authorities” published by the Department of the Environment, Heritage and Local Government (DEHLG) and Office of Public Works (OPW) in November 2009, (known as the Flood Guidelines).

The findings of the FRA were that the developable site is not located within Flood Zone A or B and therefore is not at risk of fluvial flooding. No groundwater flood risk was identified and there is no overlap between the Land Use Zoning and the Indicative Flood Zones for the site area.

The predicted tidal flood extents from the Lee Catchment Flood Risk and Management Study (Lee CFRAMS) Maps provide possible fluvial and tidal flood extents in the Glashaboy River adjacent to the study area as well as giving indicative flood water levels at a number of locations near the subject site including Glanmire Village and the Dunkettle Roundabout. No risk of flooding to the development area is identified by the Lee CFRAMS maps.

The Glashaboy River Flood Relief Scheme has been developed to manage the risk of flooding in the Glanmire Area. Hydraulic modelling as part of this study updated the Lee CFRAMS hydraulic model and was calibrated against the large 2012 flood event. The predictive flood levels in the lower reaches of the Glashaboy River were found to be very similar to the Lee CFRAMS predictions with no significance difference between the two studies.

Therefore the conclusion of the JODA FRA was that the published information for the existing site showed that (1) the developable site is not in Flood Zone A or B and therefore is in Flood Zone C, and that (2) the existing Glashaboy watercourse adjacent to the site is subject to fluvial and tidal flooding.

The assessment of flood risk due to the proposed development has also been addressed in the JODA FRA with supporting documentation in the form of the JODA Site Civil Infrastructure Design Statement and SuDS Impact Assessment document, (File Ref 3442-JODA-01-XX-RP-C-0001, dated 6th Nov 2024). Further information on the drainage management of the site is included in Chapter 7 – Material Assets of the EIAR and the reader should read these documents in conjunction with this chapter of the EIAR.

The findings of these studies conclude that the general topography of the site facilitates storm water drainage by gravity and the proposed development will, in overall terms, respect the general topography of the existing site and that an adequate surface water drainage system will be developed for the site so that storm water will be discharged in a means that does not significantly raise the risk of flooding in lands outside of the development site.

The surface water drainage system for the development will consist of an urban drainage system incorporating Sustainable Urban Drainage Systems (SuDS) principles. A number of SuDS systems are to be included in the stormwater management design with elements used and installed as appropriate to the requirements and constraints of the site. Some of the SuDS elements to be used include;

- Percolation Areas, Filter Drains, Infiltration Trenches,
- Attenuation Pond,
- Tree Pits,
- Green Roofs,
- Attenuation Storage and Flow Controls
- Hydrocarbon & Silt Interceptors

The layout of the proposed development will form mini-catchments and water discharge directions that are similar to the mini-catchments of the existing site.

The Catchment 1 area drainage system will collect runoff from this part of the site with outflows to the existing piped system attenuated to greenfield runoff rates by means of a concrete attenuation tank and flow control hydro-valve device in the downstream outlet chamber.

The proposed surface water drain system will ultimately discharge to the existing piped drainage systems at the site boundary on the Dunkettle Road. Discharges to the existing piped drainage system will be attenuated to that of the equivalent of greenfield runoff rate from the undeveloped site in accordance with established drainage design principles. This will minimise the impact on the existing drain system and thus minimise the risk of flooding on lands downstream of the development.

Catchments 2a and 2b are located at the north end of the site with the majority of this area within 2a which drains towards an outlet to the Glashaboy river at the site boundary. While the water will be passed through a pond feature to assist in managing water quality it is proposed not to attenuate the surface water runoff from the site prior to discharge as it won’t cause a flood risk, (as outlined below).

Mini-catchment 2b naturally drains towards an existing farm track at the north end of the site connecting with Dunkettle Road at Glanmire Village. It is proposed to develop this existing farm track to create a new pedestrian and cycle path that connects the development to Glanmire Village. A piped drainage system collects surface water runoff from this path and discharges to the existing surface water drainage system on the Dunkettle Road. The site development will not significantly alter this scenario and the future drainage system will not cause an exceedance of the greenfield runoff rates.

Catchment 3 is at the west and south end of the study area. A drainage system will collect runoff from the site and discharge to the adjacent Glashaboy river at one location. It is proposed not to attenuate surface water runoff from the site prior to discharge as it won’t increase the flood risk. (Note that a large part of Catchment 3 is outside of the current application boundary. The drainage system for areas outside of the current application boundary is yet to be finalised and so the proposed drainage system currently includes for the areas of this catchment that are within the application site boundary. One exception to this is the outlet to the Glashaboy river which has been designed with an allowance for surface water discharge from a future Phase 2 development.

A detailed hydraulic assessment of the effects on the Glashaboy river of surface water discharge from the site was performed by JODA. The assessment was performed for rainfall events up to the 0.01 AEP (1:100 year) rainfall event and considered the effect on water levels in the river due to unattenuated discharge from the fully developed site, i.e. both the current development proposal and a possible future extension to the scheme in adjacent zoned development lands.

The assessment shows that water levels in the Glashaboy River locally in the vicinity of the site rise by less than 1mm due to surface water discharges from the development site, which is not considered of material significance, and not capable of effecting flood heights in the context of the Glashaboy River Catchment area. The final discharge of surface water runoff from the majority of the developed area to the adjacent Glashaboy river is proposed at two locations, one on the north end and one on the southwestern end of the site boundary.

Refer to the JODA Flood Risk Assessment and Site Civil Infrastructure Design and SuDS Impact Assessment documents included in the developments planning documents.

10.6.3 Hydrogeology

The EPA Catchment Mapping shows that the proposed site and surrounding area are located within the Ballinhassig East Groundwater Body (WFD Code Ref - IE_SW_G_004). The WFD Third Cycle Assessment Data indicates that the quality designation for this aquifer is ‘Good’ and that the Ground Waterbody Quality Risk Projection is ‘Not at Risk’. Refer to the EPA Groundwater Catchment Maps in Appendix 10.3.

10.6.3.1 Aquifer Classification

Aquifers are described as “bodies of saturated geological materials that both store and transmit important quantities of water”, (Young 2007). Given that a groundwater supply suitable for domestic use can be derived from nearly all the bedrock types in Ireland and this would be deemed an “important quantity of water”, nearly the whole county is considered by the EPA to be underlain by an “aquifer”. The GSI has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics of the bedrock as well as the potential size and productivity of the groundwater resource.

Groundwater in Ireland is primarily derived from open fracture or fissures in the bedrock which is identified as secondary permeability rather than groundwater coming from pores or openings in the rock fabric, or from pores in unconsolidated sands and gravels, which is identified as primary permeability. The GSI aquifer classification depends on a number of parameters including, the aerial extent (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$), aquifer transmissivity (m^2/d) and groundwater flow.

The general locality and whole study area is identified by the GSI mapping as being underlain by the Devonian aged Gyleen Formation (GY) geological unit. This bedrock is described by the GSI as being composed of sedimentary interbedded ‘thinly bedded and interlaminated alternating sequences of red, grey and green sandstones and purple, red and green siltstone and mudstone’.

Typically the aquifer categories are assigned to bedrock formations with similar age, properties and hydrogeological characteristics which, for simplicity, are combined together form geological Rock Unit Groups (RUGs). The GSI have identified 27 RUGs nationally and the Gyleen Formation at Dunkettle is part of the Old Red Sandstone (ORS) Rock Unit Group.

The Devonian aged bedrock formations are classified by the GSI as a “Locally Important Aquifer”, (LI), that is which is moderately productive only in local zones. Refer to the GSI Rock Unit Aquifer Mapping presented in Appendix 10.4.

The sites geology, soil and bedrock types and aquifer vulnerability are discussed in Chapter 9 with related GSI mapping included in Appendix 9.6.

10.6.3.2 Site Hydrogeology

No groundwater production wells were found to be present in the Dunkettle study area and there are no springs or rises identified in the site area by the OSI or GSI mapping and none were identified during the site walkover. Photographs form the VCL site walkover are included in Chapter 9 Appendix 9.3.

The local area is supplied by water mains and the development will be supplied by existing Uisce Eireann water supply infrastructure.

The GSI Groundwater Wells Mapping identifies a number of possible wells within the local area (~1km) of the site related to the housing to the east and single residence to the southwest.

No Groundwater Public Water Supply Schemes were identified by the GSI mapping within about 15km of the site. Refer to the GSI Borehole Map presented in Appendix 10.4.

The site specific shallow trial pit excavations completed on the site did not encounter any groundwater or evidence of the natural water table and no interaction with the groundwater is anticipated for the development. The site specific Geotechnical Investigation Report is included in Appendix 9.5.

10.6.4 Groundwater Flow Direction

The direction of natural groundwater movement is principally influenced by topography and the groundwater table is generally a subdued reflection of the ground surface. For the Dunkettle study area it would be expected that the natural groundwater flow direction would follow the local topography and reflect the three surface water catchments with variable flows to the northeast, north and west to southwest. Ultimately all groundwaters would be within the catchment of the Glashaboy River Estuary. Refer to the Site Drainage Maps included in presented in section 10.6.2.3.

10.6.5 Conceptual Site Model

As per the IGI Guidance recommendations a Conceptual Site Model (CSM) has been developed for the site examining the interaction of the project with the hydrological and hydrogeological environment.

A CSM represents the characteristics of a site, in word, graphic or diagrammatic form, and shows the possible relationships between potential contaminates (source), pathways (pollutant linkages), and receptors (environmental targets).

The main risks to waters from the Dunkettle development from the construction phase are via pollutants, such as fine sediments, directly impacting surface water runoff quality and entering the local drainage network and Glashaboy River Estuary, or by pollutant losses, such as hydrocarbons leaks from construction vehicles going to ground and entering the hydrological cycle via the groundwater.

The JODA engineering team have modelled an Earthworks Cut and Fill Layout for the Phase 1 and Phase 2 areas which indicates some areas that will need to be either reduced or raised in ground level in order to enable the construction works to proceed within the required design parameters.

The Earthworks Cut and Fill Layout Plan and related calculation are included in Appendix 9.8.

The main operational impact of the development on the water environment relates to potential pollution due to leaks from the buried sewage drainage infrastructure and changes to surface water drainage due to changes in topography and the extent of the hard surface area and its discharge to the local drainage systems and ultimately the Glashaboy River Estuary.

10.6.6 Type of Environment

As outlined in Section 9.7 of Chapter 9, Step 3 of the IGI Guidelines recommends that the type of Geological and Hydrogeological Environment are assessed. Based on the stable geology and locally important aquifer classification the site is deemed to have a:

Type A - Passive Geological/Hydrogeological Environment,

This is based on the fact that the area is underlain by well mapped, reasonably homogenous sedimentary derived rock types of the Gyleen Formation which represent a historically stable geological environment. There are no karst or other geo-hazards associated with this type of bedrock.

The local geology is classified by the GSI as a locally important bedrock aquifer. The Dunkettle site does not represent any aspect of a Type B groundwater discharge area, Type C Man-Made Dynamic Hydrogeological Environment with mining or quarrying below the water table, or with nearby waste discharges to ground or a Type D Sensitive Geological/Hydrogeological environment with karst limestone or water supply SPAs or a Type E Groundwater Dependent Ecosystem or wet-land with a river with a high base flow of groundwater.

The hydrological attribute Site Importance rating follows the NRA use of five importance criteria – Extremely High, Very High, High, Medium and Low depending on the attribute quality.

The two attributes that are relevant to Dunkettle site are the underlying aquifer and the Glashaboy River Estuary system and related habitats, which is ultimately the final receiving water that will get the piped storm water runoff discharges from the site. The site importance criteria, with examples, are applied to the Dunkettle site in Table 10-3.

Table 10-3 Criteria for rating Site Importance for Hydrology/Hydrogeology at EIA stage.

IMPORTANCE	CRITERIA	TYPICAL EXAMPLE	DUNKETTLE SITE
Extremely High	**Attribute has a high quality or value on an international scale.**	**River, wetland or surface water body ecosystem protected by E.U Legislation e.g. Salmonoid River or SAC/SPA**	**Yes – rainfall runoff from the site is proposed to discharge to the Glashaboy River Estuary which is an internationally protected SPA.**
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 e.g. pNHA, Regionally Important Aquifer with multiple wells, Potable Water Supply >2500 homes	No – water from the site is not supporting any national hydrological feature or a protected water ecosystem. No large wells in area.
High	Attribute has a high quality or value on a local scale	Salmon Fishery, Regionally Important Aquifer, Potable Water Supplying >1000 homes.	No - no salmon fishery or amenity importance locally and limited wells in the area. Locally Important Aquifer
Medium	Attribute has a medium quality or value on a local scale	Coarse Fishery, Locally Important Aquifer Local potable water supply to >50 homes.	Yes – Locally important Aquifer under site area. Some local well supplies.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Local potable supply <50 home.	No – no on site watercourses or known borehole supplies.

The bedrock aquifer classification as being Locally Important gives the groundwater a rating of Medium Importance, as per the relevant guidelines for hydrogeological attributes.

Given that the surface runoff enters the local Glashaboy River Estuary, which is a designated as part of the internationally important Cork Harbour Special Protection Area (SPA) an Extremely High hydrological rating accurately represents the importance of the local Surface Water attribute.

10.7 The ‘Do Nothing’ Scenario

The ‘Doing Nothing’ Scenario would result in no residential development at the site and the continued use of the land for intensive agricultural tillage and pastoral grassland. Potential organic runoff from the agricultural activity on the site to the local groundwater and Glashaboy Estuary would continue.

Given the proximity of the lands to Cork City and Glanmire, their zoning and suitability for residential development it is probable that they will be built on at some stage in the future.

10.8 Potential Significant Effects

10.8.1 Construction Phase

The main potential direct effect for the initial site establishment construction phase of the development is sediment runoff and/or dust generation from the cut and fill earth moving activities that are required to establish the appropriate final floor level hights for building construction as well as the excavation and backfilling earth works that will be required for establishing the site surface water, waste water piping and internal roadway infrastructure. Fuel spills from machinery is also possible environmental risk at this stage of the development works.

For the building construction phase the main potential effects include chemical runoff in the form of extensive cement use and/or potential fuel spills from construction vehicles and machinery use on site, to the ground and potentially to the local Glashaboy River Estuary. While earth works are reduced during the construction phase there would still be potential for local sediment runoff and/or dust effects to arise.

10.8.2 Operational Phase

During the operation phase the main potential direct effect is the change in stormwater runoff volume to the local receiving surface water and indirect increase in waste water loading to the local WWTP infrastructure. There would be a potential risk of leaks from the waste water piping to occur which could affect local groundwater quality.

10.8.3 Cumulative Effects

There could be cumulative stormwater runoff effects from adjacent sites that could affect the Glashaboy River Estuary system in terms of water quality and flooding risk. Refer to Section 10.4.5.

10.8.4 Summary

The following Table summarises the identified likely significant effects during the site establishment and construction phases of the proposed development before mitigation measures are applied.

Table 10-4 Summary of Construction Phase Likely Significant Effects without mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Sediment Runoff	Negative	Not Significant to Imperceptible	Local	Medium to Low	Brief to Temporary	Small Adverse to Negligible
Fuel Spills	Negative	Not Significant to Imperceptible	Local	Low	Brief to Temporary	Small Adverse to Negligible
Chemical (cement) losses	Negative	Not Significant to Imperceptible	Local	Low	Brief to Temporary	Small Adverse to Negligible

Table below summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 10-5 Summary of Operational Phase Likely Significant Effects without mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Change to water Runoff Rate	Neutral	Slight to Not Significant	Site Wide	High	Long term to Permanent	Small Adverse to Negligible
Change to Groundwater Recharge Rate	Neutral	Not Significant to Imperceptible	Built On Areas	High	Long Term to Permanent	Negligible
Change to Aquifer Vulnerability	Neutral	Not Significant to Imperceptible	Local	High	Long Term to Permanent	Negligible
Wastewater pipe leaks to ground	Negative	Slight to Not Significant	Local	Low	Brief to Temporary	Small Adverse to Negligible
Soiled Surface Water Runoff	Negative	Not Significant to Imperceptible	Local	Low	Brief to Temporary	Small Adverse to Negligible

10.9 Mitigation Measures

The sensitivity and value of the receiving environment combined with the magnitude and duration of the potential impact defines the environmental significance of the effect and is examined both before and after the application of mitigation measures. Generally, the more significant and long term the impact the more difficult it is to mitigate it.

While the magnitude of the potential long-term impact on the groundwater and surface water attributes from the development are considered to be Small Adverse to Negligible, there are potential brief to temporary or short term impacts that may arise, especially during the development/construction stage, which could cause pollution and environmental risks and there are a number of mitigation measures that would help eliminate and/or reduce the occurrence of these potentially negative effects.

10.9.1 Incorporated Design Mitigation

All new-build service infrastructure is to be designed in accordance with the relevant service provider and asset owner’s code of practice, which require due cognisance of the receiving environment. In particular design, choice and standard of materials for buried pipe work and interceptors shall be adequate for operating successfully without effecting the local environment for the long term.

The design seeks to mitigate potential negative effects with all new-build infrastructure to be designed in accordance with the Technical Guidance Documents of the Building Regulations and associated codes of practice, which require due cognisance of the receiving environment. Design depths of proposed infrastructure are to be optimised so that excessive excavations are avoided and by association a reduction in potential waste material, machinery operation time and associated risks.

The proposed development will be provided with a surface water management system that is designed in accordance with the principles of Sustainable Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).

The proposed surface water network for the development is arranged into individual systems that match the natural catchments of the site. Each system will operate independently of each other.

The proposed surface water networks includes a train of SuDS features which collectively provide for interception, treatment and conveyance of surface water, including nature-based features, which will aid the reduction of runoff volumes by slowing surface water flows, both providing the opportunity for evapotranspiration and rainwater storage. Interception storage requirements of GDSDS will be sufficiently met through the provision of SuDS features. Discharges to existing drainage systems is controlled as necessary to ensure adequate flood protection.

The SuDS features incorporated into the site scheme were chosen following an assessment using the guidance provided in the following documents:

- SuDS Manual, CIRIA 753;
- Nature-based Solutions to the Management of Rainwater and Surface Water Run-off In Urban Areas, Dept of Housing, Local Government and Heritage.

SuDS features suitable for the site layout and site constraints have been identified and incorporated into the proposed surface water drainage scheme. Surface water drainage has been designed to, where necessary, mimic the site run-off characteristics with storm water run-off passing through the necessary treatment systems to prevent pollution. The design of the residential heating systems shall exclude the use of potentially polluting kerosene or fuel oils.

10.9.2 Construction Phase Mitigation

The phased nature of the sites development will reduce the foot print of open ground and active earth work areas as the site is being prepared for construction works. The areas where the excavation of unconsolidated soil and subsoils is required within each building phase will be kept to a minimum and, as far as practicable, only extended as already stripped ground has been built over. Keeping the surface area of exposed soils in the construction areas to a minimum is the most effective way of preventing the release of dust in dry weather and suspended sediments during or after wet conditions. Potential dust and suspended solids runoff impacts are therefore reduced or avoided.

Limiting excavation works and machinery activity during and immediately after periods of heavy rainfall (>20mm/day) will also be incorporated into the earth works management to help limit sediment generation.

Control of Soil Excavation and Export from Site using the Reduce, Reuse and Recycle approach with all excavation arisings to be reused on site where possible. The implementation of an appropriate earthworks handling protocol with adequate runoff control and dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping and general housekeeping will ensure that the surrounding environment are free of nuisance dirt on roads which will reduce sediment runoff and dust generation.

There will be a requirement for a Construction Management Plan to oversee the development (the Main Contractor(s) will update the Outline CEMP); Earthwork operations will be carried out such that surfaces, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and suspended sediments from going off site.

Construction Phase Mitigations will include;

- Construction methods used by the contractor are to be tailored to reduce, where possible, sediment runoff and leaks or spills to ground and to minimise effects on the local environment.
- Designated roadways and internal access/construction routes will be clearly designated and fenced off in-order to prevent uncontrolled tracking of construction vehicles across the site. This will help reduce the surface area of disturbed ground which will limit the potential for soil compaction, sediment runoff or dust generation. Similarly existing hedge rows and site features which are to be maintained will be fenced off.
- Any spoil or waste material generated from the construction process is to be temporarily stored on level ground at an approved location on site, and segregated from surface water runoff, before being either re-used on site or removed off-site to a suitably licenced waste management facility.
- All fill and aggregate for the project will be sourced from reputable suppliers.
- Designation of bunded refuelling areas on the site (as required) as well as the provision of spill kits across the site will reduce the potential for fuel or oil spills occurring or their extent.

- Fuel, oil and chemical storage should be sited within a bunded area. The bund must be able to take the volume of the largest container plus 10% and be located at least 10m away from drains, ditches, excavations and other locations where it may cause pollution. Bunds should be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination.
- All bowsers to carry a spill kit and operatives must have spill response training; and portable generators or similar fuel containing equipment will be placed on suitable drip trays and/or absorbent fuel 'nappies'. In the case of drummed fuel or other potentially polluting substances (i.e. cement) which may be used during construction the following measures will be adopted:
- The use of a dedicated concrete truck washout areas and secure storage areas for the storage of concrete materials. All containers that contain potential polluting substances to be stored in dedicated internally bunded chemical storage cabinet units or inside concrete bunded areas. Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.
- All works in the riparian corridor (<10m from the river) will be carried out in consultation with Inland Fisheries Ireland and the project ecologist following the best practice guidelines for construction in the vicinity of watercourses. Extra care needs to be taken when working in sloped areas which could have direct runoff to the local Glashaboy River Estuary System.
- All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines. Potable water supply networks and waste water infrastructure are to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with the requirements of Uisce Eireann.
- Connections to the service providers are to be carried out to the approval and / or under the supervision of the Local Authority or relevant utility service provider, prior to commissioning. All new sewers are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase.
- All construction works will be completed in line with the recommendations of
  - the Construction Industry Research and Information Association (CIRIA) *Environmental Good Practice on Site 4th Ed (C741 - 2015) & Control of Water Pollution from Construction Site* (C532 - 2001).
  - The SuDs Manual (C752) Construction Industry Research and Information Association (CIRIA), 2015.
  - UK Environmental Agency Guidance Series for Pollution Prevention (GPP), including GPP5: Works and maintenance in or near water (NRW, NIEA, SEPA), January 2017 and GPP22: Dealing with Spills, (NRW, NIEA, SEPA), October 2018
- Best practice environmental guidance will be incorporated into the Construction Environmental Management Plan (CEMP) for the development, an outline of which is part of the planning submission, prepared by JODA Engineering Consultants.

10.9.3 Operational Phase Mitigation

Mitigation measures proposed during the operation phase include

- routine maintenance of the site services;

- regular maintenance of the development’s green roofs and interceptors
- regular maintenance of landscaped areas, bio-retention, percolation and attenuation areas

10.10 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

10.10.1 Construction Phases

Once the proposed mitigation measures are fully implemented on the site during the initial site clearance and preparatory earthwork then the risk of any significant negative effects occurring to the water attributes will be greatly reduced or eliminated and are considered neutral negligible effects.

Once the proposed mitigation measures are fully implemented on the site during the construction period then the risk of any significant negative effects occurring to the water attributes will be greatly reduced or eliminated and are considered neutral negligible effects.

10.10.2 Operational Phase

Once the proposed mitigation measures are fully implemented for the operational phase of the site then the risk of any significant negative effects occurring to the water attributes will be negligible.

10.10.3 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 10-6 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Sediment Runoff	Negative	Imperceptible	Local	Low	Brief	Negligible
Fuel Spills	Negative	Imperceptible	Local	Very Low	Brief	Negligible
Chemical (cement) losses	Negative	Imperceptible	Local	Very Low	Brief	Negligible

The following Table summarises the identified likely residual significant effects during the operational phase of the proposed development post mitigation.

Table 10-7 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Increased Runoff from site	Neutral	Imperceptible	Local	Very Low	Brief	Negligible
Wastewater pipe leaks to ground	Negative	Imperceptible	Local	Very Low	Brief	Negligible
Soiled Surface Water Runoff	Negative	Imperceptible	Local	Very Low	Brief	Negligible

10.11 Risk of Major Accidents or Disasters

The risk of Major Accident or Disasters arising from the water attributes are very unlikely as the scale of the construction works is manageable and is normal for a large scale residential development. While there are some local surface water and groundwater receptors proper planning site management will ensure the likelihood of a major accident or disaster occurring would be extremely unlikely.

10.12 Worst Case Scenario

In terms of Water attributes the ‘Worst Case Scenario’ Environmental Effect would probably relate to the accidental loss of fuel from active machinery in the development or the spillage of hydrocarbons during the re-fueling of construction machinery. This could impact on the surface or groundwater quality which could, if left unmanaged, have a significant negative effect on the water quality of the aquifer under the site and may result in local surface waters becoming contaminated. In either case the potential volume of fuel loss would be relatively small, in the 10’s rather than 100’s of liters, and the duration of the effect would be brief, temporary to short term.

10.13 Interactions

The main interaction of the water attribute is with Chapter 9 Land & Soils (Geology) due to the cut & fill earth work activities that could produce sediment runoff. Interactions with the groundwater attribute is not anticipated.

10.14 Monitoring

Runoff from works, stockpile and compound areas will be observed during the construction phase to ensure that it is not impacting on the local watercourse. Both hydrocarbons and silt cause discolouration so are easy to visually monitor for their presence. If necessary water sampling and monitoring of the Glashaboy River can be completed to test for Total Suspended Solids (TSS) and Hydrocarbon concentrations for the construction phase.

A Maintenance schedule for monitoring drainage infrastructure during the operational phase is recommended.

10.15 Summary of Mitigation and Monitoring

With the importance of the Surface Water attribute's being 'Extremely High' and the Groundwater attribute being 'Medium' and the potential Magnitude of Impact as 'Negligible' then the potential for significant effects arising from the Dunkettle development are rated as 'Imperceptible'.

The potential residual impacts are those that will occur after the proposed mitigation measures have taken effect. The mitigation measures described will further reduce the potential for any significant brief to temporary or short-term environmental impacts occurring during the development works.

No specific monitoring is proposed. In general, monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission. Monitoring of compliance with Health & Safety requirements will be undertaken by the Project Supervisor for the Construction Process (PSCP).

Also, with proper maintenance of the water drainage infrastructure, no significant residual operational phase impacts area anticipated.

The following Table summarises the Construction Phase mitigation and monitoring measures.

Table 10-8 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Sediment Runoff from work areas	Silt fencing, bunding, drainage control, limit work in very wet weather and maintain buffers	Daily visual checking and if necessary sampling of local watercourse or drains
Fuel losses or leaks to ground	Dedicated fuel areas, spill kits and staff training, pads under plant.	Visual inspection of re-fuelling areas, check leak pads & spill kits.
Chemical (cement) spills or runoff	Proper storage of cement and any other toxic chemicals	Visual inspection of laydown areas, bunds and storage containers.

The following Table summarises the Operational Phase mitigation and monitoring measures.

Table 10-9 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Drainage infrastructure blocking	Ongoing maintenance of swales, drains, interceptors and piping	Maintenance schedule for monitoring drainage infrastructure.

10.16 Conclusion

No significant residual impacts are predicted for the Water & Hydrology aspects of the proposed development. The consideration of cumulative projects does not change the residual impact rating.

10.17 References and Sources

- EPA "Guidelines on the information to be contained within an EIAR", (EPA May 2022).
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Dunkettle EIAR

Volume II

Main Statement

CHAPTER 11

Biodiversity

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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11 Biodiversity

11.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development on Biodiversity.

in relation to a Proposed Mixed-used Residential Development, located at Dunkettle, Glanmire Co. Cork, hereafter referred to as 'Proposed Development' or 'Site' when referring to the site area of the Proposed Development.

This Chapter assesses the potential effects of the Proposed Development on habitats and species; particularly those protected by national and international legislation or considered to be of particular nature conservation importance on or adjacent to the Site. This Chapter will describe the ecology of the Site, with emphasis on habitats, flora and fauna, and will assesses the potential effects of the Construction and Operational Phases of the Proposed Development on these ecological receptors.

The Report follows Guidelines for Ecological Impact Assessment in the UK and Ireland, by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) and supplemented by the National Roads Authority (2009) guidelines for Assessment of Ecological Impacts of National Road Schemes.

The purpose of this Chapter is to:

- Set out the methodologies used to inform the assessment.
- Identify Key Ecological Receptors (KERs) within the Zone of Influence (ZOI).
- Assess the impacts from the Proposed Development on the KERs and the resulting significant effects.
- Set out measures to avoid or mitigate negative impacts.
- Assess the residual effects after the incorporation of agreed avoidance or mitigation measures to ensure legal compliance.
- Set out agreed measures to offset significant residual effects.
- Set out opportunities for ecological enhancement.

This Chapter should be read in conjunction with Chapter 8 Material Asset: Waste, Chapter 9 Land & Soils and Chapter 10 Water & Hydrology as well as the Construction Environmental Management Plan and Civil Infrastructure Design Statement (JODA, 2024) accompanying this EIAR.

11.2 Expertise and Qualifications

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

Enviroguide Consulting as a company remains fully briefed in European and Irish environmental policy and legislation. Enviroguide staff members are highly qualified in their field. Professional memberships include the Chartered Institution of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

All surveying and reporting have been carried out by qualified and experienced ecologists and environmental consultants. CBH, Ecologist with Enviroguide, undertook the habitat, fauna and flora surveys and desktop research for this Report.

TR is the author and lead contributor of this Report. TR holds a B.Sc. in Environmental and Natural Resource Management (Hons.) and a Post-Graduate Diploma in Environmental Management with GIS. TR is an experienced Ecologist who has specialised in Ornithology and terrestrial mammals with ample experience in ecological consultancy along with a lifetime of personal interest and experience in wildlife management. TR has extensive experience in ecological surveying, desktop research, preparing AA Screening Reports (AA), Ecological Impact Assessment Reports (EcIAs), Bird Activity Reports and detailed Species-Specific Mapping. His ability to deal with and understand a range of species, survey methods and habitats is excellent, having an in-depth knowledge and understanding of EU and Irish legislation.

CBH is an Ecologist with Enviroguide and has a BSc. (Hons) in Wildlife Biology from Munster Technological University (formerly ITT) and a wealth of experience in desktop research, literature review and reporting, as well as practical field and laboratory experience. CBH has prepared several Stage I and Stage II Appropriate Assessment (AA) Reports. Additionally, CBH has supported the preparations of several Biodiversity Chapters for Environmental Impact Assessment Reports. CBH is also a Qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

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

BMc is an Ecologist and experienced Ornithologist with 12 years of bird survey experience. BMc is a longstanding and active member of Bird Watch Ireland and has provided Ornithology survey work for ecological consultancies, e.g., vantage points surveys of gulls, terns, raptors, waders, and wildfowl; hinterland surveys of the above as well as riverine species; and breeding waders and country birds. BMc is highly experienced with all survey methodologies and with surveying all species groups of Irish birds and migrants. HR

CRK is an intern Ecologist with a M.Sc. in Biodiversity and Conservation from Trinity College Dublin. CRK's experience as an ecologist is broad both variety of ecological reports and literature, and field surveys conducted. CRK has experience in surveying habitats, birds, plants, bats, mammals and invasive species, with some experience in assessing welfare conditions of animals using behavioural repertoires as indicators. CRK's experience in ecological report writing extends from Research associated literature reviews to AA screening reports and Municipal District Summary reports.

KM is an intern Ecologist with a wealth of experience in desktop research, report writing, and QGIS mapping, as well as practical field and laboratory experience. Field experience includes bat surveys, freshwater macroinvertebrate surveys, fallow deer tagging in Pheonix Park, and trail camera set-up and analysis. KM has prepared several Municipal District Summaries and Stage I Appropriate Assessment Reports.

11.3 Description of the Proposed Development

The proposed development is described in Chapter 2 of this EIAR. The following are aspects of this development which are relevant to the assessment in this Chapter.

11.3.1 Drainage and Water Supply

11.3.1.1 Surface water

The overall EIAR area contains four mini catchments which are detailed by JODA (2024) in reports supporting this application. Land within the Site drain predominantly south and westwards towards the Glashaboy Estuary. Land further north drain towards existing surface drainage networks located on Dunkettle road and towards the Glashaboy River to the north and west of the Site. The lands have the benefit of direct access to the public stormwater network and will enter such at three locations to the north and east, along Dunkettle Road. Land within the southwest of the main development area and within the access routes extending south towards Dunkettle will be released post SuDS treatment directly into the Glashaboy Estuary.

Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control device (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).

11.3.1.1.1 SuDS Measures

The detailed design of the phase 1 section of the overall EIAR areas surface water management infrastructure has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and a similar, standardised approach will be followed in the design of subsequent development phases within the overall landholding (EIAR area). GSDS requires that the following design criteria be applied to all sites:

1. River water quality protection.
2. River regime protection.
3. Level of (surface) flooding for the Site.
4. River flood protection.

Following a comprehensive review of the above, the design approach for the phase 1 development of the EIAR study area is detailed in the infrastructure report (JODA Consulting Engineers, 2024). These design principles will be followed in the design of subsequent development phases within the overall landholding and include the following SuDS:

- Permeable Pavements.
- Greenroofs.
- Tree Pits.
- Percolation Areas.

- Swales.
- Ponds.
- Rainwater Harvesting.
- Attenuation Tank.
- Detention Basins.
- Flow Control Device.
- Hydrocarbon and silt Interceptors.
- Swales.
- Management Train.

Conforming to the objectives of SuDS, Interception Storage will be provided via the use of Green Roofs, Tree Pits, Rain Gardens and Percolation Areas. The area of the Phase 1 Proposed Development directly connected to the public surface water network on Dunkettle is c. 7.97 ha, resulting in a requirement of 797 cubic metres of interception and percolation for a 10mm rainfall event. It is noted by JODA (2024) that the majority of interception will be provided by percolation in eight separate areas within the Site, all of which will be facilitated by hydrocarbon and silt interceptors upstream in order to prevent contamination and sedimentation of the existing soils. It is worth noting that the entire EIAR study area including lands south of Dunkettle House measures c.64 ha. Development post phase 1 will include an equally substantial suite of interception storage, percolation and hydrocarbon removal as detailed in the phase 1 design (JODA, 2024)

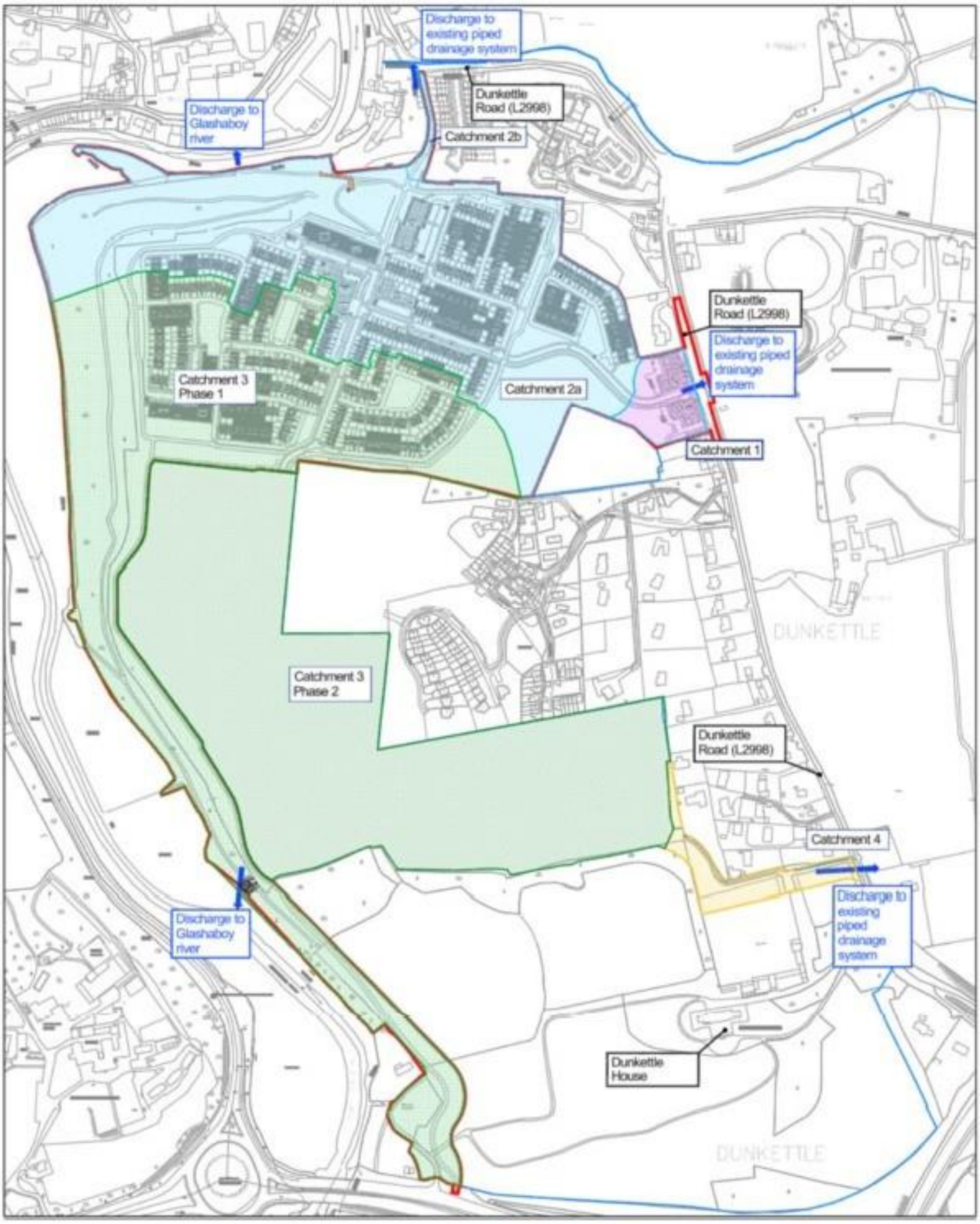

Figure 11-1 Showing the location of the stormwater outfall to the Glashaboy River, and existing piped drainage system to the north and east of the Proposed Development (JODA Consulting Engineers, 2024)

11.3.1.1.2 SuDS Statement

For the purposes of objectivity and clarity, mitigation measures are not considered in the impact prediction. As per the judgment of the Court (Second Chamber) on the 15th of June 2023 (see Eco Advocacy CLG v An Bord Pleanala (Case C 721/21)), *'Article 6(3) of Directive 92/43 must be interpreted as meaning that, in order to determine whether it is necessary to carry out an appropriate assessment of* *the implications of a plan or project for a site, account may be taken of the features of that plan or project which involve the removal of contaminants and which therefore may have the effect of reducing the harmful effects of the plan or project on that site, where those features have been incorporated into that plan or project as standard features, inherent in such a plan or project, irrespective of any effect on the site*'.

The above SuDS measures are incorporated into the surface water design of the Proposed Development as standard practice and, although they will result in the removal of pollutants such as silt, and hydrocarbons from surface waters, they have not been included for the purpose of mitigating impacts on any European sites.

11.3.1.2 Foul Drainage

The Proposed Development will be connected to the foul sewer network that is already laid within the existing lands encompassing the Site and running southwards to meet the existing public network at Dunkettle, subsequently ending up at Carrigrennan Waste Water Treatment Plant (WWTP).

The wastewater infrastructure serving the development is a conventional piped system, designed and constructed in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03). The system will be completely segregated from the surface water drainage network as per the below extract from the accompanying drainage design scheme accompanying this report under separate cover.

> *''The wastewater discharged from the site will ultimately discharge to the Carrigrennan Waste Water Treatment Plant. There are no proposed process water emissions. The industrial wastewater discharge from the development is zero. If insufficient capacity is available in the public infrastructure, there is a potential for increased levels of pollution in receiving waters, however confirmation of feasibility from Uisce Éireann on the wastewater requirements for the proposed development has been provided".*

For further details of the wastewater drainage system, refer to the infrastructure design report and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application.

11.3.2 Landscaping Plan

The proposed landscaping of the phase 1 section of the study area has been prepared by DMNA Ltd. Architects (2024) in consultation with the project ecologist, TR. The landscape plan incorporates features to enhance the areas biodiversity value including the below and these features will be incorporated as standard in any future development of the overall EIAR area, making future design measures consistent with those proposed for phase 1 as standard for the Dunkettle landholding.:

- Wildflower Meadows.
- Bee Hotels.
- Bat and nocturnal wildlife friendly lighting.
- Attenuation Pond with biodiversity friendly planting and hibernacula.
- Log Piles.
- Creation of new woodland.

- Native planting.
- Bird and bat boxes.

All of which are connected throughout.

The phase 1 Landscape Plan includes the creation of a new woodland connecting the wooded areas to each other and linking the habitats already present on Site. Greenways will be designed to be wildlife friendly and the edges of steep topography and otherwise unusable areas will be planted with pollinator friendly meadows.

An outline strategy for the Phase 2 LRD lands has also been prepared by DMNA with input from Enviroguide. While detailed design has not yet been prepared, the principles of the Phase 1 proposals will be incorporated into the landscape design.

11.3.3 Lighting Plan

A collaborative approach has been taken to design the lighting scheme. Areas of sensitivity for nocturnal wildlife which include the woodland areas, hedgerows and connecting natural features have all been identified and where possible, operational phase lighting has been designed to be below 1 lux in order to avoid significant ecological effects. Details of the phase 1 scheme design are summarised as follows, and will be incorporated as standard in any future development of the overall EIAR area, making future design measures consistent with those proposed for phase 1 as standard for the Dunkettle landholding.:

- Lighting of the proposed greenways which connect the Site with the surrounding areas will be kept below 1 lux and avoided entirely where possible. Key areas of sensitivity within the site have been shared with the lighting consultant (John Kelleher & Associates) and incorporated into the Landscape Plan prepared by DMNA (2024).
- Lighting to be developed to be bat and nocturnal wildlife friendly and follow the guidelines set out by the Bat Conservation Trust (BCT) (Collins, 2023) and the Institute of Lighting Professionals (ILP) (2023).

11.3.4 Description of the Construction Phase

The entire Construction element of phase 1 will comprise the following elements and these elements are likely to be required for future works associated with development of the lands south of the phase 1 area.:

- The works will involve the excavation of materials to facilitate the works.
- A Site compound(s) containing site offices, canteen and toilet/changing facilities, temporary water supplies and wastewater disposal to the existing foul sewer.
- A secure compound and containers for storage of materials and plant;
- Temporary vehicle parking areas.
- A contained area for machinery refuelling and construction chemical storage.
- A contained area for washing out of concrete and mortar trucks.
- Security fencing will be provided at the main site entrance and around all boundaries as required.

- Appropriate signage will be positioned at approach roads to the Site area so as to inform the public of the Site activities. Public access will not be permitted to the Site.
- All vehicles and personnel will be checked on entry to ensure no unauthorised access or fly-tipping.

For the duration of the Construction Phase, it is envisaged that the maximum working hours shall be 07.00 to 18.00 Monday to Friday (excluding bank holidays) and 08:00 to 14:00 Saturdays.

On occasion, it may be necessary to carry out noisy activities outside of normal working hours. In such instances, prior consultation will be carried out with Cork City Council.

11.3.5 Description of the Operational Phase

The Operational Phase of the phase 1 area will comprise residential and some neighbourhood commercial uses that is consistent with the neighbouring land use in the area, indefinitely. Subsequent development of the lands within the EIAR area and south of phase 1 will be of a similar nature and consistent with the wider residential and neighbourhood commercial uses in the area.

11.4 Methodology

This Chapter has been undertaken to support and assess the Proposed Development planning application and assesses the potential impacts that the Proposed Development may have on the ecology of the Site and its environs. Where potential for a risk to the environment is identified, mitigation measures are proposed on the basis that by deploying these mitigation measures the risk is eliminated or reduced to an insignificant level.

This section details the steps and methodology employed to undertake an ecological impact assessment of the Proposed Development.

11.4.1 Relevant Legislation and Policy Context

An EcIA is a process of identifying, quantifying, and evaluating potential effects of development-related or other actions on habitats, species and ecosystems (CIEEM, 2018). When an EcIA is undertaken as part of an EIA process (in the form of an EIAR Biodiversity Chapter) it is subject to the EIA Regulations (under the Planning and Development Regulations 2001-2023.

There is a number of pieces of legislation, regulations and policies specific to ecology which underpin this assessment. These may be applicable at a European, National or Local level. Legislation at the International level relevant to the Proposed Development are listed below:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter the ‘Habitats Directive’.
- Directive 2009/147/EEC, hereafter the ‘Birds Directive’.
- Directive 2011/92/EU, hereafter the ‘EIA Directive’.
- EU Regulation 1143/2014, on Invasive Alien Species.
- Convention on the Conservation of European Wildlife and Natural Habitats 1982, hereaf-ter the ‘Bern Convention’

- The Convention on the Conservation of Migratory Species of Wild Animals 1983, hereafter the 'Bonn Convention'.
- Ramsar Convention on Wetlands 1971, hereafter referred to as 'Ramsar'.
- Water Framework Directive 2000/60/EC, hereafter the 'WFD'.

National legislation and policy relevant to the Proposed Development are listed below:

- Wildlife Act 1976, as amended in 2000.
- Flora (Protection) Order 2022.
- The Planning and Development Act 2000.
- National Biodiversity Plan 2023-2030.

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

Local plans and policies relevant to the Proposed Development are listed below:

- Cork City Heritage and Biodiversity Plan (2021-2026).
- Cork City Development Plan (2022-2028).

Other International and National designated Sites were searched for within the ZOI, such as Ramsar Sites, Irish Wetland Bird Survey and Important Bird Areas (IBA'S). All of which are recognised as important areas for the protection of wintering and migratory wildfowl.

Local plans and policies relevant to the Proposed Development are listed below:

- Cork County Development Plan (2022-2028).
- Cork Heritage and Biodiversity Plan 2021-2026.
- Cobh Municipal District Local Area Plan 2017.
- All Ireland Pollinator Plan (2021-2025).

Further details on legislation and policy relevant to the Proposed Development are detailed in Appendix 11.1 and 11.2.

11.4.2 Scope of Assessment

The specific objectives of the study were to:

- Undertake baseline ecological surveys and evaluate the nature conservation importance of the Site;
- Identify and assess the direct, indirect and cumulative ecological implications or impacts of the Proposed Development during its lifetime; and
- Where possible, propose mitigation measures to remove or reduce those impacts at the appropriate stage of the Proposed Development.

11.4.3 Desk Study

A desktop study was carried out to collate and review available information, datasets and documentation sources pertaining to the Site's natural environment. The desk study, completed in September 2024, relied on the following sources:

- Information on species records[1] and distributions, obtained from the National Biodiversity Data Centre (NBDC) at maps.biodiversityireland.ie;
- Information on Fresh Water Pearl Mussel obtained (via data request) from the National Parks and Wildlife Service (NPWS) at www.npws.ie;
- Information on waterbodies, catchment areas and hydrological connections obtained from the Environmental Protection Agency (EPA) at gis.epa.ie;
- Information on bedrock, groundwater, aquifers and their statuses, obtained from Geological Survey Ireland (GSI) at www.gsi.ie;
- Information on the network designated conservation sites, site boundaries, qualifying interests and conservation objectives, obtained from the National Parks and Wildlife Service (NPWS) at www.npws.ie;
- Satellite imagery and mapping obtained from various sources and dates including Google, Digital Globe, Bing and Ordnance Survey Ireland;
- Information on the existence of permitted development, or developments awaiting decision, in the vicinity of the Proposed Development from the National Planning Application Database available at: https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=9cf2a09799d74d8e9316a3d3a4d3a8de*; and*
- Information on the extent, nature and location of the Proposed Development, provided by the applicant and/or their design team.

A comprehensive list of all the specific documents and information sources consulted in the completion of this report is provided in Section 11.17 References.

11.4.4 Zone of Influence

The ZOI for a project is the area over which ecological features may be affected by changes as a result of the Proposed Development and associated activities. This is likely to extend beyond the development site, for example where there are ecological or hydrological links beyond the site boundaries (CIEEM, 2018). The ZOI will vary with different ecological features, depending on their sensitivities to an environmental change.

Furthermore, ZOI in relation to European sites is described as follows in the 'OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management' (OPR, 2021):

> *"The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on*

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[1] The Site of the Proposed Development lies within the 10km grid square W77, the 2km grid square W77G. Records from the last 20 years from available datasets are given in the relevant sections of this report.

> *a case-by-case basis using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15 km).”*

11.4.5 Identification of Relevant Designated Sites

To determine the ZOI of the Proposed Development for designated sites, reference was made to the OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management’ (OPR, 2021), a practice note produced by the Office of the Planning Regulator, Dublin. This note was published to provide guidance on screening for AA during the planning process, and although it focuses on the approach a planning authority should take in screening for AA, the methodology is also readily applied in the preparation of EcIA reports such as this to identify all relevant designated sites potentially linked to the Proposed Development.

As noted above, the most recent guidance advises against the use of arbitrary distances that serve as precautionary ZOI (e.g., 15km), and instead recommends the application of the Source-Pathway-Receptor (S-P-R) model in the identification of designated sites, stating that “*This should avoid lengthy descriptions of European sites, regardless of whether they are relevant to the proposed development, and a lack of focus on the relevant European sites and issues of importance*”. Although this statement refers to European sites, it is also applicable to other designated sites.

Thus, the methodology used to identify relevant designated sites comprised the following:

- Identification of potential sources of effects based on the Proposed Development description and details;
- Identification of potential pathways between the Site of the Proposed Development and any designated sites within the ZOI of any of the identified sources of effects.
    - Water catchment data from the EPA (www.epa.ie) were used to establish or discount potential hydrological connectivity between the Proposed Development and any designated sites.
    - Groundwater and bedrock information used to establish or discount potential hydrogeological connectivity between the Proposed Development and any designated sites.
    - Air and land connectivity assessed based on Proposed Development details and proximity to designated sites.
    - Consideration of potential indirect pathways, e.g., impacts to flight paths, *ex-situ* habitats, etc.
- Review of Ireland’s designated sites to identify those sites which could potentially be affected by the Proposed Development in view of the identified pathways, using the following sources;
    - European sites and nationally designated sites (e.g., NHAs and pNHAs) from the NPWS (www.npws.ie);
    - Ramsar sites from the Irish Ramsar Wetland Committee (https://irishwetlands.ie/irish-sites/);
    - Other internationally designated sites e.g., UNESCO Biosphere’s; and

- Regional development plans to identify any remaining sites or areas designated for nature conservation at a local level.

11.4.6 Field Surveys

11.4.6.1 Habitat and Flora Surveys

Ecological walkovers of the Site were conducted on the 28th of August 2023 where the entire Site was walked. Subsequent Site visits in 2023/2024 were vigilant of all habitats and species and baseline surveys were updated where applicable. Possible species compositions and abundance are described using the DAFOR (Dominant, Abundant, Frequent, Occasional or Rare) scale, An effective method of assigning abundance categories to species.

Habitats were categorised to level 3, according to the Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011) published by the Heritage Council, and the National Roads Association (now known as Transport Infrastructure Ireland (TII)) guidance on 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (TII, 2009). Habitats within the surrounding area of the Proposed Development were classified based on views from the Site and satellite imagery where necessary (Google Earth, Digital Globe and OSI). The habitat and flora surveys cover the period considered suitable for such surveys as per the abovementioned guidance (April-October). The surveys also included a search for any rare or protected plant species which may be present at the Site.

11.4.6.2 Invasive Species Surveys

Invasive species surveys were incorporated into the ecological walkovers carried out at the Site. During the ecological walkovers conducted on the 28th of August 2023, the location of invasive species, where they were encountered, was documented on the field map or through the use of GPS in the field, along with the extent of the area they cover. The invasive plant species survey primarily focused on plant species that are listed on Schedule III of the European Communities (Birds and Habitats) Regulations and considered to be 'High impact' invasive species e.g., Japanese Knotweed (*Reynoutria japonica*). Incidental observations of other terrestrial plant species known to be potentially invasive, such as Butterfly Bush (*Buddleja davidii*), were also recorded, where found.

11.4.6.3 Non-volant Mammals Surveys

Mammal surveys of the Site were carried out in conjunction with the habitat and bird surveys. The Site was searched for tracks and signs of non-volant mammals (i.e., mammals which are incapable of flight). Bat surveys were carried out separately and are described below. The habitat types recorded throughout the survey area were used to assist in identifying the fauna considered likely to utilise the area. During this survey, the Site was searched for tracks and signs of mammals as per Bang and Dahlstrom (2001).

11.4.6.4 Bat Surveys

The following should be read in conjunction with the Bat Report, Appendix 11-3, completed by Enviroguide.

11.4.6.4.1 Preliminary Bat Roost Assessment

A daytime inspection of the Site was undertaken on the 28th of August 2023. The aim of the inspection was to search for indication of the presence of roosting bats, and to assess the habitat for its ability to support commuting and foraging bats. Buildings and trees on Site were visually assessed from the ground with the aid of a torch and binoculars. The roost inspection comprised a detailed inspection of structures and trees on Site. These were subject to exterior and interior inspections (where possible) to search for evidence of bat use. This includes live and dead specimens, droppings, feeding remains, oil staining and noise (Collins 2023). Buildings were assessed for cracks and crevices, or entry points to the roof that might support roosting bats, while trees were searched for Potential Roosting Features (PRFs) such as hollow trunks, knot holes, peeling bark, splits, cracks, and crevices (Collins 2023; Andrews 2018). Collins (2023) recommends that structures and trees are assessed for their ability to support roosting bats under separate categorisations using professional judgement and sub-categories as presented in Table 4.1 (Collins, 2023):

- Negligible – No suitable features observed, however, a small element of uncertainty remain;
- Low – A structure with one or more roost features as used by individual bats opportunistically at any time of year;
- Moderate – A structure with one or more roost features that could be used by bats on a regular basis or by a larger number of bats; and
- High – A structure with one or more roost features that are obviously suitable for use by a larger number of bats on a regular basis, and potentially for longer periods of time. These features have the potential to support high conservation status roosts.

Trees are categorized separately accordingly to Table 4.2 of Collins (2023). These classifications are:

- NONE – Either no PRFs in the tree or highly unlikely to be any;
- FAR – Further assessment required to establish if PRFs are present in the tree; and
- PRF – A tree with at least one PRF present.

Where a tree contains at least one PRF, each PRF is further assessed according to Table 6.2 (Collins 2023). PRFs are scored as either:

- PRF-I – PRF is only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats.
- PRF-M – PRF is suitable for multiple bats and may therefore be used by a maternity colony.

For trees with PRF-I’s only, no further surveys may be required, but appropriate compensation for all PRF-Is must be designed and incorporated in advance of impacts along with a Precautionary Working Method Statement (PWMS). As the Site increases in suitability for roosting bats e.g., PRF-Ms present, the survey effort increases accordingly. A PRF-M will require a detailed inspection, such as aerial inspection, conducted over three survey visits, a minimum of three weeks apart, which should be carried out between May and September with at least two in the period May to August. Where features are inaccessible by ladder, climbing, or MEWP, or too extensive for a PRF inspection, the aerial inspection should be replaced with emergence surveys carried out between May and September with Night Vision Aids (NVA) where possible or otherwise surveyed using Advanced Licence Bat Survey Techniques (ALBST), such as trapping, tagging, and radio-tracking to inform of the importance of a roost.

11.4.6.4.2 Preliminary Bat Habitat Suitability Assessment

A Bat Habitat Suitability Assessment was carried out in conjunction with the roost assessment on the 28th of August 2023. This assessment evaluated the habitats present on Site and in the wider area for bat foraging and commuting suitability. Habitat suitability is assessed qualitatively from Negligible to High:

- Negligible – No suitable foraging or commuting habitats on Site
- Low – Suitable but isolated habitats that could be used by small numbers of commuting and/or foraging bats, such as poorly connected gappy hedgerows, lone trees, unvegetated streams, etc.
- Moderate – Suitable continuous habitat connected to the wider landscape that could be used by commuting and/or foraging bats, such as treelines, scrub, grassland, water, etc.
- High – Continuous high-quality habitat that is well-connected to the wider landscape, and is likely used regularly by commuting and/or foraging bats, such as river valleys, broadleaved woodland, woodland edge, grazed parkland, etc.

11.4.6.4.3 Bat Landscape Suitability

The Bat Conservation Ireland Landscape Suitability Model (Lundy *et al*., 2011) provides a habitat suitability index for bat species across Ireland. The model divides the country into 1 km grid squares and ranks the habitat within the squares according to its suitability for various bat species. The scores are divided into five qualitative categories of suitability, namely:

- - 13.000000: Low
- 13.000001 - 21.333300: Low – Medium
- 21.333301 - 28.111099: Medium
- 28.111100 - 36.444401: Medium – High
- 36.444402 - 58.555599: High

11.4.6.4.4 Bat Activity Surveys

The Site was assessed by an experienced ecologist in relation to the potential bat foraging habitat and commuting routes. As a result, activity surveys were undertaken on a monthly basis during the Spring, Summer and Autumn periods to best practice guidance (Collins, 2023 and Marnell et al., 2022) during times of suitable weather conditions. Surveys commenced in September 2023 and ran until August 2024. Survey dates are detailed in Table 11-1 below.

Table 11-1 Bat Activity Survey Effort

Survey Date	Ecologists	Wind (Beaufort)	Precipitation	Temp (°C)
21.09.2023	Ecology Ireland	F3, NW	Dry	11-10
10.10.2023	Ecology Ireland	F3, SW	Dry	15-12
29.04.2024	BMc & TR Enviroguide	F3, S	Dry	9-7
06.06.2024	HR & TR Enviroguide	F2, SW	Dry	12-11
26.06.2024	KM & CRK Enviroguide	F1, SW	Dry	12-9
06.08.2024	BT & YM Enviroguide	F3, SW	Dry	13-11
21.08.2024	TR & BT Enviroguide	F4, SW	Light Showers	15-11

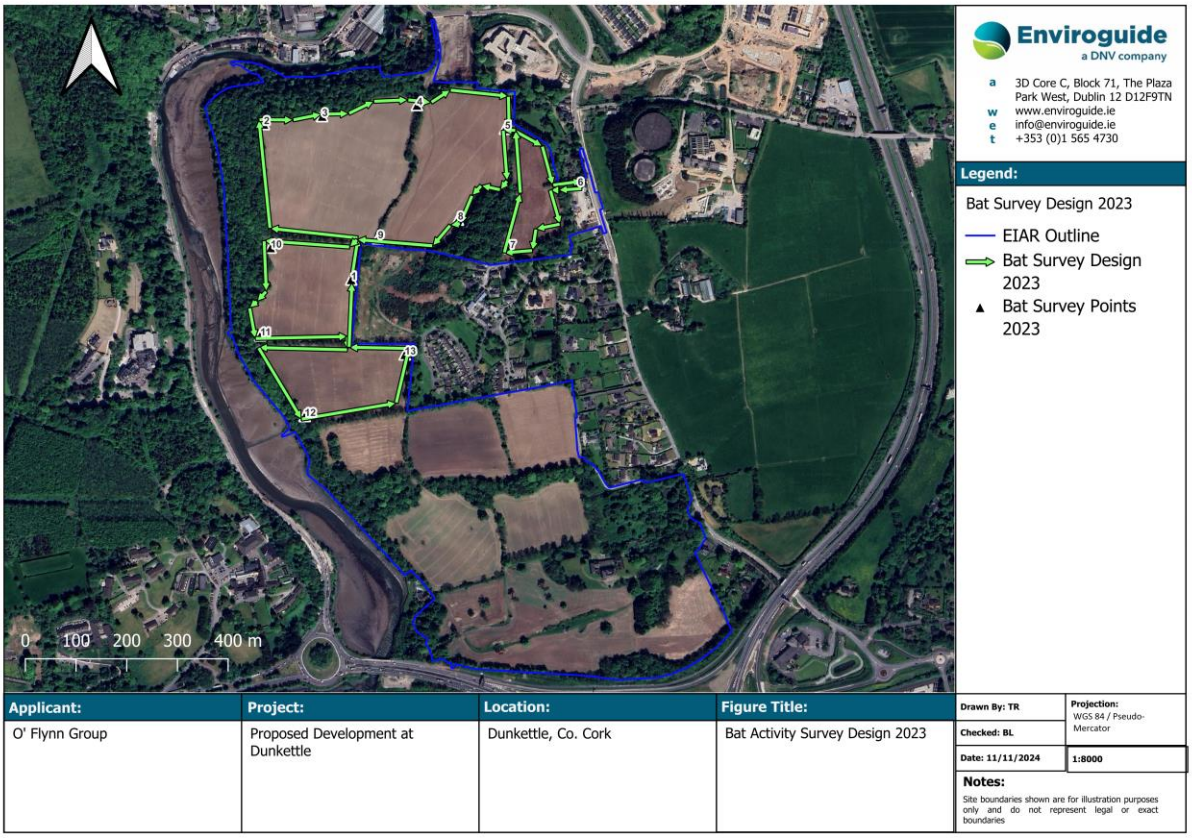


Figure 11-2 Bat Activity Survey Design used in September and October 2023 surveys

Figure 11-3 Bat Activity Survey Design used in the period April to August 2024

11.4.6.5 Otter / Badger Surveys

A mammal survey visit to the Site was made in October 2023, to check for the presence or signs of Otter (*Lutra lutra*) and/or Badger (*Meles meles*) on Site or in the immediate environs. Particular attention was paid to the riparian woodland on the western edge of the Site, bordering the Glashaboy River. Areas of notable potential to support badger (all hedgerows and woodland) were also checked thoroughly and in accordance with best practice guidelines in relation to both species (Harris, Cresswell & Jefferies 1989; NRA (TII) 2005).

11.4.6.6 Bird Surveys

The survey methodology employed was based on that recommended in standard literature used by for example the British Trust for Ornithology (BTO) (Gillings et al, 2007; Bibby et al, 1992 and Gilbert et al, 1998), which has subsequently been adapted into guidelines for ecological consultants by the Bird Survey & Assessment Steering Group. (2022). During the surveys, the Site was walked slowly, approaching all habitat within and adjacent to the Proposed Development and scanning and listening for birds. The locations of birds seen and heard were mapped using standard BTO codes and activity symbols.

Monthly transect surveys were carried out in accordance with guidelines set on by The Bird Survey & Assessment Steering Group (2024). Each transect was divided up into four parts (all a similar distance) and the transect was walked with all species noted at each side of the ecologist. Distance brackets were also used, with the majority of species recorded within 50 meters on each side of the surveyor on each transect. Breeding status was assigned to each species following a full suite of monthly Breeding Bird Surveys which were deemed appropriate for the Site given its location in proximity to high quality habitat (incl. Riparian and Oak Ash Holly Woodland), scale and habitat features in relation to breeding birds.

11.4.6.6.1 Breeding Bird Survey

A general (scoping) bird survey of the Site was carried out during the initial walkover on the 28th of August 2023, with a precautionary approach taken when assessing the likelihood of species recorded at the Site to breed therein. The Site was walked with details of all bird species encountered recorded to assess their behaviour and numbers.

The breeding bird surveys commenced on the mornings of the 30th April, 30th May, 13th June 31st of July, 29th of August and 30th September 2024. Transects were carried out throughout the site to record all the species that were present. A final zig-zag walk through was done at the end of the survey to ensure no additional species were missed, outside the reach of the transects.

- Assess the potential usage of the Site by breeding birds during the breeding season, and;
- To identify any key breeding habitats on Site that may be in use by breeding bird species

The survey methodology has been adapted from the breeding bird survey guidance published by the Bird Survey & Assessment Steering Group (2022) ‘Bird Survey Guidelines for assessing ecological impacts’. The survey consisted of a combination of walked transects of the Site (being walked at a slow, ambling pace, stopping to scan priority habitat/features where appropriate) and vantage point observation from fixed points, as required.

Surveys of the breeding bird community should start between half an hour before sunrise and half an hour after sunrise. Surveys should typically be concluded by around mid-morning (10–11 am, with some regional variation) as activity levels (and hence detectability) of many species will have tailed off.

11.4.6.6.2 Winter Bird Surveys

Monthly visits were made to the Site between October 2023 – March 2024 inclusive in accordance with guidelines set on by the Bird Survey & Assessment Steering Group (2024), to evaluate the significance of the Site as a wintering area for all bird species present. This includes an assessment of the importance of the Site to farmland bird assemblages, wintering flocks of feeding waders, geese, swans and gulls and the monthly visits considered the presence of commuting flocks moving through the Site area. Surveys were carried out by an experienced and competent Ecologist.

11.4.6.7 General Fauna Surveys

The Site was assessed for the presence of fauna other than mammals and birds in conjunction with the habitat surveys undertaken at the Site. The Site was searched for signs of aquatic fauna (incl. amphibians, fish and invertebrates), reptiles and rare/endangered invertebrates, and habitats were assessed for their potential suitability for same.

11.4.7 Ecological Assessment

This Chapter has been undertaken following the methodology set out in Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018); and with reference to the National Roads Authority 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009) and the Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) and BS 42020:2013 Biodiversity: Code of practice for planning and development (BSI, 2013).

The evaluation of significant effects should be based on available scientific evidence. Based on the precautionary principle, if the available information is not sufficient, then a significant effect may be assumed likely to occur.

11.4.7.1 Evaluation of Ecological Features

The value of the ecological features, i.e., the habitats and species present or potentially present, was determined using the ecological evaluation at different geographical scales (NRA, 2009), presented in Appendix 11-2. This evaluation scheme, with values ranging from locally important to internationally important, seeks to provide value ratings for habitats and species present that are considered ecological receptors of impacts that may ensue from a proposal. Based on best practice (CIEEM, 2018), any features considered to be less than of local value are not assessed within this Chapter.

11.4.7.2 Impact Assessment

As per the NRA guidelines, impact assessment is only undertaken of Key Ecological Receptors (KERs). The assessment of the potential impact of the Proposed Development on the identified KERs was carried out with regard to the criteria outlined in the EPA Guideline (EPA, 2022). These guidelines set out a number of parameters that should be considered when determining which elements of the Proposed Development could constitute impact or sources of impacts. These include;

- Positive, neutral or negative effect;
- Significance;
- Extent;
- Probability;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

The impact assessment process considers both direct and indirect impacts: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process, or feature, e.g., the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to an adverse effect of a sensitive habitat.

11.4.7.3 Assessment of Cumulative Impacts and Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a Proposed Development results in individually insignificant impacts that, when considered in combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

Relevant plans and policies were reviewed to identify any potential for negative cumulative impacts with the Proposed Development. Additionally, existing planning permissions from the past five years (from 2018 onwards) within the ZOI of the Proposed Development were reviewed, with particular focus on potential cumulative impacts on the identified KERs. Long-term developments were also considered where applicable.

11.4.7.4 Avoidance, Mitigation, Compensation and Enhancement Measures

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement. When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

It is important for the EcIA to clearly differentiate between avoidance, mitigation, compensation and enhancement and these terms are defined here as follows:

- Avoidance is used where an impact has been avoided, e.g., through changes in scheme design. In practice, avoidance measures are typically implemented during the design stage via discussions and re-design (e.g., avoiding a sensitive habitat by relocating a building). Avoidance measures are therefore rarely reported within an EcIA, which focuses on assessing the final design.

- Mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ.
- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible.
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

11.5 Difficulties Encountered

Every effort has been made to provide a comprehensive description of the site; however, the following specific limitations apply to this assessment:

- An extensive search of available datasets for records of rare and protected species within proximity of the Proposed Development has been undertaken as part of this assessment. However, the records from these datasets do not constitute a complete species list. The absence of species from these datasets does not necessarily confirm an absence of species in the area. The on-Site habitat and species compositions was continually re assessed during all Site visits during 2023 and 2024 throughout the optimum seasons.
- The survey effort of bat activity surveys changed slightly during the bat activity study period. This was due to a change of scope to the developable area during this period. Activity surveys were carried out further south in 2024 and covered a larger area than those carried out in the Autum period of 2023. See Figures 11-3 & 11-4 in Section 11.4.6.4.4 above for comparison of areas covered. Although not seen as a barrier to accurate assessment of the areas use by bats, this should be considered when viewing the results of bat surveys in 2023 compared to those carried out in 2024.

11.6 Baseline Environment

This section sets out the baseline conditions for the ecological features within the Site using the findings of the desk study and field surveys.

11.6.1 Geology, Hydrogeology and Hydrology

Geology, Hydrogeology and Hydrology are described due to their relevance to later assessments and impacts on ecology.

11.6.1.1 Surface Water Body

The Site is located in the Lee, Cork Harbour and Youghal Bay Catchment (ID: 19) and in the Glashaboy[L.Mahon]_SC_010 Sub-catchment (ID: 19_11) (EPA, 2024).

The Glashaboy Estuary (Glashaboy [L. Mahon] river) (ID: IE_SW_060_0800) is located within the north and west boundaries of the Site, flows southwards and ultimately discharges to the Western Celtic Sea (HAs 18;19;20) coastal water body (IE_SW_010_0000) located 19.4km southeast of the Site via the River Lee (ID: IE_SW_060_0750), the Lough Mahon transitional water body (ID: IE_SW_060_0750) and the Cork Harbour coastal water body (ID: IE_SW_060_0000) (EPA, 2024).

The Transitional Waterbody WFD status 2016-2021 of the Glashaboy Estuary (Glashaboy [L. Mahon] river) is Bad. In addition, the Transitional Waterbodies Risk 2013-2018 of the river has been projected to be At Risk of not achieving their WFD objectives. The EPA data indicates that there is an upward trend in Chlorophyll and Dissolved Inorganic Nitrogen (as N) for the water body for the period 2013-2018 (EPA, 2024).

11.6.1.2 Groundwater Body

The Site of the Proposed Development is situated on the Ballinhassig East (ID: IE_SW_G_004) groundwater body. The bedrock aquifer identified beneath the Site is mapped as “Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones” (LI) (GSI, 2024).

The Groundwater Vulnerability Rating of the Site is mapped as “Extreme” (E) or “High” (H) beneath the majority of the Site, and a portion of the west and east areas of the Site is mapped as “Rock at or near Surface or Karst” (X) (GSI, 2022).

SoilsThe soil beneath the majority of the Site is mapped as “Acid Brown Earths, Brown Podzolics” (AminDW) while the soil beneath the majority of the Site is mapped as “Shallow well drained mineral soil” (AminSW) (GSI, 2024). Both soil types are derived from mainly acidic parent materials.

The quaternary sediments beneath the majority of the Site and the east portion/west boundary of the Site are mapped as Till derived from Devonian sandstones (TDSs) and Bedrock outcrop or subcrop (Rck). As well, the subsoils beneath the majority of the Site and the east portion/west boundary of the Site are mapped as Sandstone till (Devonian) (TDSs) and Bedrock at Surface (Rck), respectively (GSI, 2024).

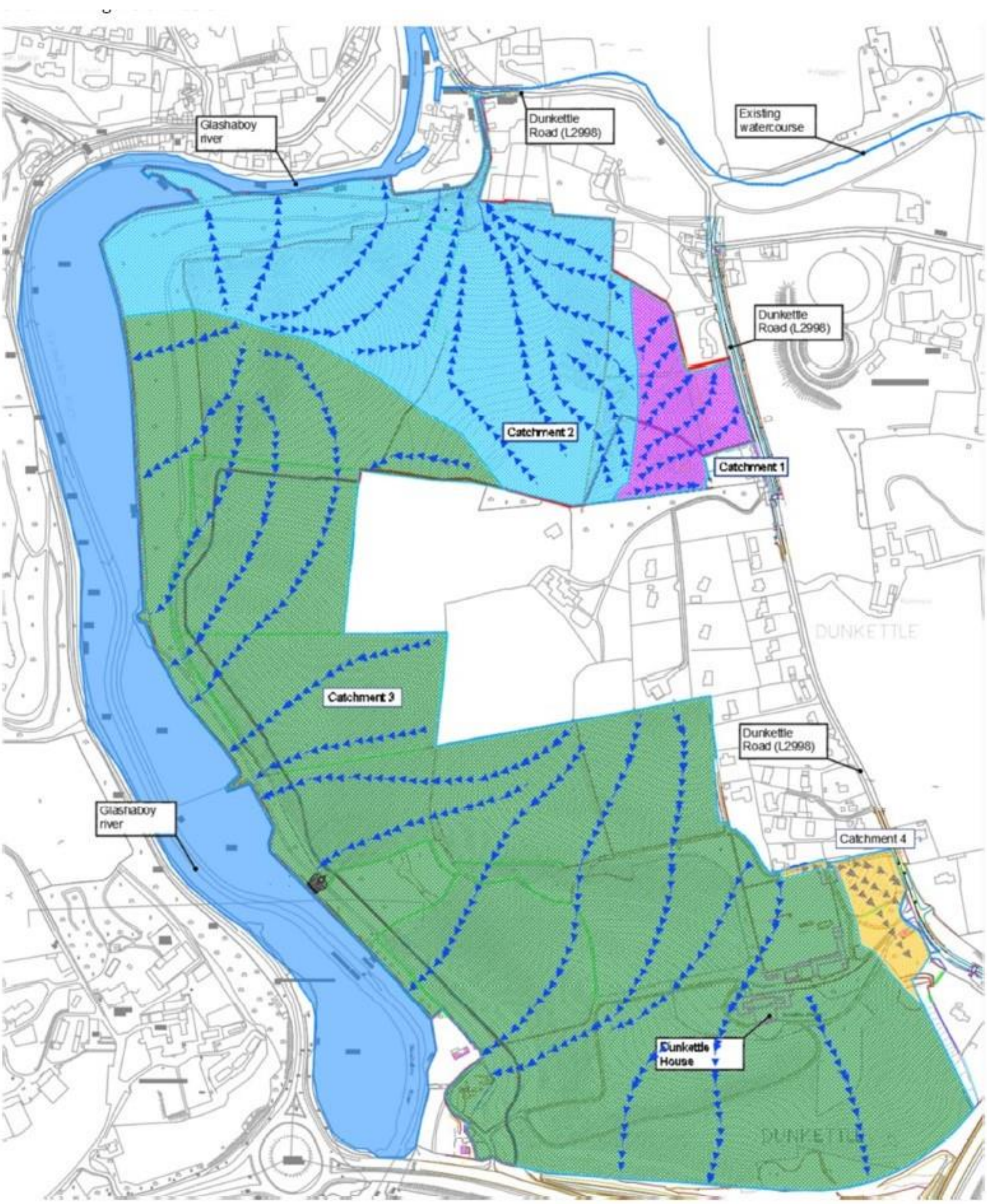


Figure 11-4 Showing the topography of the overall landholding and Proposed Development (Black Outline North and West) with three mini-catchments (JODA 2024)

The EPA water quality monitoring data for the stations on the Glashaboy Estuary located closest to the Site is summarised in **Error! Reference source not found.**. The reported Q-value results indicate that water quality in the Glashaboy Estuary in the vicinity of the Site is good.

Table 11-2 EPA monitoring stations and assigned Q values (2021)

EPA Monitoring Station name	Station Code	Location from Site	Distance from Site	Assigned Q value
LE220 - Glashaboy Estuary, Dunkettle Bridge	TW05003158LE3002	West	40m	Good
Glashaboy Estuary - WFD Reporting Station	TW05003158LE3004	West	110m	Good
LE310 - Upper Lough Mahon (Lee Tunnel)	TW05003157LE4001	Southeast	900m	Bad

Table 11-3 WFD Risk and Water Body Status (EPA< 2016-2021)

Waterbody Name	Water body; EU code	Location from Site	Distance from Site (km)	WFD water body status (2016-2021)	WFD 3rd cycle Risk Status	Hydraulic Connection to the Site
Transitional Water Bodies						
Glashaboy Estuary	IE_SW_060_0800	West	Adjacent	Bad	At Risk	Adjacent
Lough Mahon	IE_SW_060_0750	South	90m	Moderate	At Risk	Downstream of the Glashaboy Estuary
Coastal Water Bodies						
Cork Harbour	IE_SW_060_0000	Southeast	8.5 km	Moderate	At Risk	Downstream of Lough Mahon
Groundwater Bodies						
Ballinhassig East Groundwater Body	IE_SW_G_004	N/A	N/A	Good	Not at Risk	Underlying groundwater-body

11.6.2 Designated Sites

All European sites potentially linked to the Proposed Development have been identified and fully assessed in the AA Screening Report (Stage 1 AA) and subsequent Natura Impact Statement (NIS) (Stage 2 AA) accompanying this submission under separate cover. A summary of the AA conclusions is given below.

Other nationally or internationally designated sites potentially linked to the Proposed Development are identified in Section 11.6.2.3 below.

11.6.2.1 European sites – Appropriate Assessment

An AA has been completed (Stage 1; Screening and Stage 2; NIS) for the Proposed Project which identified any potential S-P-R links to designated European Sites. Following completion of the Stage 1 Screening for AA, some certainty still existed as to the potential impacts of the Proposed Development on the Cork Harbour SPA (004030) and an NIS will be prepared under separate cover. The following has been extracted from the NIS Report prepared for this Proposal:

"This NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of the Proposed Development on lands at Dunkettle, Co. Cork, on the following European site:

- Cork Harbour SPA (004030).

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

Where potentially significant effects were identified, a range of mitigation and avoidance measures have been suggested to avoid them. This NIS has concluded that, once the avoidance and mitigation measures are implemented as proposed, the Proposed Development will not have an adverse effect on the integrity of the above European site, individually or in combination with other plans and projects. Where applicable, a suite of monitoring surveys have been proposed to confirm the efficacy of said measures in relation to ensuring no adverse impacts on the habitats of the relevant European sites have occurred.

As a result of the complete, precise, and definitive findings of this NIS, it has been concluded, beyond reasonable scientific doubt, that the Proposed Development will have no significant adverse effects on the QIs, SCIs and on the integrity and extent of Cork Harbour SPA (004030). Accordingly, the Proposed Development will not adversely affect the integrity of any relevant European site."

11.6.2.2 National and International Designated Sites

Cork Harbour SPA mentioned in Section 11.6.2.1 above is of International Importance and is overlapped by Nationally Important Sites namely Dunkettle Shore pNHA (001082), Douglas River Estuary pNHA and Great Island Channel pNHA (001058). The Internationally Important Cork Harbour Ramsar Site (837), designated for its importance for migratory waterbird species also overlaps Cork Harbour SPA.

11.6.2.3 Relevant Designated Sites

A designated site will only be at risk from likely significant effects where an S-P-R link of note exists between the Proposed Development and the designated site. All designated sites considered as part of the S-P-R method.

Those sites with notable S-P-R links to the Proposed Development are assessed further in this report as KERs of 'National Importance' (pNHAs and NHAs) or 'International Importance' (SACs/SPAs, UNESCO sites, Ramsar sites, etc.).

In conclusion, the desk study determined that there is a total of one SPA and three pNHAs within the ZOI of the Proposed Development Site as listed below.

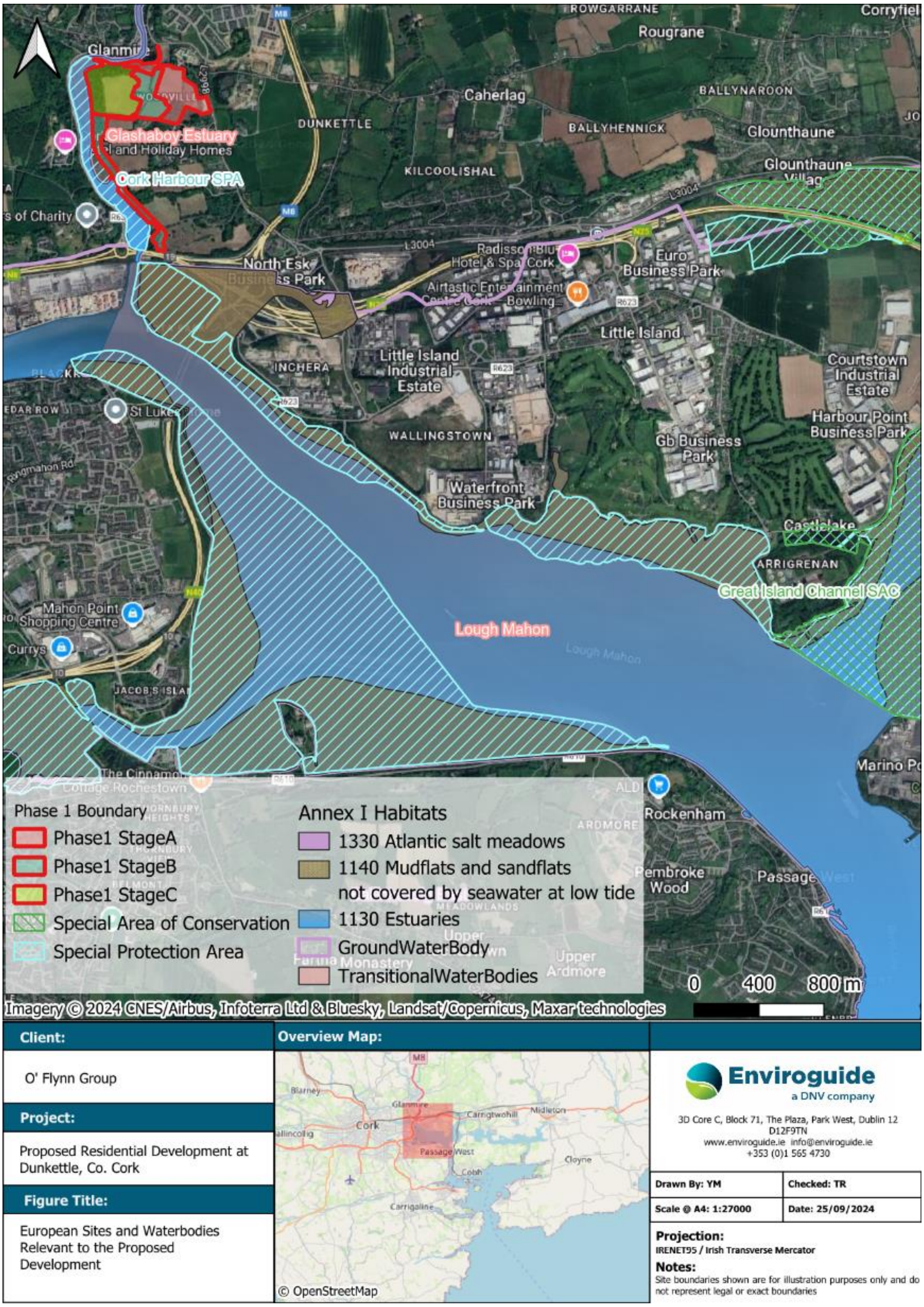
- Cork Harbour SPA.
- Glanmire Wood pNHA.
- Dunkettle Shore pNHA.

- Douglas River Estuary pNHA.

Table 11-4 Showing a complete list of designated sites which have been considered with the source-pathway-receptor (s-p-r) method to establish notable links between the sources of effects arising from the Proposed Development, and any relevant designated sites. Those sites with notable s-p-r links that are further assessed in this report are highlighted in green (if any)

Site Name & Site Code	Qualifying Interests (*= priority habitats)	Potential Pathways
	Special Protection Areas (SPAs)	
Cork Harbour SPA (004030)	**As per NPWS (2014a) - SCI Species** - Little Grebe (Tachybaptus ruficollis) [A004] - Great Crested Grebe (Podiceps cristatus) [A005] - Cormorant (Phalacrocorax carbo) [A017] - Grey Heron (Ardea cinerea) [A028] - Shelduck (Tadorna tadorna) [A048] - Wigeon (Anas penelope) [A050] - Teal (Anas crecca) [A052] - Pintail (Anas acuta) [A054] - Shoveler (Anas clypeata) [A056] - Red-breasted Merganser (Mergus serrator) [A069] - Oystercatcher (Haematopus ostralegus) [A130] - Golden Plover (Pluvialis apricaria) [A140] - Grey Plover (Pluvialis squatarola) [A141] - Lapwing (Vanellus vanellus) [A142] - Dunlin (Calidris alpina) [A149] - Black-tailed Godwit (Limosa limosa) [A156] - Bar-tailed Godwit (Limosa lapponica) [A157] - Curlew (Numenius arquata) [A160] - Redshank (Tringa totanus) [A162] - Black-headed Gull (Chroicocephalus ridibundus) [A179] - Common Gull (Larus canus) [A182] - Lesser Black-backed Gull (Larus fuscus) [A183] - Common Tern (Sterna hirundo) [A193] - Wetland and Waterbirds [A999] **Additional species as per SDF update 2021** - Mallard (Anas platyrhynchos) [A053] - Gadwall (Anas strepera) [A051] - Turnstone (Arenaria interpres) [A169] - Common Pochard (Aythya ferina) [A059] - Tufted Duck (Aythya fuligula) [A061] - Goldeneye (Bucephala clangula) [A067] - Red Knot (Calidris canutus) [A143] - Common Ringed Plover (Charadrius hiaticula) [A137] - Whooper Swan (Cygnus cygnus) [A038] - Coot (Fulica atra) [A125] - Black-Headed Gull (Larus ridibundus) [A179] - Greenshank (Tringa nebularia) [A164]	**Linear Distance to Proposed Development - 0km West, (directly adjoining)** **Direct/indirect air/land pathways** to SCI bird species due to the Site directly adjoining the SPA or adjacent lands as a significant ex-situ site. **Direct/indirect hydrological/hydrogeological pathway** precautionarily envisaged, much as the result of the geotechnical site investigation showing no encounter groundwater flow in the Site and the proposed surface water/wastewater treatment system.

	Relevant Annex I Habitats within the SPA - Estuaries [1130]:Linear Distance to Proposed Development: 0km W - Mudflats and sandflats not covered by seawater at low tide [1140]: - Linear Distance to Proposed Development: 0.44km S - Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]:	
	Natural Heritage Areas (NHAs)	
	There are no Natural Heritage Areas within the zone of influence of the Proposed Development or with a potential pathway to the Proposed Development.	
	Proposed Natural Heritage Areas (pNHAs)	
Glanmire Wood pNHA (001054)	There are no formal qualifying interests listed for proposed Natural Heritage Areas. A general site synopsis is available for most sites on the NPWS website: https://www.npws.ie/sites/default/files/general/pNHA_Site_Synopsis_Portfolio.pdf	0km west (adjacent)
Dunkettle Shore pNHA (001082)	There are no formal qualifying interests listed for proposed Natural Heritage Areas. A general site synopsis is available for most sites on the NPWS website: https://www.npws.ie/sites/default/files/general/pNHA_Site_Synopsis_Portfolio.pdf	75m south



Client: O' Flynn Group

Project: Proposed Residential Development at Dunkettle, Co. Cork

Figure Title: European Sites and Waterbodies Relevant to the Proposed Development

3D Core C, Block 71, The Plaza, Park West, Dublin 12
D12F9TN
www.enviroguide.ie info@enviroguide.ie
+353 (0)1 565 4730

Drawn By: YM	Checked: TR
Scale @ A4: 1:27000	Date: 25/09/2024

Projection: IRENET95 / Irish Transverse Mercator

Notes: Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 11-5 Location of European sites relative to the Proposed Development (all remaining European sites are located >12km away with no S-P-R link).

11.6.3 Habitats

The habitats present within the Site, as recorded in the survey area during the field surveys, are described in this Section and summarised below. Site photographs of these habitats are included after each habitat Section and a map of the habitats is presented in Figure 11-6 below, while invasive plant species are mapped in Figure 11-7.

The combined results of the field surveys and the desktop study of satellite imagery showed that the dominant habitat type within the Site is Arable Crops (BC1), with an area of Riparian Woodland (WN5) and Oak Birch Holly Woodland (WN1) (Glanmire Wood pNHA) running the entire length of the western boundary and halfway across the northern edge of the Site. Oak Birch Holly Woodland is also present on the southeast side of the northern Section of the Site, surrounded by Horticultural Land (BC2).

Ground species present in the GS2 habitat include Broad-leaved Dock (*Rumex obtusifolius*), Creeping Buttercup (*Ranunculus repens*), Lesser Trefoil (*Trifolium dubium*), Bird's Foot Trefoil (*Lotus corniculatus*), Clover (*Trifolium repens*), Daisy (*Bellis perennis*), Common Valerian (*Valeriana officinalis*), Vetch (*Vicia sativa*), Bramble (*Rubus fructicosus*), Silverweed (*Potentilla anserina*), Willowherb (*Chamaenerion angustifolium*), Ground Ivy (*Glechoma hederacea*), and various grass species, but predominantly Perennial Ryegrass (*Lolium perenne*).

No rare or protected plant species were observed during the ecological walkovers. Adjacent and linked habitats are discussed in Section 11.6.3.13 below.

Applicant:	Project:	Location:	Figure Title:
O' Flynn Group	Proposed Development at Dunkettle, Co. Cork	Dunkettle, Co. Cork	Habitat Map

Drawn By: TR Checked: BL	Projection: IRENET95 / Irish Transverse Mercator
Date: 05/11/2024	Scale @ A4: 10000

Notes:
Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 11-6 Habitat Map

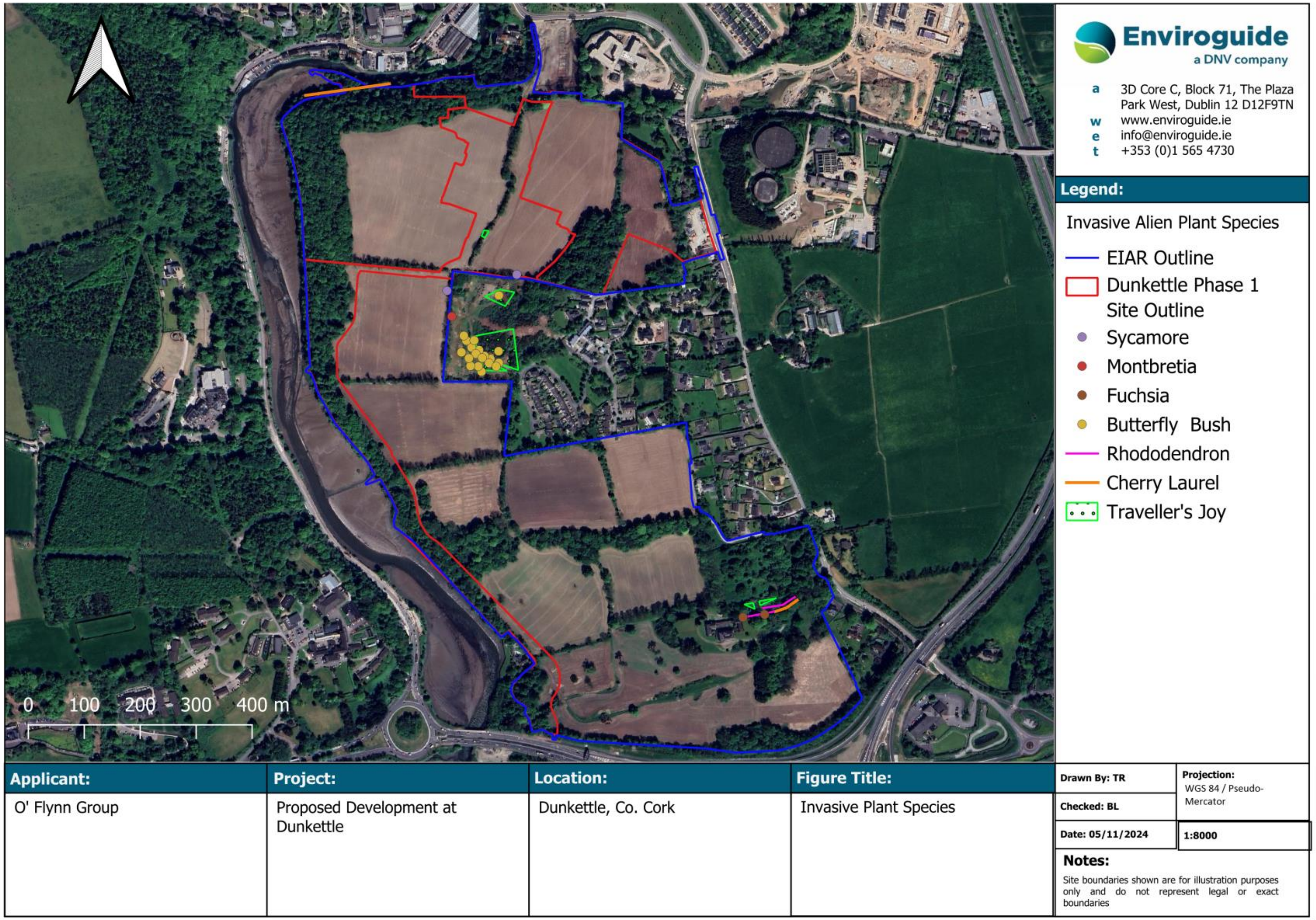


Figure 11-7 Invasive Alien Species

11.6.3.1 WN5 - Riparian Woodland

Riparian Woodland is located on the western side of the Site (Figure 11-8). This area forms part of Glanmire Wood pNHA which has a total area of 10 ha. and is considered an ancient woodland. This habitat occurs on the edge of the Cork Harbour SPA and separates the Proposed Development from the SPA at the west and north. Saltmarsh habitat borders the woodland on the western side, off-Site. The woodland is dominated by Oak, with Beech also present in smaller numbers throughout. The understorey has historically supported species suggesting ancient woodland namely Wood Fescue (*Festuca altissima*) and Wood Millet Grass (*Milium effusum)* (Goodwillie, 1986).

The woodland has the potential to support a range of fauna and insect life including bats, small mammals such as Pine Marten (*Martes martes*), Red Squirrel (*Sciurus vulgaris*) and Badger and bird species ranging from a variety of passerines including Treecreeper (*Certhia familiaris*) to larger raptors such as Buzzard (*Buteo buteo*) and Sparrowhawk (*Accipiter nisus*). Although the woodland has shown signs of alteration and tree removal in the past (Goodwillie, 1986) the area remains largely undisturbed and acts as a valuable refuge for wildlife locally and owing to the very low abundance of such habitats remaining in Ireland, is of **National Importance**.

Figure 11-8 Example of Riparian Woodland (Wn5)(September 2024)

11.6.3.2 WN1 – Oak Birch Holly Woodland

Oak Birch Holly Woodland is located both adjoining the Riparian Woodland mentioned above at the northern edge of the Site, and in an isolated pocket to the southeast of the northern section of the Site. The total area is c.4.3 ha. The wooded areas provide ample supports for local wildlife and is assed as being of **County Importance.**

Figure 11-9 Oak Birch Holly Woodland (WN1)

11.6.3.3 WL2 - Treelines

Treeline habitat intersperses the Site and provides connectivity for wildlife between the wooded areas and the surrounding landscape. Tree species present include Ash, Sycamore, Willow, Beech and An example of the treeline present within the Site is shown below (Figure 11-10). The Cork County Biodiversity Action Plan (202109-202614) highlights the importance of woodlands, trees and hedges as wildlife corridors. As a result, this habitat has been assessed to be of **Regional/County Importance**. It is noted that this habitat is being largely retained, apart from the planned removal of one north/south treeline in the centre of the Site area. A small number of trees are also scheduled for removal due to condition and to facilitate necessary greenspace and walkways as part of the Proposed Development.

Figure 11-10 Example of Treelines on Site (WL2) (August 2023).

11.6.3.4 BC1 – Arable Crops

The majority of the land use on Site is comprised of Arable Crops. High inputs typically associated with intensive agriculture are evident within this habitat with crops including Oats, Barley and Beans present at varying periods of the year. The habitat is of **local importance** to a variety of species including birds.

Figure 11-11 Example of Arable Crops on Site (BC1) (August 2023)

11.6.3.5 BC2 - Horticultural Land

Horticultural Land is present alongside Arable fields within the main landholding of the Site. The habitat is of **local importance** to a variety of species including birds.

Figure 11-12 Example of Horticultural Habitation Site (BC2) (August 2023).

11.6.3.6 BL3 – Buildings and Artificial Surfaces

Dunkettle House is surrounded by an artificial gravel surface and three buildings were identified during the preliminary ecological appraisal of the Site in August 2023. Two of these building are classed as having moderate roosting potential for bats (Collins, 2023). The building could also potentially be used by common cavity dwelling bird species during the breeding season. This habitat is classed as being of **local importance to** bats and birds.

Figure 11-13 Example of Buildings and Artificial Surfaces on Site (BL3) (August 2023)

11.6.3.7 ED2 – Spoil and Bare Ground

A limited area of spoil and bare ground habitat was identified adjacent to the Site boundary, off-Site. This habitat is of **negligible** ecological importance locally.

Figure 11-14 Example of Spoil and Bare Ground on Site (ED2) (August 2023)

11.6.3.8 ED3 - Recolonising Bare Ground

A limited area of spoil and bare ground habitat was identified adjacent to the Site boundary, off-Site. This habitat is of **negligible** ecological importance locally.

Figure 11-15 Example of Recolonising Bare Ground on Site (ED3) (August 2023)

11.6.3.9 GA2 – Amenity Grassland

Amenity Grassland surrounds Dunkettle House and areas extending further southwest. This habitat is of relatively low ecological significance due to low flora species diversity. It could support wildlife such as foraging birds and small mammals. This habitat is of **local importance.**

Figure 11-16 Example of Amenity Grassland on Site (GA2) (August 2023)

11.6.3.10GS2 – Dry Meadows

Dry Meadows were identified north of Dunkettle House and to the northeast of the landholding. This habitat is capable of supporting resting amphibians, small mammals and local breeding birds and is of **local importance.**

Figure 11-17 Example of Dry Meadows on Site (GS2) (August 2023)

11.6.3.11WD5 – Scattered Tress and Parkland

Tree species observed within the treelines that bound the field margins that make up the Site include Ash (*Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*), and Oak (*Quercus sp.*) with some Birch (*Betula pendula*), Willow (*Salix spp.*) and Holly (*Ilex aquifolium*) interspersed.

Figure 11-18 Example of Scattered Trees and Parkland on Site (WD5) (August 2023)

An area bordering The Beeches housing estate, to the east of the landholding was found to contain this habitat type, which can provide foraging and breeding opportunities for local wildlife including birds, small mammals, invertebrates and bats. This habitat is given **local importance**.

11.6.3.12WS1 – Scrub

There were large areas of Scrub in the field adjacent to 'The Beeches' housing estate which comprised some IAS species, Gorse (*Ulex europaeus*), and Bramble (*Rubus fructicosus*). In addition, Scrub was common within the woodland areas of the Site and there is the potential for the Site to be used by small mammal species, particularly along the Site margins which is considered likely to provide suitable commuting and foraging habitat for small mammals such as Hedgehog and Pygmy Shrew. This habitat is of **local importance.**

Figure 11-19 Example of Scrub on Site (WS1) (August 2023)

11.6.3.13 Adjacent and Linked Habitats

Cork Harbour SPA is located to the west of the Site and is directly adjacent to the Riparian Woodland on Site. The SPA is important for a wide range of bird species and is of International Importance as a bird refuge during the winter months and forms part of the Cork Harbour Ramsar Site. The section that abuts the Site, the Glashaboy River Estuary Transitional Waterbody, is located at the northern edge of Cork Harbour SPA (004030). Both sides of the Glashaboy estuary are heavily wooded, the eastern side being the Site of the Proposed Development.

The Glashaboy Estuary beside the Site is intertidal and is fed by freshwater flowing southwards through Glanmire. The Glashaboy Estuary was found to support three fish species when sampled by Inland Fisheries Ireland (2010). Namely Sand Goby (*Pomatoschistus minutus*) which was most abundant, followed by Thick-lipped Grey Mullet (*Chelon labrosus*) and Flounder (*Paralichthys dentatus*). The estuary was found to be predominantly composed of a thin layer of mud covering a mix of gravel and stones.

Further downstream of the Glashaboy Estuary there are pockets of Annex 1 habitats including 1140 ‘Mudflats and sandflats’ (c.75m linear distance) and 1330 ‘Atlantic salt meadows’ (*Glauco-Puccinellietalia maritimae*) (c.900m linear distance), both within Dunkettle Shore pNHA, which is hydrologically connected to the adjacent estuary waters.

11.6.4 Species and Species Groups

11.6.4.1 Flora

11.6.4.1.1 Rare and Protected Flora

The Site of the Proposed Development is located within the Ordnance Survey 10km Grid Square (W77), 2km Grid Square (W77G) and 1km Grid Squares W7273 and W7373. Species records from the NBDC online database were studied for the presence of rare and/or protected species within the last 20 years. This database contained no records of protected flora within the last 20 years. Similarly, no rare or protected floral species were recorded during the Site visits.

11.6.4.1.2 Invasive Species

11.6.4.1.2.1 Desk Study results

There are records for six species of flora considered to be invasive within the grid squares which encompass the Site of the Proposed Development. Details of these records are listed in Table 11-5 below.

Table 11-5 Records of invasive species of flowering plant for the surrounding 2km (W77G) grid squares associated with the Site from the NBDC.

Species	Grid square	Date of last record	Source	Designations
Bohemian Knotweed (Fallopia japonica x sachalinensis = F. x bohemica)	W77G	27/08/2014	National Invasive Species Database	High Impact Invasive Species (Third Schedule SI. 477 of 2011)
Giant Hogweed (Heracleum mantegazzianum)	W77G	07/10/2014	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species (Third Schedule SI. 477 of 2011)
Japanese Knotweed (Fallopia japonica)	W77G	24/05/2023	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	High Impact Invasive Species (Third Schedule SI. 477 of 2011)
Himalayan Honeysuckle (Leycesteria formosa)	W77G	15/11/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species
Traveller's-joy (Clematis vitalba)	W77G	15/11/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species

Species	Grid square	Date of last record	Source	Designations
Himalayan Knotweed *(Persicaria wallichii)*	W77G	15/11/2016	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Medium Impact Invasive Species (Third Schedule SI. 477 of 2011)

Of the six invasive plant species that were recorded, four are listed in Schedule III of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011).

Bohemian Knotweed *(Fallopia japonica x sachalinensis)* was recorded in 2014, at the opposite edge of the Glashaboy Estuary bordering Dunkettle Road c.70m west of the Site boundary.

Giant Hogweed (*Heracleum mantegazzianum*) was also recorded in 2014 c. 400m west of the Site.

The nearest recorded instance of **Japanese Knotweed** is c. 500m east of the Site, bordering the M8 motorway, north of the Dunkettle intersection.

Himalayan Knotweed was recorded c. 100m west of the Site in 2016 at the opposite edge of the Glashaboy Estuary bordering Dunkettle Road.

11.6.4.1.2.2 Field Study Results

A total of six invasive plant species were recorded on Site and are listed below. Locations of all invasive species are mapped for reference in Figure 11-7, Section 11.6.3 above.

Field surveys carried out in August 2023 also recorded a number of invasive species within the landholding of the applicant, (O'Flynn Group) off Site. These include those listed below;

- **Cherry Laurel** (*Prunus laurocerasus*) - High Impact Invasive (Third Schedule, SI. 477)– c. 470m east of Phase 1 Site boundary in the surrounds of Dunkettle House. It has been established also, that Cherry Laurel is present in areas within Glanmire Wood pNHA, at the northern edge of the Site bordering the Glashaboy Estuary and Cork Harbour SPA.
- **Rhododendron** (*Rhododendron ponticum*) - High Impact Invasive (Third Schedule, SI. 477)– c. 470m east of Phase 1 Site boundary in the surrounds of Dunkettle House.
- **Sycamore (***Acer pseudoplatanus***) -** Medium Impact Invasive Species. Located on treelines and in scattered areas of the woodland edges on Site.
- **Travellers Joy** (*Clematis vitalba*) – Medium Impact Invasive – c. 30m south of Site boundary and also c. 470m east of Phase 1 Site boundary in the surrounds of Dunkettle House.
- **Butterfly Bush** (*Buddleja davidii*) - Medium Impact Invasive – Dominant East of the EIAR boundary (adjoining existing housing development).
- **Montbretia (***Crocosmia x crocosmiiflora)* – Medium Impact Invasive. Present on the north-eastern treeline in one isolated area.

11.6.4.2 Non-volant Mammals (excl. bats)

11.6.4.2.1 Desk Study Results

Records for terrestrial mammals were obtained from the NBDC online database. Table 11-6 lists these species, their date of last record and summarises their protected status/designation. A total of six native terrestrial mammals were recorded within the 2km grid square associated with the Site.

Table 11-6 Records of terrestrial mammals (Native and Non-native) for the surrounding 2km Grid square associated with the Site (NBDC)

Species	Grid square	Date of last record	Source	Designations
Native Species				
Bank Vole (Myodes glareolus)	W77G	17/05/2017	Mammals of Ireland 2016-2025	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
Brown Rat (Rattus norvegicus)	W77G	26/11/2016	Mammals of Ireland 2016-2025	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Eurasian Red Squirrel (Sciurus vulgaris)	W77G	25/04/2022	Mammals of Ireland 2016-2025	Protected Species: Wildlife Acts
European Otter (Lutra lutra)	W77G	16/10/2017	Mammals of Ireland 2016-2025	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
European Rabbit (Oryctolagus cuniculus)	W77G	23/05/2016	Mammals of Ireland 2016-2025	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
Red Fox (Vulpes vulpes)	W77G	13/06/2011	Road Kill Survey	
West European Hedgehog (Erinaceus europaeus)	W77G	30/06/2022	Hedgehogs of Ireland	Protected Species: Wildlife Acts
Wood Mouse (Apodemus sylvaticus)	W77G	29/07/2011	Atlas of Mammals in Ireland 2010-2015	

Invasive Non-Native Species				
American Mink (Mustela vison)	W77G	04/02/2016	Mammals of Ireland 2016-2025	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> High Impact Invasive Species || Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)

11.6.4.2.2 Field Survey Results

General Fauna Evaluation

The Site could potentially support resident and regularly occurring and locally important populations of some of the smaller native mammals, such as Hare, Hedgehog, Irish Stoat and Pygmy Shrew. These species are less likely to be recorded during walkover surveys due to their timid behaviours and small size, however some areas of the Site such as the western and northeast areas of woodland, higher sward grasses, and treeline habitat intersecting the Site provide potentially sufficient suitable habitats for these species.

During the ecological walkovers the Site was checked for any evidence of fauna presence/activity on Site.Red Squirrel (Sciurus vulgaris) was recorded on two occasions as an incidental observation during winter bird surveys on the 15th of November 2023 and the 16th of January 2024. No evidence of badger activity was observed. There were some mammal trails traversing the Site which could be used by Fox (*Vulpes vulpes*). Although a local domestic cat was observed using the Site to hunt on several occasions. Fox was heard and observed on the 11th of May 2023 prior to the commencement of a bat emergence survey within the southwestern corner of the Site boundary.

Droppings of European Rabbit (*Oryctolagus cuniculus*) were observed in February 2023, and were largely concentrated to the north and west of the Site.

Other, smaller mammals such as Hedgehog (*Erinaceous europaeus*), Stoat (*Mustela erminea*) and Pygmy Shrew (*Sorex minutus*) were not observed, although it is considered that the treeline habitat along the Site margins could provide potentially suitable shelter/commuting habitat for these species.

11.6.4.3 Bats

11.6.4.3.1 Desk Study Results

A total of six bat species have been recorded within the 2km (W77G) grid square which encompasses the Site and are detailed in Table 11-7 below.

Table 11-7 Records of bats for the surrounding 2km Grid square (W77G) which encompasses the Site (NBDC)

Species	Date of last record	Database	Designation
Brown Long-eared Bat (Plecotus auritus)	09/06/2005	National Bat Database of Ireland	▪ EU Habitats Directive Annex IV ▪ WildlifE Act 1976 (as amended)
Common Pipistrelle (Pipistrellus pipistrellus sensu stricto)	31/12/2011	National Bat Database of Ireland	▪ EU Habitats Directive Annex IV ▪ WildlifE Act 1976 (as amended)
Lesser Noctule (Nyctalus leisleri)	31/12/2011	National Bat Database of Ireland	▪ EU Habitats Directive Annex IV ▪ WildlifE Act 1976 (as amended)
Natterer's Bat (Myotis nattereri)	09/06/2005	National Bat Database of Ireland	▪ EU Habitats Directive Annex IV ▪ WildlifE Act 1976 (as amended)
Pipistrelle (Pipistrellus pipistrellus sensu lato)	31/12/2011	National Bat Database of Ireland	▪ EU Habitats Directive Annex IV ▪ WildlifE Act 1976 (as amended)
Soprano Pipistrelle (Pipistrellus pygmaeus)	31/12/2011	National Bat Database of Ireland	▪ EU Habitats Directive Annex IV ▪ WildlifE Act 1976 (as amended)

11.6.4.3.2 Field Survey Results

11.6.4.3.2.1 Bat Roost Assessment and Habitat Suitability

During the Site visit in August 2023, a preliminary bat roost assessment was conducted on all trees and buildings within the Site. No evidence of bats was detected on Site and the trees proposed for removal or significant alteration present were assessed as having *negligible* value for roosting bats (Collins, 2023). No evidence of roosting bats was present, nor were any significant gaps or cracks evident on the trees capable of supporting roosting bats.

During the initial Site walkover survey, eight trees (8 no.) were assessed as having potential roost features (PRF's) within the overall EIAR area. As all trees are to be retained as part of the Proposed Development, no bat emergence surveys were carried out due to the planned retention of said trees. A detailed examination of the planned tree removal plan as prepared by DMNA Architects (2024) was carried out prior to drafting this assessment report and no further surveys were deemed necessary to assess the likely effects of the Proposed Works on roosting bats.

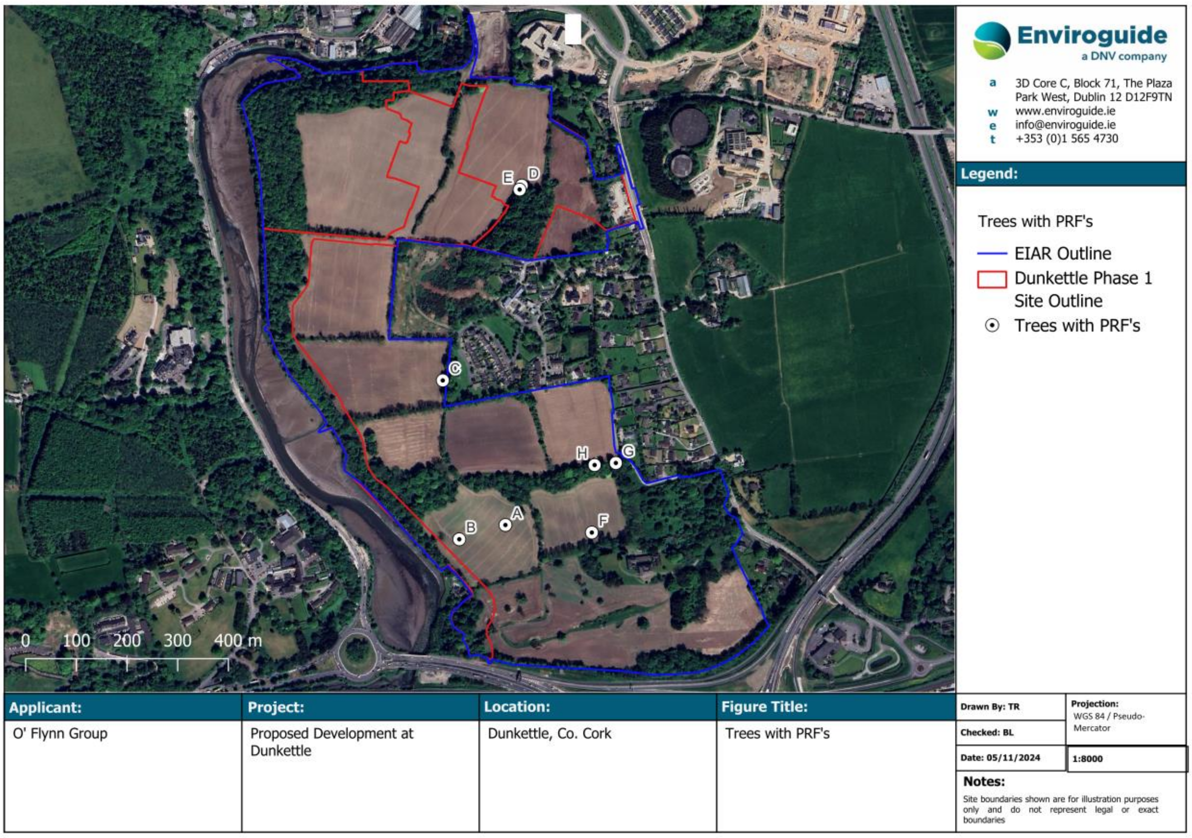


Figure 11-20 Trees with PRF'S

The buildings adjoining Dunkettle house were considered as part of this assessment and were found to have moderate bat roosting potential during the initial preliminary ecological appraisal. Details of all PRF’s are included in the Bat Report (Appendix 11.3).

Figure 11-21 Buildings where preliminary bat roost assessment was undertaken in August 2023. Located within the surrounds of Dunkettle House, east of the Phase 1 area and within the southeastern section of the applicant's landholding.

11.6.4.3.2.2 Bat Habitat Suitability Assessment Survey

The habitats present on Site were also assessed for their potential to provide suitable features which could be used by commuting and foraging bat species which may be present in the area. The dominant habitat types on Site were ancient riparian and oak birch holly woodland, arable crops, horticultural crops and treelines. The overall landholding as well as habitats within the Phase 1 Site boundary are classed as **High** suitability for foraging and commuting bats (Collins, 2023).

11.6.4.3.2.3 Bat Habitat Suitability Evaluation

The presence of natural and semi-natural habitats on Site and on the edges are considered important to bats in a local context both for foraging and commuting. Roosting features are also present on-Site and are likely to be present within the ancient riparian and oak ash holly woodland areas of the Site in areas out of view from ground level. Due to the nature of the Proposed Development, areas of high importance for local bat species are almost entirely retained and will remain intact during the construction and operational phases of the Proposed Development, however the design of the Proposed Development in line with best practice and with adequate cognisance of nocturnal wildlife (including bats) will be important to the integrity of the current suitable habitat/ landscape.

11.6.4.3.2.4 Bat Activity Survey Results

Enviroguide bat surveys conducted in 2023/2024 detected five specific bat species using the Site and overall landholding, including Leisler's bat and Common, Soprano and Nathusius Pipistrelle, Brown Long-eared bat. Numerous registrations were also recorded for Myotis species also, which cannot readily be identified to species level. Roosting behaviour was recorded during August 2024 surveys, in the vicinity of Beech and Sycamore trees, outside of the phase 1 Site to the southeast of the applicants landholding (EIAR study area) These trees will need to be considered in any future works in the area.

11.6.4.3.2.4.1 Bat Activity September 2023

Table 11-8 Bat registrations from transect walkover period (Dunkettle, September 2023)

Species	No. of Registrations	Notes
Soprano Pipistrelle (Pipistrellus pygmaeus)	39	Strong activity from 19:55 -20:00
Common Pipistrelle (Pipistrellus pipistrellus)	8	
Leisler's Bat (Nyctalus leisleri)	1	At 20:09

Table 11-9 Showing the species and the total number of calls recorded for each species during the September 2023 Bat Activity Transect Survey

Species Common Name	Species Latin Name	Number (n) of Calls [#]	% of Total Calls
Lesser Noctule	*Nyctalus leisleri*	1	1.0%
Common Pipistrelle	*Pipistrellus pipistrellus*	19	19.4%
Soprano Pipistrelle	*Pipistrellus pygmaeus*	78	79.6%
Total number of calls		**98**	**100%**

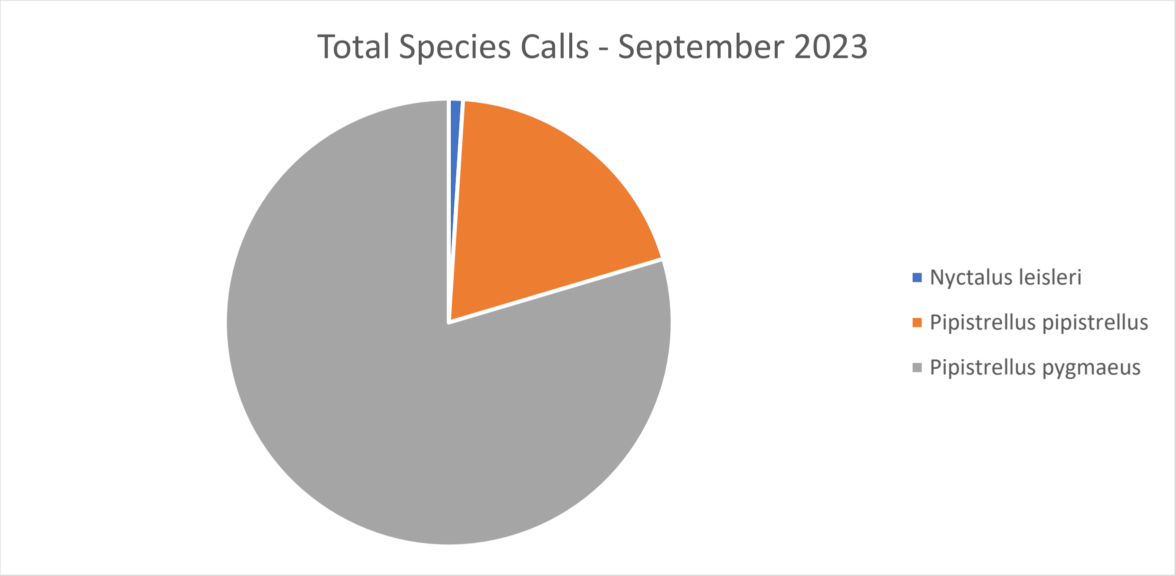


Figure 11-22 Total Species Calls – September 2023

Figure 11-23 Showing the species name, composition, and the number of calls recorded for each species during the September 2023 Bat Activity Transect Survey.

11.6.4.3.2.4.2 Bat Activity October 2023

It is noted that the activity transect route was completed in reverse during the October 2023 survey, so as to survey the transect points at different times than the September 2023 survey, giving a greater overview of bat activity on Site.

In total, five bat species were recorded during the October 2023 survey (Table 11-10). Relative species compositions are shown in Table 11-7. Soprano pipistrelle (*n*=802) was the most common bat species recorded accounting for 86.9% of all bat passes. Common pipistrelle (*n*=60) was the second most recorded species making up 6.5% of recorded bat passes. Myotis species was the next most commonly recorded species, followed by Leisler's Bat, and lastly Brown Long-eared Bat (*Plecotus auritus*), which had the lowest number of recorded calls. No other species were recorded during the October 2023 bat survey. These records differed slightly from the survey in September 2023. The results of the September surveys showed activity which was more strongly correlated with the field boundary to the north of the Proposed Development Site (Figure 11-23). While the same species were also recorded along this northern boundary during the October 2023 survey, a greater level of activity was recorded throughout the Site. Pipistrelle species were recorded along treelines further east, Soprano Pipistrelle was recorded along treelines to the southeast also, and Brown Long-eared Bat was recorded along the western extent of the Site, bordering a mature treeline and the Glashaboy River to the west, as shown in Figure 11-25 below.

Table 11-10 Showing the species and the total number of calls recorded for each species during the October 2023 Bat Activity Transect Survey

Species Common Name	Species Latin Name	Number (n) of Calls [#]	% of Total Calls
Myotis species	*Myotis species*	26	2.8%
Lesser Noctule	*Nyctalus leisleri*	19	2.0%
Common Pipistrelle	*Pipistrellus pipistrellus*	60	6.5%
Soprano Pipistrelle	*Pipistrellus pygmaeus*	802	86.9%
Brown Long-eared Bat	*Plecotus auritus*	17	1.8%
Total number of calls		**924**	**100%**

Table 11-11 Bat Registrations from Point Count Locations (Dunkettle, October 2023)

Point Count Location + Time	Field Notes
P8 18:52	No activity observed
P9 18:59	No activity observed
P10 19:09	No activity observed
P11 19:18	x2 Pipistrelle bats foraging and circling at tree junction at this point.
P12 19:32	No activity observed
P13 19:42	No activity observed
P1 19:53	No activity observed
P2 20:06	X1 Pipistrelle foraging and commuting along treeline
P3 20:14	No activity observed
P4 20:23	X1 Pipistrelle commuting along treeline between P4 and P9
P5 20:35	No activity observed
P6 20:48	Common Pipistrelle detected but not seen x3 times at this point
P7 21:00	Common Pipistrelle detected but not seen at this point

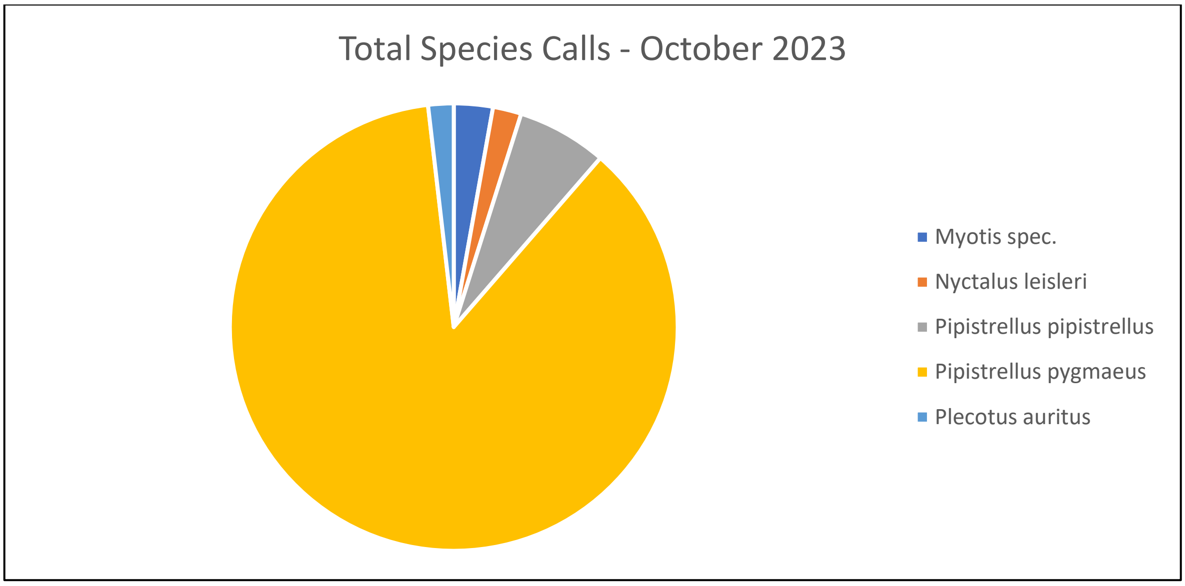
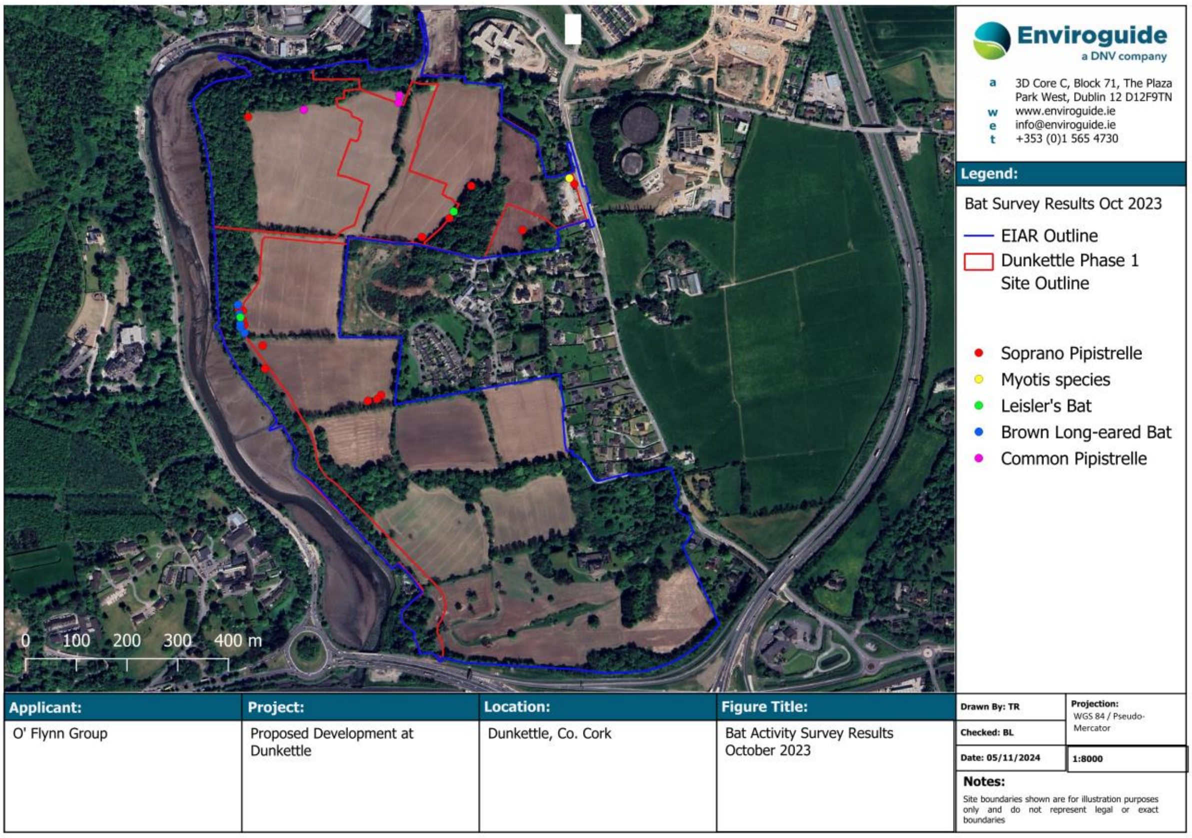


Figure 11-24 Total Species Calls - October 2023



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Applicant:	Project:	Location:	Figure Title:
O' Flynn Group	Proposed Development at Dunkettle	Dunkettle, Co. Cork	Bat Activity Survey Results October 2023

Drawn By: TR
Checked: BL
Date: 05/11/2024
Projection: WGS 84 / Pseudo-Mercator
1:8000

Notes:
Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 11-25 Showing the species name, composition, and the number of calls recorded for each species during the October 2023 Bat Activity Transect Survey

11.6.4.3.2.4.3 Bat Activity April 2024

Table 11-12 Bat Activity April 2024

Species Common Name	Species Latin Name	Number (n) of Calls [#]	% of Total Calls
Myotis species	*Myotis species*	26	2.8%
Myotis spec.	*Myotis species*	371	34.8%
Common Pipistrelle	*Pipistrellus pipistrellus*	329	30.9%
Soprano Pipistrelle	*Pipistrellus pygmaeus*	286	26.9%
Leisler's	*Nyctalus leisleri*	59	5.5%
Not ID'd	*N/A*	20	1.9%
Total number of calls		**1065**	**100%**

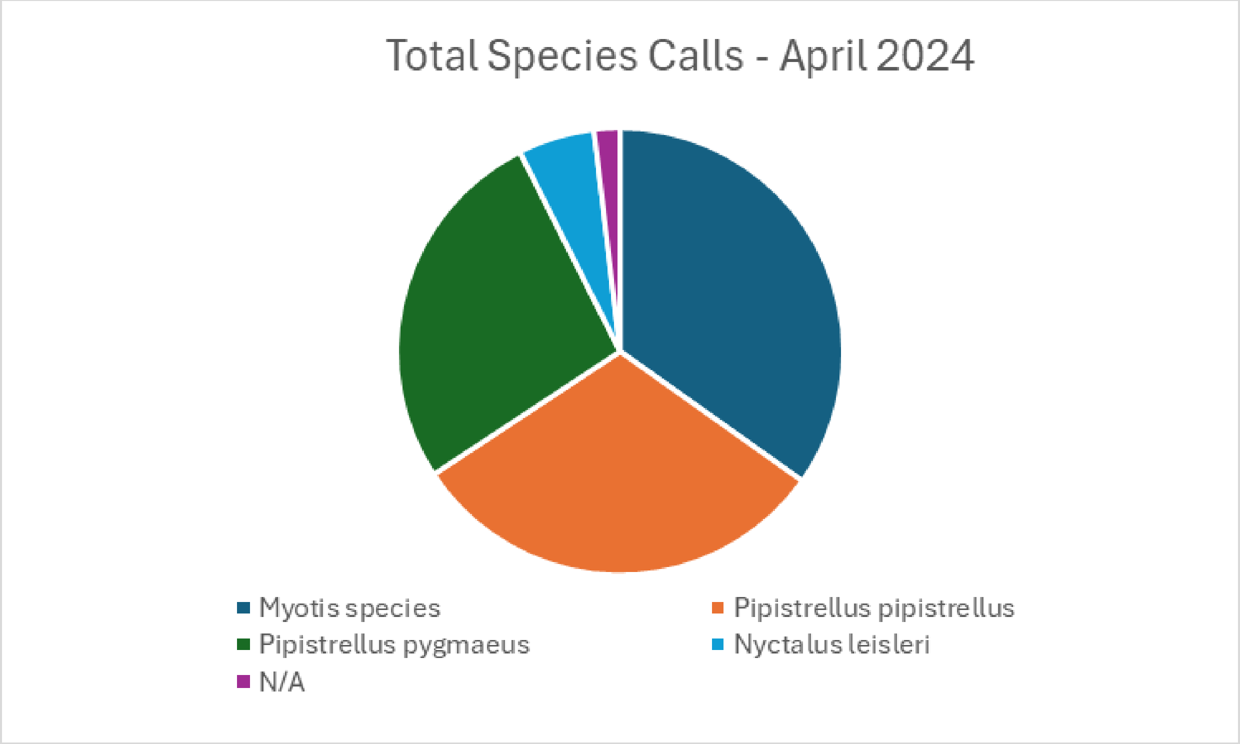

Figure 11-26 Total Species Call April 2024

Applicant:	Project:	Location:	Figure Title:
O' Flynn Group	Proposed Development at Dunkettle	Dunkettle, Co. Cork	Bat Activity Survey Results April 2024

Drawn By: TR

Projection: WGS 84 / Pseudo-Mercator

Checked: BL

Date: 05/11/2024

1:8000

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 11-27 Bat Activity Survey Results Map April 2024

11.6.4.3.2.4.4 Bat Activity June 2024

Table 11-13 Bat Activity June 2024

Species Common Name	Species Latin Name	Number (n) of Calls [#]	% of Total Calls
Myotis spec.	Myotis species	1558	39.7%
Soprano Pipistrelle	Pipistrellus pygmaeus	1516	38.7%
Pipistrellus pipistrellus	Pipistrellus pipistrellus	670	17.1%
Not ID'd	Not ID'd	111	2.8%
Leisler's	Nyctalus leisleri	63	1.6%
Brown Long-eared	Plecotus auritus	4	0.1%
Total number of calls		**3922**	**100%**

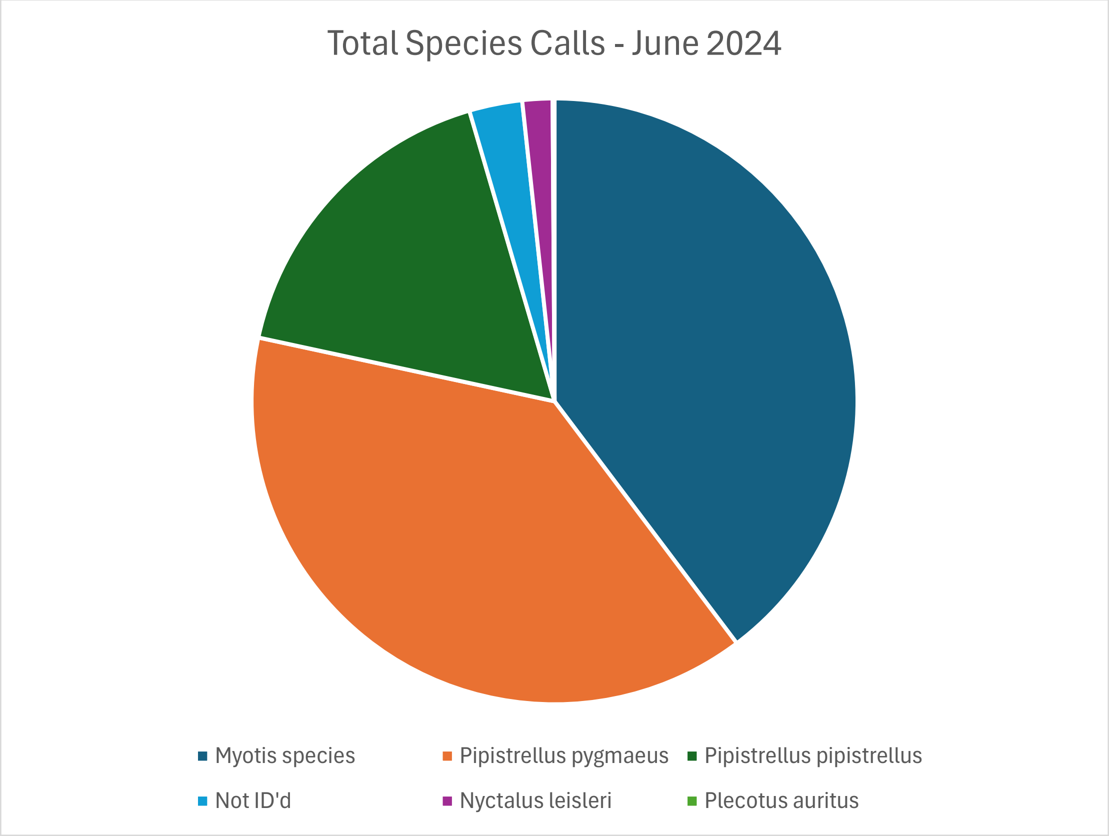

Figure 11-28 Total Species Calls - June 2024

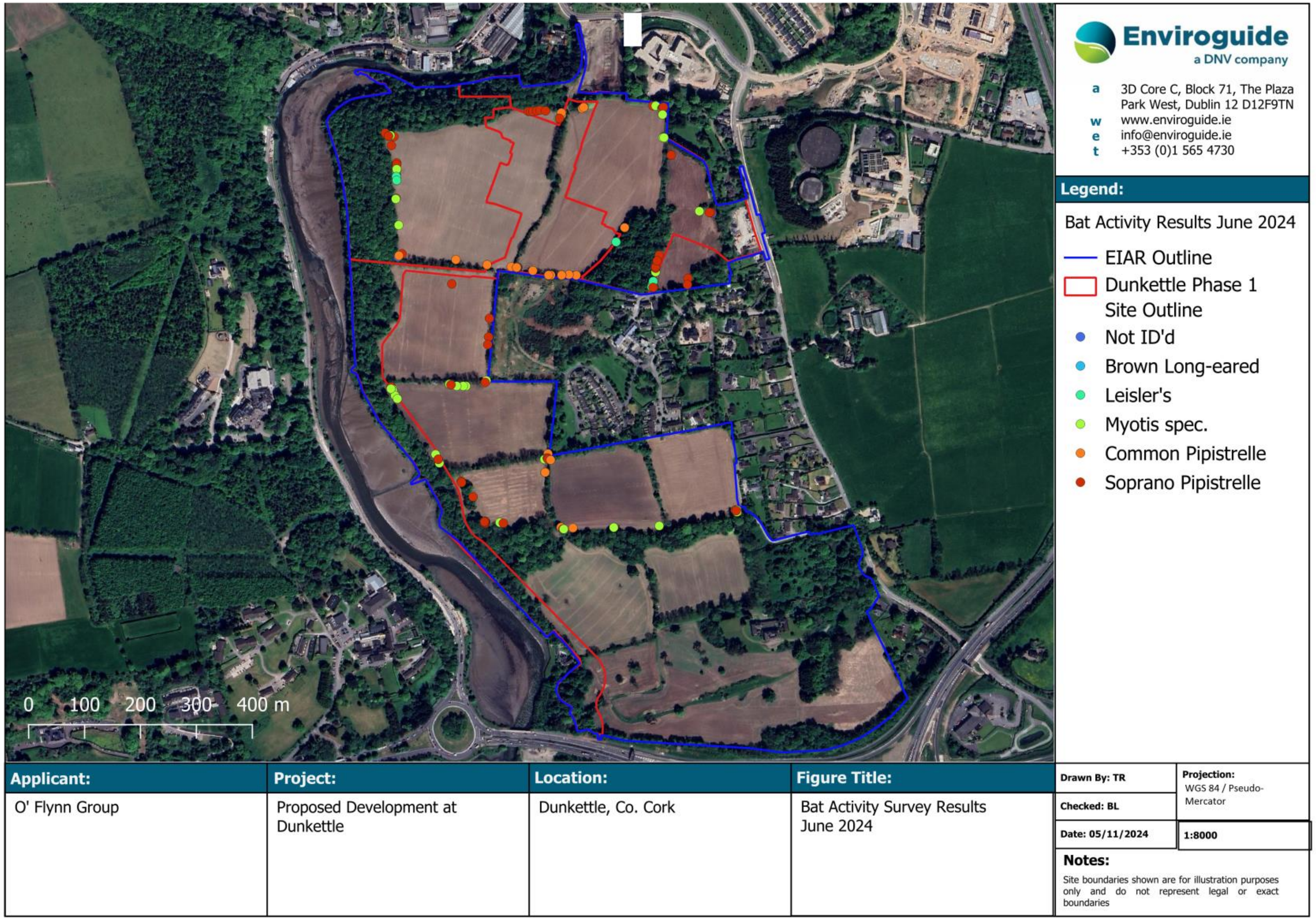

Figure 11-29 Bat Activity Survey Results Map June 2024

11.6.4.3.2.4.5 Bat Activity August 2024

Table 11-14 Bat Activity August (1) 2024

Species Common Name	Species Latin Name	Number (n) of Calls [#]	% of Total Calls
Pipistrellus pipistrellus	*Pipistrellus pipistrellus*	659	39.5%
Myotis spec.	*Myotis species*	637	38.2%
Soprano Pip	*Pipistrellus pygmaeus*	298	17.9%
Not ID'd	*Not ID'd*	46	2.8%
Leisler's	*Nyctalus leisleri*	27	1.6%
Total number of calls		**1667**	**100%**

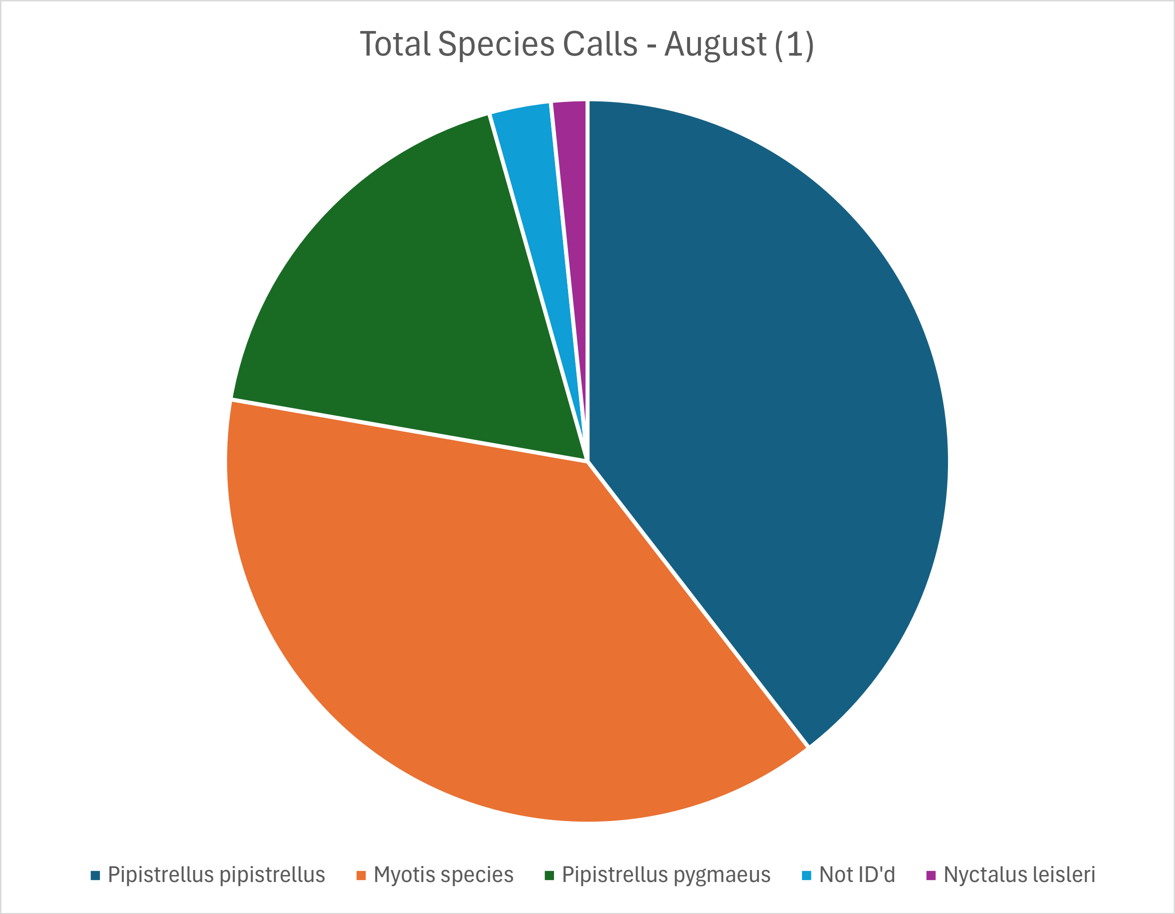

Figure 11-30 Total Species Calls August (1) 2024

Applicant:	Project:	Location:	Figure Title:
O' Flynn Group	Proposed Development at Dunkettle	Dunkettle, Co. Cork	Bat Activity Survey Results August (1) 2024

Drawn By: TR	Projection: WGS 84 / Pseudo-Mercator
Checked: BL	
Date: 05/11/2024	1:8000

Notes:
Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 11-31 Bat Activity Survey Results Map August (1) 2024

Table 11-15 Bat Activity August (2) 2024

Species Common Name	Species Latin Name	Number (n) of Calls [#]	% of Total Calls
Soprano Pipistrelle	*Pipistrellus pygmaeus*	2832	65.4
Common Pipistrelle	*Pipistrellus pipistrellus*	965	22.3
Myotis Species	*Myotis species*	348	8.0
Leislers	*Nyctalus leisleri*	109	2.5
Not ID'd	*Not ID'd*	73	0.05
Nathusius Pipistrelle	*Pipistrellus nathusii*	2	0.05
Brown Long-eared	*Plecotus auritus*	1	0.02
Total number of calls		**4330**	**100**

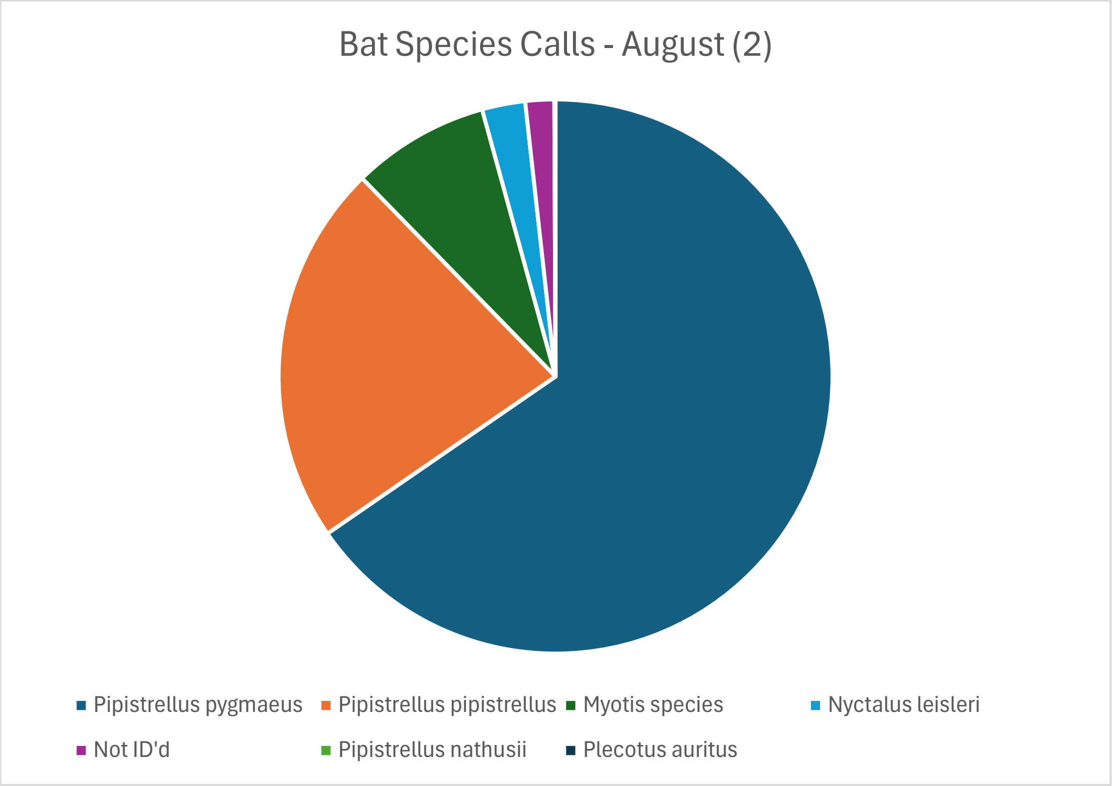

Figure 11-32 Bat Species Calls August (2)

Enviroguide
a DNV company

a 3D Core C, Block 71, The Plaza
Park West, Dublin 12 D12F9TN
w www.enviroguide.ie
e info@enviroguide.ie
t +353 (0)1 565 4730

Legend:

Bat Activity Results August 24

- — EIAR Outline
- ▭ Dunkettle Phase 1 Site Outline
- ● Not ID'd
- ● Brown Long-eared
- ● Leislers
- ● Myotis Sp.
- ● Nathusius Pipistrelle
- ● Common Pipistrelle
- ● Soprano Pipistrelle

Applicant:	**Project:**	**Location:**	**Figure Title:**
O' Flynn Group	Proposed Development at Dunkettle	Dunkettle, Co. Cork	Bat Activity Survey Results August (2) 2024

Drawn By: TR	**Projection:** WGS 84 / Pseudo-Mercator
Checked: BL	
Date: 05/11/2024	1:8000

Notes:
Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 11-33 Bat Activity Survey Results Map August (2) 2024

11.6.4.4 Birds

11.6.4.4.1 Desk study Results

A total of 103 bird species have been recorded within the W59 10 km grid square. Of these, 62 No. are Green-listed, 26 No. are Amber-listed and 12 No. are Red-listed according to Birds of Conservation Concern in Ireland 2020-2026 (Gilbert et al., 2021). Two Green-listed species were also noted as being listed under Annex I of the EU Birds Directive, namely; Little Egret (*Egretta garzetta*) and Peregrine Falcon (*Falco peregrinus*).

Table 11-16 Details of amber and red listed bird species within the 10km grid square (W59)

Species Name	**Date of Last Record**	**Title of Dataset**	**Conservation Status BoCCI, EU Birds Directive**
Black Redstart (Phoenicurus ochruros)	31/12/2011	Bird Atlas 2007 - 2011	Scarce passage migrant Spring and Autumn
Peregrine Falcon (Falco peregrinus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List, Annex 1 Birds Directive
Little Egret (Egretta garzetta)	22/04/2021	Birds of Ireland	BoCCI Green List, Annex 1 Birds Directive
Common Snipe (Gallinago gallinago)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Eurasian Curlew (Numenius arquata)	29/10/2012	Birds of Ireland	BoCCI Red List
Black-tailed Godwit (Limosa limosa)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Common Kestrel (Falco tinnunculus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Common Swift (Apus apus)	04/07/2022	Swifts of Ireland	BoCCI Red List
Eurasian Oystercatcher (Haematopus ostralegus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Stock Pigeon (Columba oenas)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Barn Owl (Tyto alba)	07/02/2023	Birds of Ireland	BoCCI Red List
Common Redshank (Tringa totanus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Grey Wagtail (Motacilla cinerea)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Red List
Meadow Pipit (Anthus pratensis)	31/07/1991	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	BoCCI Red List
Common Linnet (Carduelis cannabina)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI AmberList
Common Shelduck (Tadorna tadorna)	22/04/2021	Birds of Ireland	BoCCI AmberList

Species Name	**Date of Last Record**	**Title of Dataset**	**Conservation Status BoCCI, EU Birds Directive**
Common Kingfisher (Alcedo atthis)	31/07/1991	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	BoCCI Amber List, Annex 1 Birds Directive
Mallard (Anas platyrhynchos)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Eurasian Teal (Anas crecca)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Barn Swallow (Hirundo rustica)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Common Starling (Sturnus vulgaris)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Great Black-backed Gull (Larus marinus)	29/10/2012	Birds of Ireland	BoCCI Amber List
Great Cormorant (Phalacrocorax carbo)	22/04/2012	Birds of Ireland	BoCCI Amber List
Mute Swan (Cygnus olor)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Ringed Plover (Charadrius hiaticula)	31/07/1991	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	BoCCI Amber List
Black-headed Gull (Larus ridibundus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
European Greenfinch (Carduelis chloris)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Goldcrest (Regulus regulus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Amber List
Common Pheasant (Phasianus colchicus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Common Wood Pigeon (Columba palumbus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Common Greenshank (Tringa nebularia)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Black-billed Magpie (Pica pica)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Blackcap (Sylvia atricapilla)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Blue Tit (Cyanistes caeruleus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Chaffinch (Fringilla coelebs)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Coal Tit (Periparus ater)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Common Blackbird (Turdus merula)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Common Bullfinch (Pyrrhula pyrrhula)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Common Buzzard (Buteo buteo)	01/07/2021	Birds of Ireland	BoCCI Green List
Common Chiffchaff (Phylloscopus collybita)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Common Moorhen (Gallinula chloropus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Eurasian Collared Dove (Streptopelia decaocto)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List

Species Name	**Date of Last Record**	**Title of Dataset**	**Conservation Status BoCCI, EU Birds Directive**
Eurasian Jackdaw (Corvus monedula)	29/10/2012	Birds of Ireland	BoCCI Green List
Eurasian Siskin (Carduelis spinus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Eurasian Sparrowhawk (Accipiter nisus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
European Goldfinch (Carduelis carduelis)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
European Robin (Erithacus rubecula)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Great Tit (Parus major)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Grey Heron (Ardea cinerea)	29/10/2012	Birds of Ireland	BoCCI Green List
Dunnock (Prunella modularis)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Hooded Crow (Corvus cornix)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Lesser Redpoll (Carduelis cabaret)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Long-eared Owl (Asio otus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Long-tailed Tit (Aegithalos caudatus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Mistle Thrush (Turdus viscivorus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Reed Bunting (Emberiza schoeniclus)	31/07/1991	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	BoCCI Green List
Rook (Corvus frugilegus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Sedge Warbler (Acrocephalus schoenobaenus)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Song Thrush (Turdus philomelos)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Stonechat (Saxicola torquata)	31/07/1991	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	BoCCI Green List
White Wagtail (Motacilla alba)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List
Winter Wren (Troglodytes troglodytes)	31/12/2011	Bird Atlas 2007 - 2011	BoCCI Green List

11.6.4.4.2 Field Survey Results

11.6.4.4.2.1 Breeding Bird Survey Results

Two red-listed species were recorded (Stock Dove and Swift). However, due to the lack of breeding habitat on Site, Swift will not be using the Site as a breeding ground and instead using it to forage. Stock Doves are common on the Site and are very likely to be breeding on the Site due to the presence of ample suitable areas on the periphery of the Site. They are regularly found feeding with flocks of Woodpigeons or Feral Pigeons within the stubble fields.

Table 11-17 Breeding Bird Survey Results

Species	Scientific name	BoCCI Status	30/04/2024	30/05/2024	13/06/2024	31/07/2024	29/08/2024	Sept 24 data	Breeding Activity
Stock Dove	*Columba oenas*	Red	X	X	X	X	X	X	Probable breeding. Pair observed in suitable nesting habitat in breeding season
Swift	*Apus apus*	Red			X				Non-breeder. Foraging over the Site.
Goldcrest	*Regulus regulus*	Amber	X	X	X	X	X	X	Possible breeder. Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
Greenfinch	*Chloris chloris*	Amber	X	X					Possible breeding. Species observed in breeding season in suitable nesting habitat
House Martin	*Delichon urbicum*	Amber		X					Non-breeding. Flyovers and feeding over the Site.
Linnet	*Linaria cannabina*	Amber	X		X	X	X		Probable breeding. Pair observed in suitable nesting habitat in breeding season
Starling	*Sturnus vulgaris*	Amber	X	X					Probable breeding. Pair observed in suitable nesting habitat in breeding season
Swallow	*Hirundo rustica*	Amber		X	X	X	X		Possible breeding. Species observed in

Species	Scientific name	BoCCI Status	30/04/2024	30/05/2024	13/06/2024	31/07/2024	29/08/2024	Sept 24 data	Breeding Activity
									breeding season in suitable nesting habitat
Willow Warbler	*Phylloscopus trochilus*	Amber				X			One juvenile. Possibly an early autumn migrant.
Blackbird	*Turdus merula*	Green	X	X	X	X	X	X	Confirmed (Recently fledged young)
Blackcap	*Sylvia atricapilla*	Green	X	X	X	X	X	X	Possible breeder. Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
Blue Tit	*Cyanistes caeruleus*	Green	X	X	X	X	X	X	Confirmed (Recently fledged young)
Bullfinch	*Pyrrhula pyrrhula*	Green	X			X	X		Possible breeder. Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
Buzzard	*Buteo buteo*	Green	X	X	X	X	X	X	Confirmed breeding. Recently fledged chicks calling. Pair observed in suitable nesting habitat in breeding season
Chaffinch	*Fringilla coelebs*	Green	X	X	X	X	X	X	Possible. Species observed in breeding season in suitable nesting Habitat
Chiffchaff	*Phylloscopus collybita*	Green	X	X	X		X		Possible breeder. Singing male present

Species	Scientific name	BoCCI Status	30/04/2024	30/05/2024	13/06/2024	31/07/2024	29/08/2024	Sept 24 data	Breeding Activity
									(or breeding calls heard) in breeding season in suitable breeding habitat
Coal Tit	*Periparus ater*	Green	X	X	X	X			Probable breeding. Pair observed in suitable nesting habitat in breeding season
Dunnock	*Prunella modularis*	Green	X	X	X	X	X	X	Confirmed (Recently fledged young)
Goldfinch	*Carduelis carduelis*	Green	X	X	X	X	X	X	Confirmed. Recently fledged young.
Great Tit	*Parus major*	Green	X	X		X	X	X	Probable breeding. Pair observed in suitable nesting habitat in breeding season
Hooded Crow	*Corvus cornix*	Green	X	X	X	X	X	X	Probable breeding. Pair observed in suitable nesting habitat in breeding season
Jackdaw	*Corvus monedula*	Green	X	X	X	X	X	X	Confirmed (Recently fledged young)
Jay	*Garrulus glandarius*	Green		X			X	X	Possible breeding. Species observed in breeding season in suitable nesting habitat
Long-tailed Tit	*Aegithalos caudatus*	Green	X	X	X	X	X	X	Possible breeder. Species observed in breeding season in suitable nesting Habitat
Magpie	*Pica pica*	Green	X	X	X	X	X	X	Confirmed. Recently fledged young.

Species	Scientific name	BoCCI Status	30/04/2024	30/05/2024	13/06/2024	31/07/2024	29/08/2024	Sept 24 data	Breeding Activity
Mistle Thrush	*Turdus viscivorus*	Green	X	X	X	X		X	Probable breeding. Pair observed in suitable nesting habitat in breeding season
Robin	*Erithacus rubecula*	Green	X	X	X	X	X	X	Confirmed (Recently fledged young)
Rook	*Corvus frugilegus*	Green	X	X	X	X	X	X	Probable breeding. Pair observed in suitable nesting habitat in breeding season
Song Thrush	*Turdus philomelos*	Green	X	X	X	X	X	X	Confirmed. Recently fledged young.
Sparrowhawk	*Accipiter nisus*	Green	X						Possible breeding. Species observed in breeding season in suitable nesting habitat
Treecreeper	*Certhia familiaris*	Green	X		X				Possible breeder. Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
Woodpigeon	*Columba palumbus*	Green	X	X	X	X	X	X	Probable breeding. Pair observed in suitable nesting habitat in breeding season
Wren	*Troglodytes troglodytes*	Green	X	X	X	X	X	X	Confirmed (Recently fledged young)
Feral Pigeon	*Columba livia domestica*	Green			X	X		X	Non-breeder. Flyovers.

It is worth noting that Buzzard were recorded a number of times during the breeding period in 2024 and are considered to have successfully fledged chicks in the immediate area on Site or in the immediate environs, due to the presence of recently fledged chicks during bird surveys in August 2024. While no nests were observed, the presence of mature tree specimens on Site and ample areas suitable for foraging for the species located on Site and close by make the Site and its surrounds a highly suitable area for breeding Buzzard. Sparrowhawk was also recorded on Site in March 2024 in an apparent display flight, indicating the use of the area for breeding, as would be expected of this Green-listed species in suitable habitat conditions.,

Most species observed during Breeding Bird Surveys could be considered breeding within the Site or surrounding area. It is noted that the fields directly east of the Site contained crop which would provide a potential food source for and attract a variety of bird species. Considering the variety of bird species recorded both in the historical records and during the various field surveys, it is considered that the Site contains resident and regularly occurring, locally important populations of bird species protected under the Wildlife Act.

11.6.4.4.2.2 Winter Bird Survey Results

Winter Bird Surveys carried out on Site revealed no direct usage of the Proposed Development area by wintering waterbirds designated as Species of Conservation Interest (SCI's) associated with Cork Harbour SPA. Flocks of SCI species including Black-tailed Godwit, Lapwing and Gulls were recorded passing through the Site area in relatively low numbers. Summaries of each species are detailed below.

11.6.4.4.2.2.1 Black-tailed Godwit (SCI & BoCCI Red List)

In January 2024, 16 birds were recorded in flight over the western edge of the Site going southwards towards the coast, four Black-tailed Godwits were observed feeding on the Glashaboy Estuary immediately adjacent to the eastern edge of the Site in November.

11.6.4.4.2.2.2 Lapwing (SCI & BoCCI Red List)

A flock of Lapwing (18 birds) was observed in flight over Site in November 2024. The flock was observed passing through the Site area (and not observed using the Site in any other way), going southwards towards the coast.

11.6.4.4.2.2.3 Redshank (SCI & BoCCI Red List)

November surveys (two visits) revealed the presence of one Redshank feeding on the Glashaboy Estuary immediately adjacent to the eastern edge of the Site, One Redshank was also recorded flying over the western edge of the Site area.

11.6.4.4.2.2.4 Stock Dove (BoCCI Red List)

Stock Dove flocks were observed feeding on the Arable areas of the site throughout the winter period with a peak flock size of 64 birds recorded in January 2024.

11.6.4.4.2.2.5 Gull Species (SCI & BoCCI Red & Amber list)

Lesser Black-backed Gull and Black-headed Gull were observed in relatively large numbers (c.100 no.) flying over the Site in the late evening during throughout the winter period, with Common Gull also present in flight during March surveys. Small number of Herring Gull were recorded passing through in February. Gulls were the most abundant species recorded in flight over the Site.

11.6.4.4.2.2.6 Cormorant (SCI & BoCCI Amber List)

Cormorant was observed commuting through the Site regularly during the survey period, on each survey visit, including three birds travelling together adjacent to west of the Site over the Glashaboy Estuary.

11.6.4.4.2.2.7 Breeding and Wintering Bird Survey Results Evaluation

Considering the variety of bird species recorded both in the historical records and during the various field surveys, as well as the evidence of breeding within the majority of the Site, it is considered that the Site contains resident and regularly occurring, **locally important** populations of bird species protected under the Wildlife Act 1976 and subsequent amendments. The intertidal mudflats of the adjacent Glashaboy Estuary, which forms part of Cork Harbour SPA, is used as a foraging area at least occasionally by waders including Redshank during the winter period and provides suitable foraging opportunities to many of the SCI bird species associated with the SPA including Black-tailed Godwit and Lapwing, flocks of which were recorded over the Site during the winter survey period. General Fauna

11.6.4.4.3 Amphibians

While Common Frog (*Rana temporaria*) was recorded in the 10km (W77) grid square for the Site. It is noted that neither Common Frog nor Smooth Newt (*Lissotriton vulgaris*) were recorded within the 2km (W77G) grid square that encompass the Site (NBDC: Amphibians and reptiles of Ireland). Suitable habitat is present on the periphery of the Site along sheltered areas and small areas of grass verge providing limited areas of **local importance** to amphibians.

11.6.4.4.4 Reptiles

No records of Common Lizard (*Zootoca vivipara*) exist for the Site, however records of Common Lizard exist for the 10km grid square (W77), to the west of the Site (c 3km). As no targeted surveys for Common Lizard were carried out, it is assumed under the precautionary principle that a **locally important** population of this species may be present at the Site.

11.6.4.4.5 Otter

There are no records for Otter within the W77 10km hectad (NBDC, 2024). Due to the presence of suitable habitat directly adjacent to the western edge of the Site, an Otter survey was carried out in October 2023. No live sightings or signs of Otter presence were identified during the species-specific survey. The edges of the Site are considered to be of local importance for Otter.

11.6.4.4.6 Invertebrates

There are no NBDC records for protected invertebrates within the 2km (W77G) grid square, that encompasses the Site. The areas within the Site boundary are of Site importance for Invertebrates.

11.6.5 Evaluation of Ecological Features

Habitats have been evaluated for their conservation importance, based on the NRA evaluation scheme (NRA, 2009b). Those selected as KERs are those which are evaluated to be of at least local importance (higher value).

Fauna that has the potential to utilise the Site and immediate area of the Proposed Development, or for which records exist in the wider area, have been evaluated for their conservation importance. This evaluation follows the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009b).

The impacts of the Proposed Development on the identified KERs are assessed in Section 11.71.8. Table 11-18 below summarises the evaluation rating assigned to each ecological feature and the rationale behind these evaluations is also provided.

Table 11-18 Evaluation of Designated sites, habitats, flora and fauna recorded within the site and the surrounding area. Those identified as key ecological receptors (KERS) are highlighted in green

Species / Species Group	Evaluation	Rationale	Key Ecological Receptor (KER)
DESIGNATED SITES			
Cork Harbour SPA (004030)	International Importance	Occurs west of the Proposed Development and is hydrologically linked via surface run-off and ground water. High Value, internationally important habitat.	Yes
Great Island Channel SAC (001058)	International Importance	Linear Distance to Proposed Development: 3.19km East of the Site boundary.	No
Glanmire Wood pNHA (001054)	National Importance	Present within the Sites red line boundary to the west of the Proposed Development area.	Yes
Dunkettle Shore pNHA (001082)	National Importance	Located 13.95km north of the Proposed Development Site with no potential pathways identified between same.	Yes
Douglas River Estuary pNHA (001046)	National Importance	Located 700m south of the Proposed Development Site with hydrological pathways identified between same.	Yes
Rockfarm Quarry, Little Island pNHA (001074)	National Importance	Located 3.1km southeast of the Proposed Development Site with no potential pathways identified between same.	No
Great Island Channel pNHA (001058)	National Importance	Located 3.2km southeast of the Proposed Development Site with no potential pathways identified between same.	No
Cork Lough pNHA (001081)	National Importance	Located 6.4km southwest of the Proposed Development Site with no potential pathways identified between same.	No
Monkstown Creek pNHA (001979)	National Importance	Located 7.9km south of the Proposed Development Site with no potential pathways identified between same.	No
Cuskinny Marsh pNHA (001987)	National Importance	Located 9.4km southeast of the Proposed Development Site with no potential pathways identified between same.	No
Owenboy River pNHA (001990)	National Importance	Located 10.1km south of the Proposed Development Site with no potential pathways identified between same.	No
Lough Beg pNHA (001066)	National Importance	Located 10.3km south of the Proposed Development Site with no potential pathways identified between same.	No
Whitegate Bay pNHA (001084)	National Importance	Located 12.6km southeast of the Proposed Development Site with no potential pathways identified between same.	No

Rostellan Lough, Aghada Shore And Poulnabibe Inlet pNHA (001076)	National Importance	Located 14.1km southeast of the Proposed Development Site with no potential pathways identified between same.	No
Leamlara Wood pNHA (001064)	National Importance	Located 10.6km northeast of the Proposed Development Site with no potential pathways identified between same.	No
Blarney Bog pNHA (001857)	National Importance	Located 9.6km northwest of the Proposed Development Site with no potential pathways identified between same.	No
Lee Valley pNHA (000094)	National Importance	Located 8.8km west of the Proposed Development Site with no potential pathways identified between same.	No
Shournagh Valley pNHA (000103)	National Importance	Located 12.2km west of the Proposed Development Site with no potential pathways identified between same.	No
Blarney Lake pNHA (001798)	National Importance	Located 12.2km northwest of the Proposed Development Site with no potential pathways identified between same.	No
Blarney Castle Woods pNHA (001039)	National Importance	Located 12.2km northwest of the Proposed Development Site with no potential pathways identified between same.	No
Ardamadane Wood pNHA (001799)	National Importance	Located 11.9km northwest of the Proposed Development Site with no potential pathways identified between same.	No
HABITATS			
WN5 – Riparian Woodland	National Importance	This habitat occurs on the edge of the Cork Harbour SPA and separates the Proposed Development from the SPA at the west and north of the development boundary. An ancient woodland and pNHA of high biodiversity value to numerous species including birds, bats, non-volant small mammals, plants and insects	Yes
WN1 – Oak Birch Holly Woodland	Regional/County Importance	Located on the north and southeast of the Site, the mature woodland areas are of high biodiversity value to numerous species including birds, bats, non-volant small mammals, plants and insects	Yes
WL2 – Treeline (Western boundary)	Local Importance (Higher Value)	The Cork County Biodiversity Action Plan (2021-2026) highlights the importance of woodlands, trees, and hedges as wildlife corridors. Mature treelines are present on the Site edges and intersecting the Development area. This habitat will be largely retained however, works in proximity to this habitat, during the Construction Phase, could potentially cause damage on the roots of the trees or trees themselves.	Yes
BC1 - Arable Crops	Local Importance (Lower Value)	Manmade habitat of low ecological value located east of the Site. Although it is noted that crops/farming management practices can provide a foraging source for some bird	No

		species. Arable fields will be lost due to the Proposed Development.	
BC2 – Horticultural Land	Local Importance (Lower Value)	Manmade habitat of low ecological value located east of the Site. Although it is noted that crops/farming management practices can provide a foraging source for some bird species. Horticultural fields will be lost due to the Proposed Development.	No
BL3 – Buildings and Artificial Surfaces	Local Importance (Higher Value)	Two of the on-Site buildings are classed as having moderate roosting potential for bats (Collins, 2023). The building could also potentially be used by common cavity dwelling bird species during the breeding season.	Yes
ED2 – Spoil and Bare Ground	Negligible	A limited area (c.4 ha) of spoil and bare ground habitat was identified adjacent to the Site boundary, off-Site and is of limited value ecologically.	No
ED3 – Recolonising Bare Ground	Negligible	A limited area of recolonising bare ground was identified adjacent to the Site boundary, off-Site and is of limited value ecologically.	No
GA2 – Amenity Grassland	Local Importance (Lower Value)	Amenity Grassland surrounds Dunkettle House and areas extending further southwest and is of local importance to a limited diversity of species.	No
GS2 – Dry Meadows	Local Importance (Lower Value)	Dry Meadows were identified north of Dunkettle House and to the northeast of the landholding (c.1.5ha). This habitat is capable of supporting resting amphibians, small mammals and local breeding and foraging birds.	No
WD5 – Scattered Trees and Parkland	Local Importance (Higher Value)	Tree species observed within the treelines that bound the field margins that make up the Site include Ash, Hawthorn and Oak with some Birch, Willow and Holly interspersed.	Yes
WS1 Scrub	Local Importance (Higher Value)	Large areas of Scrub in the field adjacent to 'The Beeches' housing estate which comprised Gorse and Bramble. In addition, Scrub was common within the woodland areas of the Site and there is the potential for the Site to be used by small mammal species, particularly along the Site margins.	Yes
ADJACENT AND LINKED HABITATS			
MW4 - Glashaboy Estuary (Cork Harbour SPA)	International Importance	Cork Harbour SPA is an internationally important wetland site regularly supporting >20,000 wintering waterbirds and a nationally important breeding colony of breeding Common Terns (c.102 pairs). It supports internationally important numbers of Black-tailed Godwit and Redshank and nationally important numbers of 22 species including Golden Plover, Red-breasted Merganser and Dunlin. It is of special conservation interest to 25 bird species in total and is located directly adjacent to the Site, separated from	Yes

		the Proposed Developable area by ancient riparian woodland (Glanmire Wood pNHA).	
LS3 – Muddy Sand Shores. Annex I. 1140 Mudflats and sandflats not covered by seawater at low tide.	National Importance	'Viable areas' of the Annex 1 Habitat is present within Cork Harbour SPA. Downstream of the Glashaboy Estuary. This area is excluded as a KER due to the location off Site and the embedded mitigation measures being employed as part of the original design and construction methods in accordance with best practice..	No
CM – Salt Marsh. Annex I 1330 Atlantic Salt Meadow	National Importance	Viable areas' of the Annex 1 Habitat is present within Cork Harbour SPA. Downstream of the Glashaboy Estuary.	No
FLORA			
Rare & Protected Flora	Local Importance (Lower Value)	No rare or protected flora were recorded during the field surveys. Unlikely to be present in notable numbers/densities.	No
Invasive Species	**Negligible value**	**Limited stands of Travellers Joy and Sycamore provided little ecological value. However, there is a risk of introduction of invasive plant species to the Site during the Construction Phase.**	**Yes**
NATIVE FAUNA			
Bat Assemblage	Local Importance (Higher Value)	Site habitats were assessed as High suitability for foraging and commuting bats with the potential for the woodland areas to provide roosting opportunities for bat species. Bat activity transect surveys showed moderate – high usage in proximity to the woodland areas surrounding the Site and along the treeline habitats present.	Yes
Bird Assemblage	Local Importance (Higher Value)	Variety of red, amber and green listed species recorded at the Site during scoping and breeding surveys, with suitable breeding habitat for a few notable species (e.g., Stock Dove). Raptor species including Sparrowhawk and Buzzard are present and confirmed / probable breeders on/ adjacent to the Site.	Yes
Badger	Local Importance (Higher Value)	Suitable habitat is present at the Site for these mammals. Surveys have shown no signs of badger setts within the Site area, possible trails and foraging signs were recorded to the north of the Site and current and/or future usage by the species is possible given the habitat suitability.	Yes
Pine Marten	Local Importance (Higher Value)	Suitable habitat at the Site for these mammals. Likely to be regularly present within the woodland areas and along treelines.	Yes
Hedgehog	Local Importance (Higher Value)	Some commuting and foraging habitat suitability is present for these small native mammals at the Site, and European Rabbit has been observed on several occasions within the Proposed Development Site.	Yes
Pygmy Shrew			

Amphibians	Local Importance (Higher Value)	Limited suitable areas present on Site with possible habitats present on the Site periphery	Yes
Common Lizard	Local Importance (Lower Value)	Limited suitable areas present on Site.	No
Invertebrates	Local Importance (Lower Value)	Very little floral diversity on Site.	No

11.7 The 'Do Nothing' Scenario

If the Proposed Development were not to go ahead, the intensively managed agricultural lands occupying most of the land area on Site would remain of low ecological value to local wildlife.

The high ecological value habitats on Site including the riparian and mature woodlands would remain in their current state but with relatively limited connectivity (wildlife corridors) linking these habitats to one another, due to the sparse nature of the treelines on the current area, and the intensively managed fields within.

11.8 Potential Significant Effects

The Proposed Development includes several embedded design features that may act to avoid or mitigate negative impacts that would likely occur in the absence of these features. However, as opposed to typical mitigation measures, the implementation of these features is integral to the design and completion of the Proposed Development, and as such the impact assessments are performed with consideration of these features as integrated parts of the Proposed Development. All considered embedded design features that may act to mitigate negative impacts on local ecology and environment are listed in Table 11-19.

Table 11-19 Embedded design features and their potential to act to avoid or mitigate negative impacts on the local ecology and environment

Embedded Design Feature	Avoidance / Mitigation Potential
SUDS: ▪ Permeable Pavements ▪ Greenroofs ▪ Rainwater Harvesting ▪ Tree Pits ▪ Attenuation Tanks ▪ Flow Control Device ▪ Petrol Interceptor ▪ Swales Management Train	The SUDS features included in the Project Design will ensure the surface water discharge from the Proposed Development is reduced to greenfield runoff rates. These features will be implemented as part of the surface water drainage design.
Foul Water Treatment: ▪ Connection to an existing public wastewater sewer to be treated at the Carrigrenan WWTP, Little Island.	Foul water will be directed to the Carrigrenan Waste Water Treatment Plant via an existing public sewer that intersects the Site, flowing south to Dunkettle.
Landscape Design: ▪ Urban Greenway	Accounting for the listed design features, the retention of the ancient mature woodland on Site and the reinstatement of trees and grassland lost to facilitate

▪ Full Site landscape connectivity including new woodland creation ▪ Wildflower Meadows ▪ Attenuation pond and associated wet meadow planting. ▪ Wildlife Hibernacula ▪ Wood Piles ▪ Bat and nocturnal wildlife friendly Lighting	the Development, the Proposed Landscape Plan is expected to have an overall positive impact on a local scale. Features such as the wildlife friendly attenuation pond, wildflower meadows, bee hotels and the creation of a new woodland habitat to link the eastern edge of the Site have been developed in consultation between the project ecologist and landscape designer and engineers.

The below sections assess the potential impacts on the previously identified KERs of the Site and immediate surrounds during the Construction and Operational Phases of the Proposed Development.

11.8.1 Construction Phase

11.8.1.1 Impacts on Designated Sites

The lands have the benefit of direct access to the public stormwater network and will enter such at two locations to the north and east, along Dunkettle Road. Land within the southwest of the main development area and within the access routes extending south towards Dunkettle will be released post SuDS treatment directly into the Glashaboy Estuary

Construction phase surface water arising from the Proposed Development constitutes a direct hydrological connection between the Cork Harbour SPA and the Proposed Development whereby contaminated surface water run-off arising from construction phase activities could migrate into the river. There is potential for **significant, negative, short-term** effects on the adjacent Cork Harbour SPA as a result of the construction phase of the Proposed Development.

11.8.1.2 Impacts on Habitats and Flora

There are no rare/protected species present at the Site, and overall, diversity on the Site was considered low outside of the higher value areas (Woodland and Treelines). The Proposed Development will involve the removal of vegetation (resulting in Arable and Treeline habitat loss) to facilitate works during the Construction Phase, and under certain conditions (e.g., periods of heavy rainfall) could lead to run-off of silt and sediment into the downslope Glashaboy Estuary which is located adjacent to the west of the Site.

However, provided the landscape plan and proposed mitigation measures outlined in this report and the CEMP and NIS are adhered to, significant impacts on same are not envisaged, particularly owing to the extensive planting and retention of high value habitat which is included in the landscape plan developed for this Site. It should also be noted that some proposals in the landscape plan (e.g., attenuation ponds for wildlife) will serve to further enhance the biodiversity of the area. There is potential for **negative, short-term, slight impacts** on Flora and Fauna on Site and in the locality due to the proximity of the developable area to Glanmire Wood pNHA and Cork Harbour SPA.

11.8.1.3 Spread of Invasive Species

The spread or introduction of IAS to the Site and the adjacent/linked habitats during the Construction Phase of the Proposed Development could have a ***negative, local, long term, significant*** impact on local habitats.

11.8.1.4 Impacts on Native Fauna

11.8.1.4.1 Impacts on Bat Assemblage

There is potential for loss of foraging and commuting habitat for local bats through the removal of trees and vegetation and increased light levels as part of the Proposed Development. This could have a **negative, short-term, moderate** impact on local bats in the area. It is noted that the mature treeline along the eastern boundary of the Site is being retained. The trees and woodland to the south of the Proposed Development will not be impacted by the Development.

Noise generated during the Construction Phase has the potential to cause **negative, short-term, slight** impacts in the form of disturbance to mammals at a local level, potentially including bats should they roost in the surrounding landscape.

In addition, there is potential for a **negative, permanent, slight** impact on bats in the locality through the loss of foraging resources.

11.8.1.4.2 Impacts on Bird Assemblage

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

11.8.1.4.3 Impacts on Small (Non-volant) Mammals

Increased human presence in addition to noise and dust generated during the Construction Phase has the potential to cause **negative, short-term, moderate** impacts in the form of disturbance to mammals e.g., Hedgehog, Pine Marten and Pygmy Shrew, at a local level.

In addition, the clearance of vegetation during the Construction Phase of the Proposed Development has the potential to cause **negative, short-term, moderate** impacts in the form of direct mortality/injury resulting from vegetation clearance during the hibernation period and loss of commuting, foraging and sheltering habitat to small mammals at a local level, in the absence of suitable mitigation measures.

11.8.1.4.4 Impacts on Amphibians

The clearance of vegetation during the Construction Phase of the Proposed Development has the potential to cause **negative, short-term, moderate** impacts in the form of direct mortality/injury resulting from vegetation clearance during the hibernation period and loss of potential shelter/commuting habitat to amphibians (e.g., Common Frog and Smooth Newt) at a local level, in the absence of suitable mitigation measures.

11.8.1.4.5 Impacts on Otter

There are no habitat features within the Proposed Development boundary suitable for foraging or resting otter. Surveys in the immediate vicinity of the Glashaboy Estuary to the west of the Site have shown no signs of usage by Otter. The impact on Otter is assessed as **neutral** or **imperceptible**.

11.8.1.4.6 Impacts on Fauna of the Glashaboy Estuary

Surface water discharges associated with the Construction Phase of the Proposed Development may have the potential to cause **negative, short-term, significant** impacts to aquatic fauna (e.g., Fish, macro-invertebrates and birds) within the Glashaboy Estuary in the absence of suitable mitigation, owing to the topography of the developable area which is separated from the Estuary (Cork Harbour SPA) by the existing on-Site Woodland (Glanmire Wood pNHA).

11.8.1.5 Summary of Construction Phase Likely Significant Effects in the absence of mitigation

Table 11-20 Summary of Construction Phase Likely Significant Effects

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Designated Sites	Negative	Significant	Cork Harbour SPA	Unlikely	Short-term	Surface water run-off
Habitats and Flora	Negative	Slight	10ha of Glanmire Wood pNHA, Treelines and habitats interspersing the Site	Likely	Short-term	Treeline removal and operations adjacent to woodlands, surface water run-off
Spread of invasive species	Negative	Significant	On-Site and linked habitats including alterations to habitats off-Site due to hydrological connections	Likely	Long-term	Spread or introduction of invasive species on Site and spread through vectors to off-Site areas
Bat Assemblages	Negative	Moderate	10ha of Glanmire Wood pNHA, Treelines and habitats interspersing the Site	Likely	Short-term	Construction phase lighting, treeline removal and noise.
Bird Assemblages	Negative	Significant	Breeding and foraging habitat on-Site, foraging and roosting habitat off-Site (adjacent)	Unlikely	Short-term	Increased human presence, lighting Vegetation clearance and noise.
Small (Non-volant Mammals)	Negative	Moderate	Vegetation and connecting habitats on-Site	Likely	Short-term	Increased human presence, Vegetation clearance and noise.
Amphibians	Negative	Moderate	Vegetation and connecting habitats on-Site	Likely	Short-term	Vegetation clearance

Otter	Neutral	Imperceptible	Adjacent Estuary	Unlikely	Short-term	Habitat alteration or loss, noise and increased human presence.
Fauna of the Glashaboy Estuary	Negative	Significant	Adjacent Estuary	Unlikely	Short-term	Surface water run-off

11.8.2 Operational Phase

11.8.2.1 Impacts on Designated Sites

Impacts on designated sites during the operational phase will be fully considered as part of the NIS accompanying this Chapter under separate cover.

The landscape plan and development designs provide for the retention of all woodland areas on Site as well as the retention of most treelines, barring one which needs removal due to its location in relation to the planned housing structures and access requirements.

The impact on designated sites during the operational phase of the Proposed Development will be greatly reduced due to the separation or buffering provided by the retained Glanmire Wood pNHA between the Proposed Development and Cork Harbour SPA. A Paladian style fence is included in the landscape design for the development. Although this woodland is located on Site, it is not proposed as a developable area and will not be open to future residents as a recreational space, thereby removing the possibility of access or disturbance to the Estuary (SPA) through the woodland and removing the possibility of damage or disturbance to the woodland itself as a result of human access. Access to the woodland (and estuary) will be restricted to woodland maintenance activities and will be enforced by clear public signage.

In addition to this buffer zone, embedded mitigation as part of the landscape design provides for an overall net gain for biodiversity within the Site post construction due to the addition of new woodland to the east which connects the Sites natural features and provides wildlife corridors on the Sites periphery, an attenuation pond to the north with hibernacula and biodiversity friendly plant species, bee hotels, wildflower meadows and bird boxes. The baseline conditions encompassing the main footprint of the developable area are of low ecological value (intensively managed Arable crops) and it is expected that the management of the proposed landscape features aimed at biodiversity enhancement and mitigation will add to the biodiversity value of the local area.

The impact on designated sites during the operational phase in the absence of mitigation is assessed as **negative, long-term and slight**.

11.8.2.2 Impacts on Native Fauna

11.8.2.2.1 Impacts on Bat Assemblage

During the Operational Phase, there is potential for disturbance to bats utilising the immediate surrounds of the Site through light pollution. Recreational space will be provided at a separation from the Glanmire Wood pNHA, Oak Ash Holly Woodland, and Treeline habitat via greenways and open spaces which will be designed to be wildlife friendly, particularly in terms of lighting (lux) levels which will ensure lighting in areas sensitive to foraging bats and other nocturnal wildlife will be kept at suitable levels (<1 lux)., this could have a **negative, permanent, moderate** impact on bats in the locality.

It is noted that the building heights do not pose a collision risk for bats. Irish bat species navigate largely by echolocation, and fixed structures, such as those proposed as part of the Proposed Development, present a **negligible** risk in terms of collision. Light spill from outdoor lighting and the proposed structures themselves, is the more likely source of obstruction to commuting bats and this is addressed in later sections of this Report.

11.8.2.2.2 Impacts on Bird Assemblage

In relation to collision risk, as outlined by Martin (2011) birds are vulnerable to collision with objects that seem obvious or conspicuous to humans, such as buildings, and it is unclear as to why this occurs, even under conditions of apparent clear visibility. It is suggested that bird collisions may be the result of factors such as the use of binocular and lateral vision, making commuting birds periodically blind in the direction of travel. Birds are at highest risk from objects such as buildings when they protrude unnaturally above the surrounding natural vegetation.

Some of the most at-risk groups (classified as 'medium' and 'high' collision risk species) include wader species; waterfowl such as geese, swan and duck species; and some raptor species. Species such as Redshank (*Tringa tetanus*) and Black-tailed Godwit (*Limosa limosa*) are classed of Medium susceptibility to collision with powerlines. Gulls such as Herring Gull (*Larus argentatus*), and Lesser Black-backed Gull (*Larus fuscus*) are classed as 'low' collision risk species due to their superior manoeuvrability when flying (Eirgrid, 2012).

11.8.2.2.2.1 Ex-Situ Usage by SCI Bird Species

The Site itself is not deemed to represent suitable ex-situ feeding/roosting habitat for the majority of species designated as SCI's of Cork Harbour SPA. There is a slight potential for the Site to be used by species such as Lapwing and Golden Plover for foraging, particularly at high tide, however a full suite of winter bird surveys has only recorded Lapwing in the area, and they were not associating with the Site, rather passing through the Site on route to the larger coastal/ estuarine habitats further south. It is also worth noting that such species or flocks were not recorded publicly (NBDC) or on any other site visits including Autumn Bat Activity Surveys and Mammal Surveys. The effect of the Proposed Development on ex-situ habitat for SCI species using the Site is therefore deemed **imperceptible**.

11.8.2.2.2.2 Likelihood of Collision Impacts

The physical location of buildings and structures can influence the likelihood of bird collisions, with structures placed on or near areas regularly used by large numbers of feeding, breeding, or roosting birds, or on local flight paths, such as those located between important foraging and roosting areas, can present a higher risk of collision.

The Site itself is located within Arable lands adjacent to the northern edge of an Internationally Important area designated for over 20 bird species and is located in a potentially sensitive area in terms of bird flight paths i.e., it is located close to the coast, and adjacent to Cork Harbour SPA. Species deemed of medium risk of collision (Lapwing, Redshank and Black-tailed Godwit) when compared with other species such as swans and geese which are of higher risk of collision, were recorded in flight on Site and adjacent to the Site in very low numbers (far less then 1% national population) during Winter Bird Surveys.

11.8.2.2.2.3 Building Height

The Proposed Development design is dominated by low level residential buildings ranging in height from 2 - 3 storeys and as such, the risk of migrating birds colliding with the structure due to its height is deemed to be negligible (Migrating species tend to commute far above this with Swans and Geese flying up to 2500ft (ca.750m) during migration along Irish Coasts (Irish Aviation Authority, 2020). Birds that fly over the Site to commute between feeding grounds at various locations would fly lower than this, however, once the proposed structures are made of visible materials i.e., not entirely comprised of reflective materials such as glass, the birds would simply fly around or over them.

11.8.2.2.2.4 Building Appearance

The overall façades of the proposed buildings are well broken up, with a varied material composition interspersing any reflective areas. These architectural design features provide important visible cues as to the presence and extent of the proposed structures to any commuting/foraging bird species should they be in the vicinity of the Site. This overall visual heterogeneity of the building façades will be sufficient to further ensure that the risk of bird collisions as a result of the Proposed Development is negligible. These architectural design features are part of the overall design of the Proposed Development and are not considered to represent specific mitigation measures to prevent collisions, however, they will contribute to the overall effect in this regard.It is noted that birds are not deemed to be at any particular risk of collisions with the proposed buildings at the Site.

As such, based on the heights of the proposed structures, their physical appearance and the nature of their location, it is deemed that birds including any 'at-risk' species, do not have the potential to be impacted by the Proposed Development in terms of collisions and the risk is therefore deemed to be **imperceptible** in the absence of any mitigation.

11.8.2.2.3 Impacts on Small (Non-volant) Mammals

The Proposed Development has the potential to impact small mammals via the fragmentation of commuting and foraging habitat. This is largely attributed to the design nature of residential developments which comprise units, particularly garden spaces, which occur in distinct separate areas, that are not generally connected to each other. As such, in the absence of suitable mitigation measures, this risk represents a **negative, permanent, moderate impact** on small mammals at a local scale.

11.8.2.2.4 Impacts on Fauna of the Glashaboy Estuary

Surface water discharges associated with the Operational Phase of the Proposed Development may have the potential to cause **negative, long-term, slight impacts** to aquatic fauna (e.g., Fish, macroinvertebrates and birds) within the Glashaboy Estuary in the absence of suitable mitigation, owing to the topography of the developable area which is separated from the Estuary (Cork Harbour SPA) by the existing on-Site Woodland (Glanmire Wood pNHA).

The Proposed Development will be connected to the existing surface water infrastructure. The measures in the design of the SuDS at the Site and the southern catchment attenuation pond and surface water network ensure that the surface water runoff rates are reduced to greenfield rates during the Operational Phase of the project.

The potential for impacts as a result of hydraulic overloading at the Carrigrennan WWTP has been assessed and ruled out in Section 11.8.3.3 below.

As such, it is considered that no potential impacts on the Lough Mahon Estuary and its associated fauna are likely to occur as a result of the Operational Phase of the Proposed Development, thus impacts are deemed **imperceptible.**

11.8.2.3 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Table 11-21 Summary of Operational Phase Likely Significant Effects

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Designated Sites	Negative	Slight	Cork Harbour SPA	Unlikely	Long-term	Increased human presence, lighting, Surface water run-off
Bat assemblages	Negative	Moderate	10ha of Glan-mire Wood pNHA, Treelines and habitats interspersing the Site	Likely	Permanent	Operational phase lighting, treeline removal, noise and increased human presence
Bird Assemblages	Negative	Imperceptible	Developable area and surrounding areas suitable for roosting and foraging	Unlikely	Long-term	Increased human presence, lighting Vegetation clearance and noise
Small (Non-volant) Mammals	Negative	Permanent	Vegetation and connecting habitats on-Site	Unlikely	Permanent	Habitat fragmentation, increased human presence
Fauna of the Glashaboy Estuary	Negative	Slight	Adjacent Estuary	Unlikely	Long-term	Surface water run-off

11.8.3 Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant impacts taking place over a period of time or concentrated to within a single location. Cumulative effects can occur where a Proposed Development results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

The effects of the proposed Development are considered likely to be confined to the immediate area of the Site and will be limited to habitat degradation of commonly occurring and widespread habitats as well as temporary disturbance and displacement of local fauna which may be present within the Site or within the immediate surroundings and which may utilise the Site. These effects are not considered to be significant. Therefore, it is considered that there is no pathway for other plans and projects to act in-combination and to give rise to cumulative effects.

In addition to assessing potential impacts on a local scale, the sections that follow assess the potential for in-combination effects to take place on a wider scale under several sub-headings.

11.8.3.1 Relevant Plans and Policies

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

- Cork City Development Plan (2022-2028).
- Cork Biodiversity Action Plan (2021-2026).
- Cobh Municipal District Local Area Plan 2017.
- All Ireland Pollinator Plan (2021-2025).

Each of these plans has undergone AA, and where potential for likely significant effects has been identified (e.g., in the case of the Cork County Development Plan), an NIS has been prepared which identifies appropriate mitigation. As such, it is considered that the plans and policies listed will not result in in-combination effects with the Proposed Development.

The Cork City Development Plan 2022-2028 has directly addressed the protection of biodiversity through through specific Objectives and policies The Cork County Biodiversity Action (2021-2026) and the All-Ireland Pollinator plan are set out to protect and improve biodiversity and as such will not result in negative in-combination effects with the Proposed Development.

Therefore, on examination of the above it is considered that there are no means for the Proposed Development to act in-combination with any plans or projects that would cause any likely significant effects to nearby ecological sensitivities.

11.8.3.2 Existing Planning Permissions

As standard practice, a search of planning applications located within the Glanmire and Dunkettle area for which the Site of the Proposed Development is located was conducted using online planning resources such as the National Planning Application Database (NPAD) (MyPlan.ie) and Cork City Council Planning Applications online map. Any planning applications listed as granted or decision pending from within the last five years were assessed for their potential to act in-combination with the Proposed Development and cause likely significant effects on the relevant key ecological receptors. Long-term developments granted outside of this time period were also considered where applicable.

It is noted that the majority of the few developments within the vicinity of the Site of the Proposed Development are applications granted for small scale extensions and alterations to existing permitted developments.

11.8.3.3 Carrigrennan Waste Water Treatment Plant (WWTP)

Foul waters generated by the Proposed Development will be processed at Carrigrennan WWTP. Likely significant effects on Lough Mahon (and associated SPA) as a result of foul waters generated by the Proposed Development were screened out at stage one of the AA process, as detailed below.

The Carrigrennen WWTP was identified by the EPA as being non-compliant with the Emission Limit Values (ELVs) as set out in the Wastewater Discharge Licence for 2022, according to the 2022 Annual Environmental Report (AER) for the facility (Irish Water, 2022). It is also noted that Biochemical Oxygen Demand (BOD) and Total Nitrogen were the only parameters of all ELV’s that this treatment plant was non-compliant for.

Ambient monitoring of the Lough Mahon coastal/transitional waterbody does not meet the required Environmental Quality Standards (EQS) at the upstream and downstream monitoring locations. The discharge from the WWTP does not have an observable impact on water quality or an observable impact on the Water Framework Directive Status

It is not expected that foul waters generated by the Proposed Development will present any source of significant impacts to Lough Mahon transitional waterbody and associated SPA post treatment and discharge from the WWTP.

11.9 Mitigation Measures

11.9.1 Incorporated Design Mitigation

Included in this section are avoidance measures that are embedded into the project design which will further serve to protect water quality of the Glashaboy Estuary (and any downstream designated sites), ensuring no impacts to the hydrological regime of Lough Mahon and Cork Harbour occur.

Avoidance measures integrated into the project design includes the sustainable infrastructure mentioned in Section 11.9.1.1 below (e.g. green roofs and rainwater harvesting), planting and retention of native tree and shrub species within the green infrastructure areas within the main Site area and spanning the southern extent of the Site.

These are considered standard best practice design and it is envisaged that the same or greater will be included in the detailed design for LRD Phase 2.

11.9.1.1 Avoidance and Mitigation Embedded in Project Design

The Proposed Development includes several embedded design features that may act to avoid or mitigate negative impacts that would likely occur in the absence of these features. However, as opposed to typical mitigation measures, the implementation of these features is integral to the design and completion of the Proposed Development, and as such the impact assessments are performed with consideration of these features as integrated parts of the Proposed Development. All considered embedded design features that may act to mitigate negative impacts on local ecology and environment are listed in Table 11-22.

Table 11-22 Embedded design features and their potential to act to avoid or mitigate negative impacts on the local ecology and environment

Embedded Design Feature	Avoidance / Mitigation Potential
SUDS: ▪ Permeable Pavements. ▪ Greenroofs. ▪ Tree Pits ▪ Percolation Areas ▪ Swales ▪ Ponds ▪ Rainwater Harvesting. ▪ Attenuation Tank. ▪ Detention Basins. ▪ Flow Control Device. ▪ Hydrocarbon and silt Interceptors. ▪ Swales. ▪ Management Train.	The SUDS features included in the Project Design will ensure the surface water discharge from the Proposed Development is reduced to greenfield runoff rates. These features will be implemented as part of the surface water drainage design.

Embedded Design Feature	Avoidance / Mitigation Potential
Landscape Design: ▪ Wildflower Meadows ▪ Bee Hotels ▪ Bat and nocturnal wildlife friendly lighting. ▪ Attenuation Pond with biodiversity friendly planting and hibernacula ▪ Log Piles ▪ Creation of new woodland ▪ Native planting ▪ Bird and bat boxes	The landscape features will buffer the existing high biodiversity value areas on Site and further connect valuable habitats. The adjacent SPA will be separated from construction and operational activities, enhanced by the landscape design.
Lighting Design ▪ <1lux lighting in nocturnal wildlife sensitive areas.	Lighting is designed so as to reduce glare and unnecessary light spill into the valuable Woodland and Treeline habitats on Site.

11.9.1.2 Biodiversity Enhancement

11.9.1.3 Biodiversity Enhancement by Design

The landscape plan incorporates native planting throughout the green spaces of the Proposed Development including the addition of native species on the periphery of the existing woodlands and the creation of a new woodland area to the east, connecting the eastern section of the Site to the riparian woodland and hedgerows already present (DMNA 2024). Additionally, as part of SuDS measures, an attenuation pond will be located to the north, close to the edge of the Glanmire Wood pNHA, eventually outfalling into the Glashaboy Estuary post settlement and treatment.

The planting of native shrubs in the ground layer will provide cover and nesting opportunities for birds and small mammals. While the mixed planting of wildflowers, hedgerow, scrub, fruit trees and wildflower meadow will attract insects which act as food sources for the above species groups and pollinator species.

The above measures are considered good for promoting pollinators and are considered to provide an overall enhancement of the biodiversity at the Site from the baseline due to the low value and extent of habitats that are to be lost to facilitate the Proposed Development. As such, these measures are considered to have a potential positive impact at a local scale.

11.9.1.4 Enhancement 1: Amphibian and Reptile Hibernacula

It is recommended to enhance the proposed attenuation pond area to the north of the Site area for amphibian and reptile use by providing suitable refuge and hibernacula around it. It is recommended that 2-3 areas of hibernacula are provided at the northwest boundary of the attenuation area, as this is furthest removed from traffic and likely human activity, and the location would provide a potential link to the adjoining ditch and treelines.

Hibernacula for amphibians and reptiles is relatively easy to create from rubble, wood and soil, all of which can likely be sourced from the Site during works. Rubble and wood in various sizes should be piled either in a shallow depression or on the slope of the attenuation pond in a disorganised way to create nooks and crevices. Larger tree trunks or rocks should be placed so that they will protrude through the final mound to provide open entrances to the mound. This pile should then be covered in soil to allow the inner crevices to maintain a stable temperature through the winter and allow for hibernation. The top can be planted with for example grass and native wildflowers. See Figure 11-34 for examples of finished hibernacula.

Figure 11-34 Examples of suitable amphibian and reptile hibernacula and refugia

11.9.1.5 Enhancement 2: Bird Box/ Swift Brick Scheme

A bird box/Swift brick scheme is proposed to be installed at the Site of the Proposed Development and should be implemented with the landscape plan so as to enhance the potential bird nesting habitat in the area during its Operational Phase.

A total of 6 No. bird boxes are proposed to be installed on suitable trees around the Site, to provide nesting habitat for breeding birds that may be using the Site. The location of bird boxes will be advised by a suitably qualified ecologist.

In addition, and as part of this scheme, it is proposed to include 20 No. Swift bricks. These nest bricks will be installed at least 5 metres above the ground, in safe areas where they will not be disturbed. As the bricks tend not to overheat, they can be placed on any aspect, N, S, E, W. Care will be taken to ensure no obstacles or plate glass windows are located below the bricks.

The Swift bricks are installed side by side, in sets of 10 on each block, as Swifts are a social nesting species, on suitable buildings within the proposed development.

Guidelines for the bird box scheme should also follow guidelines published by Swift Conservation Ireland, and those published by Birdwatch Ireland entitle “Saving Swifts” (2009/2010).

11.9.1.6 Enhancement 3: Bat Box Scheme

It is proposed to place a total of 4 No. bat boxes on suitable retained trees within the Site. These will provide an important roost habitat for bat species which may be using the Site. As such, a suitably qualified ecologist will be required to select and oversee the placement of these bat boxes in suitable locations, paying consideration factors such as aspect and height.

These bat boxes, will work in tandem with the following, to ensure that the Proposed Development will not result in a significant adverse impact on bat species:

- The reinstatement of grassland habitat and wildflower meadows along edge habitat (e.g., scrub and hedgerow edges);
- The planting of multiple tree species within the Site;
- The bat friendly lighting plan, and;
- The planting of trees to provide connectivity and additional foraging and commuting habitat throughout the Site.

11.9.1.7 Enhancement 4: Wildflower Meadows

The Landscape Plan includes the planting of wildflower meadows lost due to Construction works. It is recommended that wherever possible proposed wildflower areas are allowed to regenerate naturally by way of the existing seedbank within the soils present on Site. In addition, this can be supplemented by locally sourced wildflower seeds where necessary. At the very least, it is recommended that all wildflower seeds will be Irish Provenance Certified Seed, from a reputable source such as Design by Nature (Wildflowers.ie). To maximise the biodiversity value of the landscaping at the Site, consideration has been made to the All-Ireland Pollinator Plan planting code (NBDC, 2022).

11.9.1.8 Enhancement 5: Native Planting

The Landscape Plan also includes the planting of trees, scrub, and native hedgerows. Whilst higher value trees will be retained, the majority of trees planted as part of the Proposed Development will be native species and will comprise a mix of species already present on Site.

The planting of native shrubs in the ground layer of the woodland habitat will provide cover and nesting opportunities for birds and small mammals. While the mixed planting of wildflowers, lawns, and hedgerows will attract insects which are a food resource for multiple species including birds, bats, and small mammals.

Native hedgerows are recommended to be retained, only removing hedgerows that are necessary from a public health and safety perspective. Hedgerows should be prioritised as an enhancement feature in relation to birds, this will provide connectivity and breeding opportunities for birds on the periphery of the Proposed Development, some of which is under the developer’s ownership. Where possible, hedgerows should be managed sympathetically (median height >2m and not cut every year) in order to remain attractive for a range of species (Finch et al, 2022).

11.9.1.9 Enhancement 6: Insect Hotels

The landscape plan includes the insertion of 2 No. insect hotels in select areas around the Site, during its Operational Phase. Insect hotels will be located in areas that are destined to be undisturbed, such as the areas bounding the perimeter where dense scrub vegetation is proposed.

11.9.1.10 Enhancement 7: Log Piles for Invertebrates and Fauna

Piles of logs and other woody vegetation arising from the proposed tree felling will be left in suitable secluded margins of the Site where they will remain undisturbed. These will provide habitat for Common Frog and small mammals such as Hedgehog and Pygmy Shrew. These areas of woody debris will also benefit local invertebrate species through the provision of shelter and food sources (precise locations to be proposed by ECoW).

11.9.1.11 Enhancement 8: Low Intervention Hedgerow/ Treeline Management

The proposed hedgerows will be managed in a way that maximises the ecological value they provide at the Site, with habitat connectivity maintained along the margins of the Site; connecting it in with the wider field boundary network in the area.

This connectivity is vital for wildlife such as birds, bats, mammals and insect pollinators in a human landscape such as that which will be provided by the Proposed Development. Additionally, by managing hedgerows and treelines in a more natural way, they will provide more in terms of biodiversity; through increased plant diversity, increase provision of food resources and higher quality shelter to wildlife inhabiting and commuting through the area.

For the hedgerows running along the outer margins of the Site, the following management approach is proposed to maximise their biodiversity value and offset the loss of any sections of existing hedgerows at the Site. Should planning be granted, a **Hedgerow Management Plan** will be prepared by a suitably qualified ecologist; for the hedgerows at the Site. This management plan will include the following, with a focus on maintaining these hedges in as natural a state as possible to maximise their ecological value:

- The hedgerows located along the outer boundaries of the Site will, as much as is practicable, link up with each other. The provision of an almost continuous vegetative margin around the Site; through planted native hedgerows and trees, will maintain habitat connectivity with the surrounding environment.
- Hedgerows will be maintained with a **natural meadow strip of 1-2m** at their base wherever possible. Hedges with plenty of naturally occurring flowers and grasses at the base support will provide higher quality habitat for local wildlife using the hedges.
- The 1-2m strip at the base of the hedgerow will be cut on a reduced mowing regime to encourage wildflower growth and maximise the value of the hedgerow for pollinators. A **two-cut management approach** is ideal for suppressing coarse grasses and encouraging wild flowers. Cut the hedgerow basal strip **once during February and March** (this is before most verge plants flower and it will not disturb ground-nesting birds). Cut the verge **once again during September and October** (this slightly later cutting date allows plants that were cut earlier in the year time to grow and set seed).
    - N.B. Raising the cutter bar on the back cut will lower the risk to amphibians, reptiles and small mammals.
- Hedgerows, where possible, will be allowed to reach <u>at least</u> 2.5m in height, and should be **trimmed in an A-shape**; maintaining a wider base to compliment the natural meadow strip at their base. Existing hedgerows being retained at the Site that are taller than 2.5m should be retained as is and pruned lightly as required.
- Where hedgerow trimming needs to occur delay trimming as late as possible – until **January and February** as the surviving berry crop will provide valuable food for wildlife. The earlier this is cut; <u>the less food will be available</u> to help birds and other wildlife survive through the winter. Any hedgerow cutting will be done outside of the nesting season and due consideration of the Wildlife Act 1976 (as amended) needs to be taken.

- Where possible, cut these outer boundary hedgerows on a minimum **3-year cycle** (cutting annually stops the hedgerow flowering and fruiting), and cut in rotation rather than all at once - this will ensure some areas of hedgerow will always flower (Blackthorn in March, Hawthorn in May etc.).
- Where they occur naturally, Bramble and Ivy should be allowed grow in hedgerows, as they provide key nectar and pollen sources in summer and autumn.

11.9.1.11.1 Methods to Avoid

Hedgerows will not be over-managed. Tightly cut hedges mean there are fewer flowers and berries, thus reducing available habitats, feeding sources and suitable nesting sites.

Hedgerows will not be cut between March 1st and August 31st inclusive. It is both prohibited (except under certain exemptions) and very damaging for birds as this is the period they will have vulnerable nests containing eggs and young birds. Red-listed bird species Yellowhammer (recorded on Site) in particular nest up until the end of August.

DO NOT use pesticide/ herbicide sprays or fertilisers near hedgerows as they can have an extremely negative effect on the variety of plants and animals they support.

11.9.1.12 Infrastructure

A *Site Civil Infrastructure Design Statement and SuDS Impact Assessment* Report has been prepared by JODA Consulting Engineers (2024) in relation to this LRD Phase 1. The relevant sections from the Report are summarised below to provide comprehensive information for the evaluation of the potential impacts of the Proposed Development. This includes the following attenuation and Sustainable Drainage Systems (SuDS) measures (JODA Consulting Engineers, 2024):

- Percolation Areas
- Pond
- Permeable Pavements.
- Green roofs.
- Rainwater Harvesting.
- Tree Pits.
- Attenuation Tanks.
- Stilling Basins.
- Petrol Interceptor.
- Swales.
- Management Train.

These SuDS elements have the capacity to retain and filter pollutants and assist with suspended solids removal prior to discharge in addition to providing attenuation on the surface and within filter materials. Due to the Site layout and topography, not all paved areas could be directed to bioretention areas/swales, but they have been included wherever practicable adjacent to roads and hard-standing areas along the southern section of the Site, receiving water from the adjoining lands and footpaths. The swales will allow for an element of infiltration but ultimately will have a connection to the attenuation system.

It is proposed to provide a hydrobrake or similar approved, at the outfall of the surface water catchment to restrict the flow of water from the subject site, as well as providing a petrol interceptor upstream of the attenuation tanks to ensure that any remaining hydro-carbons or pollutants within the runoff from trafficked areas are treated prior to outfall at the existing watercourse. These devices will remove hydrocarbons and fine sediment particles from the site runoff and lower the risk of downstream contamination following an oil spillage on site.

11.9.2 Construction Phase

11.9.2.1 Best practice Measures

Table 11-23 gives a summary of the best practice development standards and mitigation measures to be implemented during the Construction Phase of the Proposed Development. The measures listed are outlined in more detail in the CEMP (JODA, 2024) under separate cover, with the table below identify the relevant ecology mitigation measure.

Table 11-23 Summary Of best practice standards and mitigation outlined in the outline construction and environmental management plan (JODA,2024) where specific information relating to key ecological receptors is required under these measures.

Theme	Best Practice Standards and Mitigation	Ecology Specific Mitigation
Soils and Geology	During the demolition and construction phase, excavations and exposed sub-soils in open cuts will be blinded and protected with clean broken stone as soon as possible after exposing the subsoil to prevent erosion by surface water runoff for the duration of this phase. Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins. Excavated topsoil and subsoils required for reuse on site will be temporarily stored on site for re-use otherwise it will be exported. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body	Please refer to the CEMP that accompanies this report for all ecology specific mitigation measures relating to soils and geology.
Management of Invasive Alien Species	An IAS Specialist will be contracted to treat and eradicate the Travellers Joy and Sycamore on Site, per TII Technical Guidance on 'Management of Invasive Plant Species on National Roads' published in December 2020. Other measures include restriction of vehicle movements, pressure-washing of all vehicles and vehicles carrying IAS off site, all materials imported to be certified as free from invasive materials.	Yes, see mitigation 8.

Theme	Best Practice Standards and Mitigation	Ecology Specific Mitigation
Measures for Protection of Birds	Any clearance of vegetation should ideally be carried out outside the main breeding season, i.e., 1st March to 31st August, in compliance with the Wildlife Act 2000. Where any removal of vegetation within this period is deemed unavoidable, a qualified Ecologist will be instructed to survey the vegetation prior to any removal taking place. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the Ecologist confirms the young have fledged.	Yes, See Mitigation 11 and 12.
Measures for Protection of Bats	Where possible, Construction Phase lighting will be switched off during non-working hours. However, during use, directional lighting will be the lighting of choice as this will minimise light spill from the site, into any surrounding areas which may be in use by bats or other nocturnal animals that may be commuting/foraging in the area. It is recommended that LED luminaires possessing a warm white spectrum (2700k – 3000k) be used so as to reduce the blue light component. LED lights are also ideal due to their sharp cut-off, lower intensity, and dimming capabilities.	Yes, See Mitigation 11,12 and 15.
Water, Hydrology, - Water Supply, Drainage & Utilities	Measures for erosion and sediment control (i.e., settlement ponds), prevention and control of accidental spills and leaks, concrete handling. Appropriate use of settlement ponds, foul water to be discharged via existing connections at the public sewer, and all connections (wastewater, water supply, electrical, gas and telecommunications) to be made by authorized and qualified people. During the demolition and construction phase, excavations and exposed sub-soils in open cuts will be blinded and protected with clean broken stone as soon as possible after exposing the subsoil to prevent erosion by surface water runoff.	Yes, See Mitigation 9.
Site Compound Facilities and Parking	A number of car parking spaces will be provided on a temporary basis for use by the contractor adjacent to the site compound. Construction parking will be managed/ controlled during the works subject to the requirements of any planning conditions. It is estimated that up to 125 staff will be required on site during construction. Site facilities will be provided within the extent of the proposed development along with vehicular access routes from the public road. All deliveries will be controlled at the identified. compound location. The designated storage area will be identified prior to taking delivery of the materials and the driver will be directed to the compound. Site access, and the delivery of construction materials, will be carefully planned and managed throughout the construction works.	Please refer to the CEMP that accompanies this report for all ecology specific mitigation measures relating to Site Compound Facilities and Parking.

Theme	Best Practice Standards and Mitigation	Ecology Specific Mitigation
	Site access to the Contractor compound area will be via the marked routes.	
Construction Waste Management	The proposed activities include site preparation, excavation, building and construction, services installation, materials delivery, materials and waste removal and any other associated engineering works. A Construction Waste Management Plan has also been prepared to accompany this application.	Please refer to the CEMP that accompanies this report for all ecology specific mitigation measures relating to Construction Waste Management.
Noise and Vibration	Local Authority requirements with regard to the control of noise and vibration shall be observed during the works. The noise will comply with the following: BS 5228-1: 2009+A1:2014 Code of Practice for Noice Vibration Control on Construction and Open Sites: Noise; BS 5228-2:2009 Code of Practice for Noise and Vibration control on Construction and Open Sites:Vibration; Environmental Protection Agency Act 1992 Sections 106-108, Local Authority's specific requirements depending on the location of the site, and Safety, Health and Welfare at Work (Control of Noise at Work) Regulations 2006 SI 371 (2006).	Refer also to Chapter 12 of the EIAR (Noise and Vibration) for additional measures which shall be implemented for the duration of the works. Suitable methods of working and items of plant shall be chosen so that the maximised measured ground vibrations do not exceed the limits set out in Chapter 12 of the EIAR.
Dust and Air Quality	Dust control measures shall be implemented in accordance with best practice and with reference to the following: The EIAR, in particular Chapter 12 of the EIAR, accompanying this application, Air Pollution Act 1987, BS 6187: Code of Practice for Demolition. Avoid unnecessary vehicle movements and maneuvering, and limit speeds on site to minimise the generation of airborne dust; Use of rubble chutes and receptor skips during construction activities; During dry periods, dust emissions form heavily trafficked locations (on and off sites) will be controlled by spraying surfaces with water and wetting agents; Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only; Re-suspension in the air of spillages material from tanks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper; The overloading of tipper trucks exiting the site shall not be permitted; Aggregates will be transported to and from the site in covered trucks;	No.

Theme	Best Practice Standards and Mitigation	Ecology Specific Mitigation
	Where the likelihood of windblown fugitive dust emissions is high and dry weather where conditions, dusty site surfaces will be sprayed by mobile tanker bowser; Wetting agents shall be utilised to provide a more effective surface wetting procedure; Exhaust emissions from vehicles operating within construction sites, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns, the positioning of exhaust at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels; All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods; Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins; Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers; Dunkettle Development: Construction Environmental Management Plan JODA Engineering Consultants Concrete cutting equipment shall be fitted with a water dampening system; A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition of construction phase activities to ensure that the air quality standards relating to dust deposition and PM10 are not exceeded. Where levels exceed specified air quality limit values, dust gathering activities shall immediately cease and alternative working methods shall be implemented; A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated; Dust netting and site hoarding shall be installed along site boundaries with adjacent properties as necessary to minimise fugitive wildblows dust	

Theme	Best Practice Standards and Mitigation	Ecology Specific Mitigation
	emissions falling in third party lands and existing residential areas.	

In addition, to ensure the CEMP remains ‘fit for purpose’ for the duration of the project it should be reviewed and updated by the Main Contractor(s) / Project Manager in consultation with the ECoW during the life of the project to ensure that it remains suitable to facilitate efficient and effective delivery of the project’s environmental commitments. The Contractor shall also designate a Site Engineer/Manager/Assistant Manager as the Construction Waste Manager and who will have overall responsibility for the implementation of the Project Waste Management Plan (WMP). This Plan will be prepared upon appointment of the Main Contractor.

Additional mitigation measures required for sufficient protection of the KERs identified in this report, and/or details for the specific implementation of the mitigation measures as per the above table are given in the below sections.

11.9.2.2 Mitigation 1: Establish Storage, Cut and Fill Requirements

Prior to construction commencing the Contractor will be required to establish quantities of waste which will be generated by the excavation works for the substructure, roads and underground civil infrastructure, and how these will be stored, reused or exported from the Site. The contractor will be required to determine the number and size of settlement tanks and temporary surface water percolation areas required (more detail provided below).

The Contractor will prepare Construction Method Statements for key construction activities, including but not limited to:

- Site set-up;
- Sequence of works – in particular, soil disturbance and reinstatement;
- Earthworks;
- Pouring of concrete;
- Construction of residential units;
- Construction of on-site waste water treatment plant;
- Construction of settlement ponds;
- Landscaping works, and;
- Emergency protocols for surface water management.

The Employers Representative and ECoW will be required to review and sign off by the Local Authority on all Construction Method Statements prior to works commencing.

11.9.2.3 Mitigation 2: Siting of Mitigation Measures, Site Compound, and Storage

In advance of construction commencing, the ECoW, Employers Representative and Contractor will undertake a walkover of the Site. The locations of silt fencing, settlement tanks, lagoons, monitoring locations, site compounds and storage areas will be determined. It will be the responsibility of the Contractor to draw up a Construction Phase drainage and mitigation drawing which must be signed off by the ECoW and Employers Representative, this detail is outlined in the CEMP accompanying this chapter under separate cover.

This drawing must include the following information:

- The location of all surface water features (springs, drains, watercourses on/adjacent to the Site;
- The location of silt fences;
- The location(s) of settlement ponds/tanks and standby silt buster equipment;
- The location(s) of surface water percolation areas;
- The location of site compounds;
- The location of site welfare facilities;
- The location(s) of storage areas (e.g., stockpile locations) (detailed further in the next section);
- The location of the wheel wash;
- The location of the haul route, and;
- The location of spill kits and refuelling areas.

11.9.2.4 Mitigation 3: Ecological Clerk of Works (ECoW)

Prior to the commencement of the Construction Phase, the Site Ecologist will be on Site to ensure that the silt fences and bunding are correctly positioned in the correct locations and are effectively managed to ensure any run-off from these areas is intercepted.

11.9.2.5 Mitigation 4: Preparation of a Water Management System

All water protection measures will be incorporated into a detailed Water Management System (WMS) which will be prepared by the contractor.

The WMS will be drawn up in consultation with the ECoW and Employers Representative and will take into account any changes in the physical conditions of the Site e.g. river flows or ground conditions, which may have occurred subsequent to the submission of the application.

11.9.2.6 Mitigation 5: Public Signage on all entrances to Glanmire Wood pNHA

In order to protect the rich ground flora and fauna within Glanmire Wood pNHA, a number of signs will be erected on all entrances to the area informing the public of access restrictions. Access to the woods will be strictly for maintenance purposes and this will be made clear to future residents to maintain the ecological integrity of the ancient woodland. Recreation and amenity opportunities for future residents will be confined to the external perimeter through the use of proposed greenways, without the need to enter into the woods directly. The woods will be protected from incursion by a Paladian style fence, as outlined in the landscape report accompanying this application under separate cover (DMNA, 2024). Lighting will be minimised on the perimeter of the woodland in order to reduce/negate impacts on nocturnal wildlife, including bat species.

11.9.2.7 Mitigation 6: Bat sensitive lighting

DATE: 24 October 2024 DESIGNER: Karol Drapala

PROJECT No: KE/RE/DGC/01 PROJECT NAME: Dunkettle Glanmire Cork

Horizontal Illuminance (lux)

Estate SW

Results

Eav	5.10
Emin	1.06
Emax	15.83
Emin/Emax	0.07
Emin/Eav	0.21

Figure 11-35 Lighting Plan showing proposed lux levels on the edge of Glanmire Wood pNHA

11.9.2.8 Mitigation 7: Tree Protection

Protective tree fencing in compliance with BS 5837:2012 ‘Trees in relation to design, demolition and construction – Recommendations’ will be erected prior to any Construction works being undertaken to prevent damage to the canopy and root protection areas of existing trees at the Site. The fencing will be signed off by a qualified arborist prior to Construction to ensure it has been properly erected.

No ground clearance, earthworks, stock-piling or machinery movement will be undertaken within these areas.

11.9.2.9 Mitigation 8: Invasive Species Management

Cherry laurel which is classed as a High-impact invasive species is present within the Glanmire Wood pNHA to the north of the Site, and also within the wider area within the applicant's landholding. A suitably qualified ISM specialist will be required to make provision for the control and adequate removal and monitoring of this species in order to protect the integrity of the protected area on Site, and the wider environs.

All of the medium impact invasives and their respective distributions at the Site are not significant and their removal will not be an issue, however this will be placed at the discretion of the invasive species specialist with responsibility for invasive species management throughput the duration of the project.

Transport Infrastructure Ireland (2020) guidance 'The Management of Invasive Alien Plant Species on National Roads – Technical Guidance' will be consulted with regards the treatment, removal and disposal of invasive flora at the Site.

11.9.2.9.1 Biosecurity Measures

The following measures will be adhered to, to avoid the introduction or dissemination of invasive species to and from the Site of the Proposed Development site.

For the Construction Phase the contractor will prepare a project specific IAPS standard operating procedure document, in advance of work commencement. The document should be prepared by an IAPS specialist and should cover the bio-security measures to be taken, including the maintenance of records, to screen for the introduction of IAPS onsite, and to enable their tracing if such an introduction occurs; and to ensure no transmission of IAPS offsite. These measures to include:

- Removal of Cherry Laurel from the Site to be advised by a Invasive Species specialist.
- Validation that all machinery / vehicles are free of IAPS, prior to their first introduction to site.
- Certification from the suppliers that all imported soils and other fill/landscaping materials are free of IAPS.
- A regular schedule of site inspections across the IAPS growing seasons, for the duration of the construction works programme.
- Validation that all machinery / vehicles are free of IAPS, prior to leaving the site.
- Appropriate and effective site biosecurity hygiene to ensure that no IAPS are transmitted offsite for the duration of the Proposed Works.

11.9.2.10Mitigation 9: Aquatic and Surface Water Protection

To ensure that no contaminated waters containing silt, fuel, cementitious materials etc., have the potential to enter the receiving surface water network during the Construction Phase of the Proposed Development, a suite of mitigation measures will be put in place, all of which have been outlined in the CEMP which accompanies the application, along with all other relevant measures recommended to protect environmental sensitivities during the Proposed Works (including those listed in the NIS report).

11.9.2.11 Mitigation 10: Reduction of Noise Related Impacts

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

To mitigate this disturbance, the following measures will be implemented:

- Selection of plant with low inherent potential for generating noise.
- Siting of plant as far away from sensitive receptors as permitted by Site constraints.
- Avoidance of unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well-maintained and avoid steep gradients.
- Minimize drop heights for materials or ensure resilient material underlies.
- Where noise originates from resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate.
- Limiting the hours during which Site activities likely to create high levels of noise are permitted.
- Appointing a Site representative responsible for matters relating to noise.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

These measures will ensure that any noise disturbance to nesting birds or any other fauna species in the vicinity of the Site of the proposed development will be reduced to a minimum.

11.9.2.12 Mitigation 11: Timing of Vegetation Clearance

To ensure compliance with the Wildlife Act 2000 as amended, the removal of areas of vegetation will not take place within the nesting bird season (March 1st to August 31st inclusive) to ensure that no significant impacts (i.e., nest/egg destruction, harm to juvenile birds) occur as a result of the Proposed Development. Where any removal of vegetation within this period is deemed unavoidable, a qualified Ecologist will be instructed to survey the vegetation prior to any removal taking place. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the Ecologist confirms the young have fledged.

Error! Reference source not found. Table 11-24 provides guidance for when vegetation clearance is p ermissible. Information sources include The Herpetological Society of Ireland, the British Hedgehog Preservation Society's Hedgehogs and Development and The Wildlife (Amendment) Act, of 2000.

The preferred period for vegetation clearance is within the months of September and October. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., Hedgehog). Where this seasonal restriction cannot be observed, a check for active roosts and nests, as well as signs of amphibians, will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist and repeated as required to ensure compliance with legislative requirements.

Table 11-24 Seasonal restrictions on vegetation removal. Red boxes indicate periods when clearance/works are not permissible

Ecological Feature	January	February	March	April	May	June	July	August	September	October	November	December
Amphibians	🟩 Vegetation /habitat clearance permissible		🟥 Amphibian breeding season (Estimated) No habitat destruction unless confirmed to be devoid of tadpoles and other signs of amphibians				🟩 Vegetation/habitat clearance is permissible if devoid of tadpoles and signs of amphibians.					
Breeding Birds	🟩 Vegetation clearance permissible		🟥 Nesting bird season No clearance of vegetation or works permitted unless confirmed to be devoid of nesting birds by an ecologist.						🟥 Vegetation clearance permissible.			
Hibernating mammals (namely Hedgehog)	🟥 Mammal hibernation season No clearance of vegetation is permitted unless confirmed to be devoid of hibernating mammals by an ecologist.			🟩 Vegetation clearance permissible.							🟥 Mammal hibernation season No clearance of vegetation or works to relevant structures is permitted unless confirmed to be devoid of hibernating mammals by an ecologist.	
Bats	🟥 Tree felling is to be avoided unless confirmed to be devoid of bats by an ecologist								🟩 Preferred period for tree-felling		🟥 Tree felling is to be avoided unless confirmed to be devoid of bats by an ecologist	
Common Lizard	🟥 Lizard Hibernation Season No habitat clearance permissible			🟩 Active period Habitat (Scrub) clearance permissible.							🟥 Lizard Hibernation Season No habitat clearance permissible	

11.9.2.13 Mitigation 12: Small Mammal and Fauna Protection

The following general avoidance measures will be incorporated to minimise impacts to mammals during the Construction Phase:

11.9.2.13.1 Hours of work

The hours of working will be limited to daylight hours where possible, so as to limit disturbance to nocturnal and crepuscular animals.

11.9.2.13.2 Waste Management

As best practice, all construction-related rubbish on Site e.g., plastic sheeting, waste, wires, bags, netting in which animals can become entangled etc. will be kept in a designated area and kept off ground level so as to prevent small mammals such as hedgehogs from entrapment and death.

11.9.2.13.3 Excavations & Pipes

Trenches/pits must be either covered when not in use/at the end of each working day with caps (especially at night) or include a means of escape for any animal falling in and getting stuck. If this is not possible, then a strategically placed plank or object should be placed in the corner of an excavation to enable animals to safely escape (Badgers will continue to use established paths across a Site even when construction work has started).

Any temporarily exposed open pipe system will be capped in such a way as to prevent badgers from gaining access as may happen when contractors are off-site.

11.9.2.14 Mitigation 13: Construction Phase Lighting Regime

Where possible, Construction Phase lighting will be switched off during non-working hours. However, during use, directional lighting will be the lighting of choice as this will minimise light spill from the site, into any surrounding areas which may be in use by bats or other nocturnal animals that may be commuting/foraging in the area.

It is recommended that LED luminaires possessing a warm white spectrum (2700k) be used so as to reduce the blue light component. LED lights are also ideal due to their sharp cut-off, lower intensity, and dimming capabilities. See Bat Activity results maps (Figures 11-23-33, Section 11.6.4.3.2.4) for detailed illustrations of core bat foraging and commuting areas within the overall EIAR study area.

11.9.2.15 Mitigation 14: Ecological Clerk of Works (ECoW)

A suitably qualified Ecological Clerk of Works (ECoW) will be present on-site for the duration of the works until monitoring for each construction element listed in the SOWOR is no longer required and has been signed off by the ECoW and the Employers Representative. The ECoW will ensure that all targeted ecological mitigation measures identified in this Chapter, the NIS and CEMP are adhered to in full.

The ECoW will also ensure that the silt fences and bunding are correctly positioned in the correct locations as per the CEMP and are effectively managed to ensure any run-off from these areas is intercepted.

11.9.3 Operational Phase

11.9.3.1 Mitigation 15: Operational Phase Invasive Species Management

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

Despite the measures identified in the CEMP for the importation of only clean materials, there is the potential for the inadvertent import of invasive species to the Site. If established, there is a risk of further spread both within and out of the Site.

As such, it is recommended that any newly landscaped areas, particularly where infill materials and soils have been imported for soft landscaping, are assessed during the Operational Phase within the next botanical season for the presence of any inadvertently introduced invasive species, with particular focus on those listed on Schedule III of SI 477 of 2011. If invasive species are detected, an Invasive Species Management Plan will be prepared, agreed with the Local Authority and implemented at the earliest possibility to limit the potential for further spread by ongoing operations at the Proposed Mixed-use Development.

11.9.3.2 Mitigation 16: Operational Phase Lighting

In order to minimise disturbance to bats utilising the site in general, the lighting and layout of the Proposed Development will be designed to minimise light-spill onto habitats used by the local bat population foraging or commuting. See Bat Activity results maps (Figures 11-23-33, Section 11.6.4.3.2.4) for detailed illustrations of core bat foraging and commuting areas within the overall EIAR study area. This can be achieved by ensuring that the design of lighting accords with guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers *'Bats and Lighting in the UK - Bats and Built Environment Series'*, the Bat Conservation Trust '*Artificial Lighting and Wildlife Interim Guidance*' and the Bat Conservation Trust *'Statement on the impact and design of artificial light on bats'*. Therefore, where possible, the lighting scheme will include the following:

- Lighting will only be installed where necessary for public safety in known Bat Foraging and Roosting locations (Riparian corridor/pedestrian greenway). These lights have been designed and selected with specific shutters and filters to minimise any potential for back spills into the sensitive locations while still providing the primary function of safely lighting the pedestrian routes.
- Lighting along the riparian woodland corridor and existing treelines, and woodland margins (notably to the west and east) will be avoided where possible and bat friendly; using low level bollards, motion sensors where applicable, once health and safety standards are met.
- Reflectance – Downward lighting can be reflected from bright surfaces. To minimize bat disturbance, the design avoids the use of bright surfaces and incorporates darker colour lamp heads and poles to reduce reflectance. Only luminaires with an upward light ratio of 0% and with good optical control to be used.
- Lighting controls and dimming shall be utilised for post-curfew times.
- Shielding of Luminaires & Light - To minimize bat disturbance, the design avoids the use of upward lighting by shielding or by downward directional focus. i.e., no upward tilt.
- Type of Light – To minimize bat disturbance, the design avoids the use of strong UV lighting. The lighting design is based on the use of LED lighting which has minimal or no UV output of significance. Warmer 2700°K LED lighting will be utilized for amenity areas, as the warmer colour temperatures with peak wavelengths greater than 550nm (~3000°K) cause less impacts on bats.

11.9.3.3 Mitigation 17: Hedgehog Highways

By creating a number of separate private dwellings and gardens at a Site, the land becomes fragmented and largely inaccessible to species such as Hedgehog, which like to roam each night in search of food (garden pests e.g., slugs). This can easily be fixed by ensuring that the boundaries and barriers within and surrounding the Site i.e., garden fencing, railings and gates, are permeable for Hedgehogs. This can be achieved by:

- The use of fence panels with 13 x 13 cm holes at ground level (Hedgehog holes);
- Leaving a sufficient gap beneath gates, and;
- Leaving brick spaces at the base of brick walls.

Figure 11-36 Examples of 'Hedgehog highways' that can maintain habitat connectivity for Hedgehogs in residential developments (Images: BHPS Guidance document).

The inclusion of hedgehog highways will be considered as part of the landscape design of the Site, specifically the private garden boundary fencing. A variety of fence suppliers stock specific hedgehog-friendly fencing options, which can be easily incorporated at little or no additional cost. These simple measures will provide habitat connectivity at the Site for Hedgehogs and reduce the impact of the land-use change on this species.

Including details of hedgehog-friendly features in the new home owner's welcome pack will raise awareness and prevent home owners from reversing these features, for instance blocking fence holes.

11.9.3.4 Mitigation 18: Public Signage

In order to mitigate against an increase in human traffic with pets (specifically pet dogs) to the Glanmire Wood pNHA, signage should be erected on the proposed Paladian style fencing surrounding the woodland, that clearly states all pet owners should be kept on leads at all times and not allowed to enter the woodland area encompassing Glanmire Wood.

11.9.3.5 Mitigation 19: Woodland Monitoring

In order to ensure the Proposed Development is not having an adverse effect on the adjoining Glanmire Wood, and to provide added mitigation measures (should they be required) monitoring of the integrity and structure of the woodland will take place every two years for the first ten years post construction.

11.10 Residual Impact Assessment

Residual impacts are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated. Table 11-25 below provides a summary of the impact assessment for the identified KERs and details the nature of the impacts identified, the mitigation measures proposed, and the classification of any residual impacts.

Both standard Construction Phase control measures, and specific mitigation measures, have been outlined to ensure that the Proposed Development does not impact on any species, habitats or designated sites of conservation importance. It is essential that these measures are complied with, in order to ensure that the Proposed Development complies with National conservation legislation.

Provided all recommended measures are implemented in full and remain effective throughout the lifetime of the Proposed Development, no significant negative residual impacts on the local ecology, or on any designated nature conservation sites, will occur as a result of the Proposed Development.

Table 11-25 Summary of potential impacts on KERs, mitigation proposed and residual impacts.

Key Ecological Resource	Evaluation	Potential Impact	Impact Without Mitigation				Proposed Mitigation / Mitigating Factors	Proposed Enhancements	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance			
DESIGNATED SITES									
As the potential for water quality impacts on the Glashaboy Estuary and associated Cork Harbour SPA has been highlighted, mitigations for same were included in the CEMP and NIS reports accompanying this report under separate cover. Once all mitigations contained in these reports are adhered to, significant impacts on designated sites owing to the Development are not envisaged.									
HABITATS									
WN5 – Riparian Woodland	National Importance	**Construction Phase:** Loss of habitat	*Negative*	*Local*	*Short-term*	*Slight*	Mitigation 2, 3, 6,13,16, 18 & 19	Proposed Biodiversity Enhancement by Design: Landscape Plan. Enhancement 5: Native Planting.	**Imperceptible**
		Operational Phase: Disturbance, loss of habitat and light pollution.	*Negative*	*Local*	*Long-termt*	*Slight*			
WN1 – Oak Birch Holly Woodland	Regional/County Importance	**Construction Phase:** Loss of habitat	*Negative*	*Local*	*Short-term*	*Slight*	Mitigation 2, 3, 6,13,16, 18 & 19	Enhancement 5: Native Planting.	**Imperceptible**
		Operational Phase: Disturbance, loss of habitat and light pollution.	*Negative*	*Local*	*Long-term*	*Slight*			

Key Ecological Resource	Evaluation	Potential Impact	Impact Without Mitigation				Proposed Mitigation / Mitigating Factors	Proposed Enhancements	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance			
WL2 – Treeline	Local Importance (Higher Value)	**<u>Construction Phase:</u>** Risk of damage to roots. **<u>Operational Phase:</u>** Disturbance, loss of habitat and light pollution..	*Negative* *Negative*	*Local* *Local*	*Short-term* *Long-term*	*Slight* *Slight*	Mitigation 7: Tree Protection.	Enhancement 5: Native Planting. Enhancement 8: Low intervention Hedgerow/Treeline Management	**Imperceptible**
ADJACENT/LINKED HABITATS									
MW4 - Glashaboy Estuary (Cork Harbour SPA)	International Importance	**<u>Construction Phase:</u>** Deterioration of water quality from construction-related pollutants. **<u>Operational Phase:</u>** Surface water run-off during operational phase.	*Negative* *Negative*	*Local* *Local*	*Short-term* *Long-term*	*Slight* *Slight*	Mitigation 1: Establish Storage, Cut and Fill Requirements Mitigation 2: Siting of Mitigation Measures, Site Compound and Storage Mitigation 3: Ecological Clerk of Works	None. This habitat is located outside of the Site Boundary.	**Imperceptible**

Key Ecological Resource	Evaluation	Potential Impact	Impact Without Mitigation				Proposed Mitigation / Mitigating Factors	Proposed Enhancements	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance			
							Mitigation 4: Preparation of a Water Management System Mitigation 9: Aquatic and Surface Water Protection Mitigation 10: Reduction of noise related impacts. Best practice development standards outlined in various sections of the CEMP. SUDS measures.		

Key Ecological Resource	Evaluation	Potential Impact	Impact Without Mitigation				Proposed Mitigation / Mitigating Factors	Proposed Enhancements	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance			
				FAUNA					
Bat Assemblage	Local Importance (Higher Value)	**<u>Construction Phase:</u>** Loss of habitat due to lighting disruption of boundary habitats. **<u>Operational Phase:</u>** Disturbance due to proposed public lighting.	*Negative* *Negative*	*Local* *Local*	*Short-term* *Permanent*	*Slight* *Slight*	Mitigation 3: Ecological clerk of works Mitigation 6: Bat sensitive lighting Mitigation 13: Construction Phase lighting regime Mitigation 16: Operational Phase lighting regime	Biodiversity Enhancement by Design (Landscape Plan which includes significant tree and hedgerow planting suitable for commuting/foraging bats. Enhancement 3: Bat Box Scheme Enhancement 5: Native Planting	**Imperceptible**
Bird Assemblage	Local Importance (Higher Value)	**<u>Construction Phase:</u>** Risk of injury or death during vegetation clearance.	*Negative*	*Local*	*Short-term*	*Significant*	Mitigation 11: Timing of Vegetation Clearance Best practice development standards outlined in	Biodiversity Enhancement by Design (Landscape Plan which includes significant tree, grass and hedgerow planting for ground/tree/shrub nesting birds, shelter,	**Imperceptible**

Key Ecological Resource	Evaluation	Potential Impact	Impact Without Mitigation				Proposed Mitigation / Mitigating Factors	Proposed Enhancements	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance			
		Disturbance from noise, dust and/or lighting. **<u>Operational Phase:</u>** None identified.					various sections of the CEMP.	and commuting/foraging. Enhancement 2: Bird Box and Swift Brick Scheme. Enhancement 5: Native Planting (Hedgerow planting on-site) Enhancement 7: Log piles for invertebrates and fauna. Enhancement 8: Low Intervention Hedgerow/ Treeline Management.	
Mammals (Hedgehog, Badger, Pine marten, Pygmy Shrew)	Local Importance (Higher value)	**<u>Construction Phase:</u>** Risk of injury or death during vegetation clearance and / or entrapment in construction-related rubbish.	*Negative* *Negative*	*Local* *Local*	*Short-term* *Long-term*	*Moderate* *Moderate*	Mitigation 5: Public signage on all entrances to Glanmire Wood pNHA Mitigation 7: Tree protection	Enhancement 5: Native Planting (Hedgerow planting on-site) Enhancement 7: Log piles for invertebrates and fauna.	**Imperceptible**

Key Ecological Resource	Evaluation	Potential Impact	Impact Without Mitigation				Proposed Mitigation / Mitigating Factors	Proposed Enhancements	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance			
		<u>Operational Phase:</u> None identified.					Mitigation 11: Timing of Vegetation Clearance Mitigation 12: Small Mammal and Fauna protection Mitigation 17: Hedgehog Highways	Enhancement 8: Low Intervention Hedgerow/ Treeline Management.	
Amphibians	Local Importance – Higher Value	**<u>Construction Phase:</u>** Risk of injury or death during vegetation clearance and / or entrapment	*Negative*	*Local*	*Short-term*	*Moderate*		Enhancement 5: Native Planting (Hedgerow planting on-site) Enhancement 7: Log piles for invertebrates and fauna.	**Imperceptible**
		<u>Operational Phase:</u> None identified	*Negative*	*Local*	*Long-term*	*Moderate*		Enhancement 8: Low Intervention Hedgerow/ Treeline Management.	

11.10.1 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 11-26 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Designated Sites	Negative	Imperceptible	Cork Harbour SPA	Unlikely	Long-term	Increased human presence, lighting, Surface water run-off
Bat assemblages	Negative	Imperceptible	10ha of Glan-mire Wood pNHA, Treelines and habitats interspersing the Site	Likely	Permanent	Operational phase lighting, treeline removal, noise and increased human presence
Bird Assemblages	Negative	Imperceptible	Developable area and surrounding areas suitable for roosting and foraging	Unlikely	Long-term	Increased human presence, lighting Vegetation clearance and noise
Small (Non-volant) Mammals	Negative	Imperceptible	Vegetation and connecting habitats on-Site	Unlikely	Permanent	Habitat fragmentation, increased human presence
Fauna of the Glashaboy Estuary	Negative	Imperceptible	Adjacent Estuary	Unlikely	Long-term	Surface water run-off

Table 11-27 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Designated Sites	Negative	Imperceptible	Cork Harbour SPA	Unlikely	Long-term	Increased human presence, lighting, Surface water run-off
Bat assemblages	Negative	Imperceptible	10ha of Glan-mire Wood pNHA, Treelines and habitats interspersing the Site	Likely	Permanent	Operational phase lighting, treeline removal, noise and increased human presence
Bird Assemblages	Negative	Imperceptible	Developable area and surrounding areas suitable for roosting and foraging	Unlikely	Long-term	Increased human presence, lighting Vegetation clearance and noise
Small (Non-volant) Mammals	Negative	Imperceptible	Vegetation and connecting habitats on-Site	Unlikely	Permanent	Habitat fragmentation, increased human presence
Fauna of the Glashaboy Estuary	Negative	Imperceptible	Adjacent Estuary	Unlikely	Long-term	Surface water run-off

11.10.2 Cumulative Residual Effects

Effects arising as a result of the cumulative impact of combined factors are not foreseen, based on the detail described in Table 11-26 & 11-27 above.

11.11 Risk of Major Accidents or Disasters

The Proposed Development has been assessed and considered in relation to its vulnerability to major accidents and disasters, in compliance with the EIA Directive on assessment of the effects of certain public and private projects on the environment (2017). It can be reasonably concluded that the proposed development is not vulnerable to give rise to major accidents or disasters of any kind, including those likely to pose a risk to the environment and/or Biodiversity.

11.12 Worst Case Scenario

The worst case scenario for the Proposed Development area including all lands within the clients ownership at Dunkettle (EIAR boundary) is defined as the development of all lands as detailed in the phase 1 design to the north of the landholding, the future development of lands directly south of phase 1 (to a comparable specification and design) and coinciding with other plans and projects as detailed in Section 11.8.3. Taking into account the mitigation measures and the residual impacts that remain, the impacts on Biodiversity is not significant.

11.13 Interactions

The main interactions for biodiversity are:-

- Landscape & visual (Chapter 5)
- Material Assets: Built Services (Chapter 7)
- Material Assets: Waste (Chapter 8)
- Land & Soils (Chapter 9)
- Water & Hydrology (Chapter 10)

There are no interactions foreseen which could pose a risk due to accumulation of multiple non-significant effects resulting from the Proposed Development of Phase 1 or subsequent phases of the lands within the EIAR study area.

11.14 Monitoring

Table 11-28 below provides a summary of the required monitoring and pre-works inspections during the Construction Phase, as well as any surveys that should be completed during the Operational Phase. The monitoring, inspections and surveys will ensure that the identified mitigation measures are implemented and maintained efficiently and have the desired effect of protecting the local ecology from adverse impacts.

The monitoring/surveys outlined below will be included in a Biodiversity Management Plan (BMP) for the Proposed Development, along with the detailed mitigation measures for the Construction and Operational Phases (sections 6.2 and 6.3) and Biodiversity Enhancement Measures (section 6.6).

In addition to the items listed below, this document should detail the landscape management operations for the Proposed Development, including cutting/trimming regimes and maintenance of bird and bat boxes (if applicable). This document will also be updated to reflect any follow-up survey results as they are carried out. The BMP will be prepared and agreed in consultation with a suitably qualified ecologist and Cork City Council.

Table 11-28 Monitoring and Pre-Works inspections for the identified mitigation measures of the proposed Development to be carried out by a suitably qualified ecologist or ecological clerk of works (Highlighted in green) or by the development.

Measure	Monitoring
PRE-CONSTRUCTION PHASE	
Mitigation 1: Establish Site Conditions	No monitoring required – to be set up by Employers Representative
Mitigation 2: Siting of Mitigation Measures, Site Compound and Storage	No monitoring required. The location and placement of these structures should be carried out under the advisement and supervision of an Ecologist with the Employers Representative to ensure they are fit for purpose.
Mitigation 3: Ecological Clerk of Works (ECoW)	No monitoring required – to be set up by Client/Employers Representative to bring in independent, suitably qualified Ecologist (with FPM experience) to complete all ECoW duties
Mitigation 4: Preparation of a Water Management System	No monitoring required – to be set up by Employers Representative
Mitigation 5: Public signage on all entrances to Glanmire Wood pNHA.	To be set up by ECoW
Mitigation 6: Bat Sensitive Lighting	No monitoring required
CONSTRUCTION PHASE	
Mitigation 7: Tree Protection	Ongoing monitoring by ECoW per CEMP
Mitigation 8: Invasive Species Management	Ongoing monitoring by ECoW per CEMP
Mitigation 9: Aquatic and Surface Water Protection	Ongoing monitoring by ECoW per CEMP
Mitigation 10: Reduction of Noise Related Impacts	Ongoing monitoring by contractor.
Mitigation 11: Timing of Vegetation Clearance	Clearance activity including tree and hedgerow removal (where necessary) to take place between March 1st to August 31st inclusive, to ensure that no significant impacts (i.e., nest/egg destruction, harm to juvenile birds) occur as a result of the Proposed Development.
Mitigation 12: Small Mammal and Faunal Protection	Ongoing monitoring ECoW per CEMP
Mitigation 13: Construction Phase Lighting Regime	Ongoing monitoring ECoW per CEMP
Mitigation 14: Ecological Clerk of Works	Ongoing monitoring ECoW per NIS and CEMP
OPERATIONAL PHASE	

Mitigation 15: Operational Phase Invasive Species Management	An Invasive Species Survey will be carried out by a qualified Ecologist during the next botanical season after soft landscaping has been completed.
Mitigation 16: Operational Phase Lighting	No monitoring required
Mitigation 17: Hedgehog Highways	The location and placement of these structures should be carried out under the advisement and supervision of an Ecologist to ensure they are fit for purpose.
Mitigation 18: Public Signage	No monitoring required, should be established as soon as the project complete
Mitigation 19: Woodland Monitoring	The woodland will be monitored by a suitably qualified ecologist every 2 years, for a ten year period post construction.
ENHANCEMENT	
Enhancement 1: Amphibian and Reptile Hibernacula	The placement and construction of these structures should be carried out under supervision of an Ecologist to ensure they are fit for purpose.
Enhancement 2: Bird Box/Swift Brick Scheme	The location and placement of these structures should be carried out under the advisement and supervision of an Ecologist to ensure they are fit for purpose.
Enhancement 3: Bat Box Scheme	The location and placement of these structures should be carried out under the advisement and supervision of an Ecologist to ensure they are fit for purpose.
Enhancement 4: Wildflower Meadows	Contractor to oversee.
Enhancement 5: Native Planting	Contractor to oversee.
Enhancement 6: Insect Hotels	The location and placement of these structures should be carried out under the advisement and supervision of an Ecologist to ensure they are fit for purpose.
Enhancement 7: Log Piles for Invertebrates and Fauna	The location and placement of these structures should be carried out under the advisement and supervision of an Ecologist to ensure they are fit for purpose.
Enhancement 8: Low Intervention Hedgerow Management	Management to oversee.

11.15 Summary of Mitigation and Monitoring

The following Table summarises the Construction Phase mitigation and monitoring measures.

Table 11-29 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Designated Sites – **significant, negative, short-term effects**	Mitigation 8: Invasive Species Management Mitigation 9: Aquatic and Surface Water Protection Mitigation 10: Reduction of Noise Related Impacts Mitigation 13: Construction Phase Lighting Regime Mitigation 14: Ecological Clerk of Works	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.

Likely Significant Effect	Mitigation	Monitoring
Habitats and Flora – **slight, negative, short-term effects**	Mitigation 7: Tree Protection Mitigation 8: Invasive Species Management Mitigation 9: Aquatic and Surface Water Protection Mitigation 10: Reduction of Noise Related Impacts Mitigation 11: Timing of Vegetation Clearance Mitigation 12: Small Mammal and Faunal Protection Mitigation 13: Construction Phase Lighting Regime Mitigation 14: Ecological Clerk of Works	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.
Native Fauna – Bats **significant, negative, short-term effects**	Mitigation 10: Reduction of Noise Related Impacts Mitigation 13: Construction Phase Lighting Regime Mitigation 14: Ecological Clerk of Works	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.
Native Fauna – Birds **significant, negative, short-term effects**	Mitigation 9: Aquatic and Surface Water Protection Mitigation 10: Reduction of Noise Related Impacts Mitigation 11: Timing of Vegetation Clearance Mitigation 13: Construction Phase Lighting Regime Mitigation 14: Ecological Clerk of Works	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.
Native Fauna – Small Mammals **moderate, negative, short-term effects**	Mitigation 7: Tree Protection Mitigation 9: Aquatic and Surface Water Protection Mitigation 10: Reduction of Noise Related Impacts Mitigation 11: Timing of Vegetation Clearance Mitigation 12: Small Mammal and Faunal Protection Mitigation 13: Construction Phase Lighting Regime Mitigation 14: Ecological Clerk of Works	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.
Native Fauna – Amphibians **moderate, negative, short-term effects**	Mitigation 7: Tree Protection Mitigation 9: Aquatic and Surface Water Protection Mitigation 11: Timing of Vegetation Clearance Mitigation 12: Small Mammal and Faunal Protection	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.

Likely Significant Effect	Mitigation	Monitoring
	Mitigation 14: Ecological Clerk of Works	
Native Fauna – Fauna of the Glashaboy Estuary **significant, negative, short-term effects**	Mitigation 8: Invasive Species Management Mitigation 9: Aquatic and Surface Water Protection Mitigation 10: Reduction of Noise Related Impacts Mitigation 13: Construction Phase Lighting Regime Mitigation 14: Ecological Clerk of Works	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.

The following Table summarises the Operational Phase mitigation and monitoring measures.

Table 11-30 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Designated Sites – **slight, negative, long-term effects**	Mitigation 15: Operational Phase Invasive Species Management Mitigation 16: Operational Phase Lighting Mitigation 17: Hedgehog Highways Mitigation 18: Public Signage Mitigation 19: Woodland Monitoring	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.
Native Fauna – Bats **moderate, negative, permanent effects**	Mitigation 16: Operational Phase Lighting	No monitoring required. Lighting design to be below 1 lux where practical from a public H&S perspective.
Native Fauna – Small Mammals **moderate, negative, permanent effects**	Mitigation 15: Operational Phase Invasive Species Management Mitigation 16: Operational Phase Lighting Mitigation 17: Hedgehog Highways Mitigation 18: Public Signage Mitigation 19: Woodland Monitoring	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.
Native Fauna – Fauna of the Glashaboy Estuary **slight, negative, long-term effects**	Mitigation 15: Operational Phase Invasive Species Management Mitigation 16: Operational Phase Lighting Mitigation 18: Public Signage Mitigation 19: Woodland Monitoring	Ongoing monitoring by ECoW per CEMP and Table 11-28 above.

11.16 Conclusion

It is considered that, provided the mitigation measures proposed within this report together with all best practice development standards as outlined in the CEMP are carried out in full, there will be no significant negative impact to any KER habitat, species group or biodiversity as a result of the Proposed Development.

Additionally, the landscaping plan for the Proposed Development was designed to offset some of the habitat loss that will result from the Proposed Development and further enhance the area in the form of native planting and woodland creation.

Furthermore, the attenuation pond at the Site allows for some additional habitat enhancements for small fauna such as reptiles and amphibians that may already be present at the Site to further offset the loss of habitats.

While the Proposed Enhancement Features serve to provide an overall biodiversity enhancement to the Site, which at present is predominantly comprised of Arable crops.

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Dunkettle EIAR

Volume II

Main Statement

CHAPTER 12

Noise & Vibration

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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12 Noise & Vibration

12.1 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 mix of residential units at Dunkettle, Glanmire, Co. Cork and the continued use of Dunkettle House as a private residence. 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.

12.2 Expertise & Qualifications

This chapter was prepared by 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.

This chapter of the EIAR was co-authored by Robert Holohan (Acoustic Consultant). Robert has a BA(Hons) in Geography and Business Marketing from Maynooth University as well as an environmental science background from his MSc in Coastal and Marine Environments from the University of Galway. He has completed noise monitoring campaigns across numerous sites and holds a certificate from the Institute of Acoustics in environmental noise monitoring. He has also contributed to various residential, industrial and infrastructure projects across Ireland through surveying, noise modelling and impact assessment.

12.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

For the purposes of this Chapter the Proposed Development, which includes a mix of residential dwellings ranging over 2-5 storeys and will also include a childcare facility and commercial floorspace in the centre of the development.

The cumulative assessment will include the LRD Phase 1 Proposed Development and LRD Phase 2, which includes a mix of residential dwellings and a second access point from Dunkettle Road (L2998). At the time of writing this EIAR, final detailed design proposals are not available for LRD Phase 2 but for the purposes of assessment in this EIAR, the location and general layout of Phase 2 has been referred to. At the time of writing this EIAR, no detailed design proposals have been prepared for Dunkettle House, the outbuildings or its attendant grounds and the House will remain in its current use as a private residence.

12.3.1 Construction Stage

During the construction phase, the main site activities will include 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 external to the Proposed Development, including Dunkettle House residents.

12.3.2 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 apartment buildings, commercial units and amenity spaces.

12.3.3 Cumulative Development

Due to the nature of the proposed development under consideration, the same characteristics apply to the LRD Phase 1 and LRD Phase 2 sub areas and the Dunkettle House development.

The cumulative construction impact assessment will consider the potential impacts on noise sensitive locations external to the cumulative development, including those Noise Sensitive Locations (NSLs) occupying LRD Phase 1 dwellings during the construction of LRD Phase 2.

12.4 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.

12.4.1 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.

12.4.2 Construction Phase Methodology

12.4.2.1 Criteria for Assessing Construction 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 may be found in 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 calls for 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 is 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.

Table 12-1 Example Thresholds of Potential Significant Effect at Dwelling.

Assessment category and threshold value period (L_{Aeq})	Construction Noise Threshold (CNT), in decibels (dB)		
	Category A[1]	Category B[2]	Category C[3]
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends[4]	55	60	65
Daytime (07:00 - 19:00) and Saturdays (07:00 – 13:00hrs)	65	70	75

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 12.6), 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, includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance 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 12-2 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	

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[1] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

[2] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

[3] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

[4] 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

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.

Construction Vehicular Traffic

In order to assist with interpretation of construction traffic noise, Table 12-3 includes guidance as to the likely magnitude of impact associated with changes in traffic noise levels along an existing road. This guidance is taken from the DMRB: Noise and Vibration (UKHE 2020). 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 12-3 Likely Effect Associated with Change in Traffic Noise Level – Construction Noise (DMRB 2020)

Increase in Traffic Noise Level (dB)	DMRB Magnitude of Impact (Short Term Period)	EPA Significance of Effect
<1.0	Negligible	Imperceptible
1.0 – 2.9	Minor	Not Significant to Slight
3 – 4.9	Moderate	Moderate
≥5.0	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.

12.4.2.2 Criteria for Assessing Construction Vibration Impacts

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. For the purpose of the proposed development, the range of relevant criteria used for surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

Peak Particle Velocity (PPV)

PPV is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values:

- 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), and;
- British Standard BS 5228: 2009 +A1 2014: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS 5228-2).

BS 7385-2 and BS 5228-2 advise that, for soundly constructed residential properties and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 of BS5228-2:2009+A1:2014 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges. For buildings or structures that are structurally unsound, lower vibration magnitudes will apply, typically 50% of those for structurally sound buildings. Protected or historic buildings are not automatically assumed to be more vulnerable to vibration unless they have existing structural defects.

The documents note that minor structural damage can occur at vibration magnitudes that are greater than twice those presented in Table 12-4. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table below. It should be noted that these values refer to the vibration at base of the building.

Table 12.4 sets out the limits as they apply to vibration frequencies below 4 Hz, where the most conservative limits are required.

Table 12-4 Recommended Construction Vibration Thresholds for Buildings

Structure Type	Allowable vibration (in terms of PPV) at closest part of sensitive property to source of vibration, at frequency of ≤4 Hz	
	Transient vibration	Continuous vibration
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s	25 mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15 mm/s	7.5 mm/s

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 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 12-5 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 12-5 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

12.4.3 Operational Phase Methodology

12.4.3.1 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 apartment and commercial 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 12-6 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 reflects 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 and a shop, café and GP located at ground floor level in LRD Phase 1.

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 12-7 and are based on annual average data.

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 12-7 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

12.4.3.2 Criteria for Assessing Inward Noise Impacts

Cork Noise Action Plan 2013 – 2018

The Cork Noise Action Plan (NAP) 2024 – 2028 has been published in order to address the requirements of the European Noise Directive 2002/49/EC. This document produced noise maps in order to determine the population exposure to noise levels that have potential health effects across the population.

The Cork Noise Action Plan (NAP) 2024 – 2028 states the following with respect to assessing the noise impact on new residential development:

> *"The Draft Interim National Guidance for the Consideration of Transportation Noise in the Design of New Residential Development (2021) (described in Section 2.3.12), which the Local Authorities have cognisance of, recommends that 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)."*

> *"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."*

Criteria for internal noise from BS8233 has also been outlined in the NAP:

> *"BS 8233:2014 is intended to provide recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of external noise sources. The guidelines for noise levels in a residential property are generally in accordance with WHO Guidelines for Community Noise and Night Noise Guidelines."*

The BS 8233 criteria has been adopted in this assessment, as explained in the preceding section. The *Professional Practice Guidance on Planning & Noise* (ProPG) guidance has also 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)[5] 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: -
    1. ***Element 1*** – Good Acoustic Design Process
    2. ***Element 2*** – Noise Level Guidelines
    3. ***Element 3*** – External Amenity Area Noise Assessment
    4. ***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 12-1 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.

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[5] Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH).

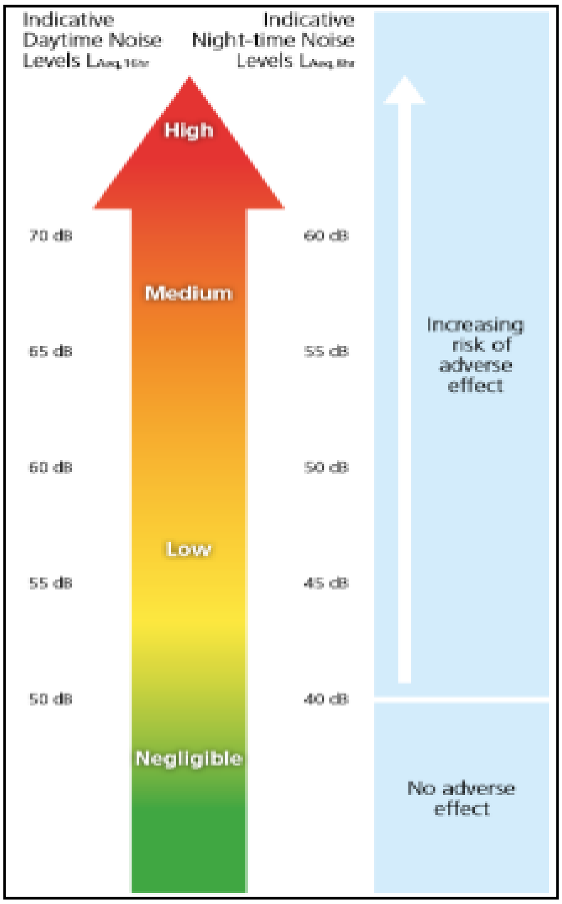

Figure 12-1 ProPG Stage 1 - Initial noise Risk Assessment

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 12-7 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 12.1 Acoustic Design Statement presents the ProPG assessment for the Proposed Development. Mitigation measures identified from the ProPG assessment are presented in Section 12.9.2.1 of this EIAR chapter. A glossary of acoustic terminology is available in Appendix 12.2.

12.5 Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

12.6 Description of Baseline Environment

The Study area comprising the proposed LRD Phase 1 development and the overall cumulative development within LRD Phase 2 and Dunkettle House, are located within Dunkettle Townland, Glanmire, County Cork.

For the Proposed Development and cumulative site 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 including the existing local road network to the north, east and west of the site.

The receiving environment in terms of baseline noise and vibration is expected to be the same for the cumulative development and each individual site within the development. Therefore, the baseline environment outlined in the following section does not differentiate between the Proposed Development or cumulative site of the development being assessed within this EIAR chapter.

12.6.1 Baseline Noise Survey

Baseline noise monitoring has been undertaken across the development site from 26 to 31 August 2024 to determine the range of noise levels at varying locations across the development site and to establish the existing noise climate the nearest existing noise sensitive locations.

The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise.*

12.6.1.1 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq}	is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
L_{AFmax}	is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.
L_{A90}	is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

12.6.1.2 Survey Equipment

The unattended and attended surveys were undertaken using RION NL-52 sound level meters. The equipment was check calibrated before and after the survey period.

12.6.1.3 Weather Conditions

Weather conditions during the unattended and attended surveys were calm and dry and did not adversely affect noise measurements.

12.6.1.4 Measurement Locations

One unattended noise monitoring location and four attended noise monitoring locations were surveyed around the development site. The locations are described below and illustrated in Figure 12-2.

UT1 Noise monitoring was undertaken along the southern boundary of the development site to characterise the noise levels incident on the closest receptors to the proposed development.

AT1 Attended noise monitoring was undertaken along Richmond Road, L2998. Proximate to residential houses along the road to characterise noise levels in that vicinity.

AT2 Attended noise monitoring was undertaken in the Avenue estate to characterise the noise environment in the local vicinity to the receptor.

AT3 Attended noise monitoring was undertaken in the Beeches estate to characterise the noise levels along the centre of the development location and nearest receptors, including Dunkettle House.

AT4 Attended noise monitoring was undertaken along Glanmire Road, R639. Proximate to Coláiste an Phiarsaigh and the residential and commercial buildings along the road.

Figure 12-2 Baseline Noise Survey Locations

12.6.1.5 Measurement Results

The results of the noise monitoring completed at the various locations are presented in the following sections. In general, it was noted that the noise environment consisted of local road traffic noise from the Lower Glanmire Road, R639 and Richmond Road L2998 along with vehicular movements in the estates which were surveyed. Additional noise came from intermittent aircraft flyovers, distant construction, car horns, pedestrians and other typical environmental noise.

Table 12-8 Noise Survey Results at Location AT1

Date	Time	Measured Noise Levels, dB		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
01/08/2024	10:00	65	83	44
	11:00	64	85	44
	12:00	64	82	44

Table 12-9 Noise Survey Results at Location AT2

Date	Time	Measured Noise Levels, dB		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
01/08/2024	10:18	40	63	35
	11:19	44	64	36
	12:20	42	59	37

Table 12-10 Noise Survey Results at Location AT3

Date	Time	Measured Noise Levels, dB		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
01/08/2024	10:37	43	59	39
	11:37	49	66	40
	12:39	43	54	40

Table 12-11 Noise Survey Results at Location AT4

Date	Time	Measured Noise Levels, dB		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
01/08/2024	13:20	62	79	53
	13:35	64	79	55
	13:50	63	77	53
	14:05	63	81	54
	14:20	62	83	54
	14:35	62	77	54

Table 12-12 Noise Survey Results at Location UT1

Date	Period	Measured Noise Levels, dB		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
26/07/2024	Day (07:00 – 19:00)	50	62	48
	Eve (19:00 – 23:00)	48	57	44
	Night (23:00 – 07:00)	42	52	39
27/07/2024	Day (07:00 – 19:00)	45	57	42
	Eve (19:00 – 23:00)	44	59	41
	Night (23:00 – 07:00)	42	53	36
28/07/2024	Day (07:00 – 19:00)	48	58	45
	Eve (19:00 – 23:00)	48	63	44
	Night (23:00 – 07:00)	44	51	39

Date	Period	Measured Noise Levels, dB		
		$L_{Aeq,T}$	L_{Amax}	$L_{A90,T}$
29/07/2024	Day (07:00 – 19:00)	48	57	47
	Eve (19:00 – 23:00)	44	57	41
	Night (23:00 – 07:00)	42	51	34
30/07/2024	Day (07:00 – 19:00)	47	57	44
	Eve (19:00 – 23:00)	45	57	42
	Night (23:00 – 07:00)	46	53	46
31/07/2024	Day (07:00 – 19:00)	48	58	46
	Eve (19:00 – 23:00)	46	57	43
	Night (23:00 – 07:00)	41	50	34
01/08/2024	Day (07:00 – 19:00)	44	57	42
	Eve (19:00 – 23:00)	-	-	-
	Night (23:00 – 07:00)	-	-	-
Average	$L_{Aeq\ 16hr}$ (07:00-23:00)	47	-	44
	L_{night} (23:00 – 07:00)	43	-	37

12.7 The ‘Do Nothing’ Scenario

The Do Nothing scenario includes retention of the current site without the proposed or cumulative 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).

As the cumulative site is zoned for development, in the absence of the Proposed Development or cumulative 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 developed proposed in this EIAR.

12.8 Potential Significant Effects

The general commentary presented in the following sections are the same across the Proposed Development (LRD Phase 1) and the cumulative development including LRD Phase 2 and Dunkettle House, unless otherwise indicated under the relevant headings. It is envisaged that c.125 dwellings will be constructed annually. This equates to a 10 year construction programme for the overall study area, with construction in some areas overlapping.

12.8.1 Construction Phase

12.8.1.1 Construction Noise

A variety of items of plant will be in use for the purpose of 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 LRD Phase 1 construction period will be approximately 5 years and hence impacts are temporary to short-term in nature at any one NSLs.

The proposed general construction hours are 07:00 to 18:00 hrs, Monday to Friday and 08:00 to 14:00 hrs on Saturdays. Some works may be necessary outside of these standard working hours, as detailed in Chapter 2.

As discussed in Section 12.4.2, 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: 65dB $L_{Aeq,12hr}$
- Evening and Weekends: 55dB $L_{Aeq,12hr}$

The main stages of construction in LRD Phase 1 will be progressed based on the following activities over the three construction stages (1A, 1B, 1C) from east to west:

- Establish contractor’s site compound and erection of site hoarding;
- Site clearance and topsoil stripping;
- Cut and fill to level and re-grading works within site to formation level;
- Installation of services (drainage networks, water supply, electricity, etc.);
- Construction of roads, footpaths & hard/ soft landscaping;
- Installation of foundations/ footings for buildings and retaining walls;
- Construction of new buildings (houses, duplex units and creche, commercial units);
- Connection to public services;
- Installation of electrical substations;
- Provision of proposed road finishes;
- Provision of landscaping finishes; and
- Complete all site finishes.

Due to the fact that the construction programme has been established in outline form, 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 associated with the planned works across the Phase 1 site.

Rock Excavation

Excavation of rock will be required at the eastern and western sides of the site where deeper excavations are required. The rock is typically red sandstone with mudstone and siltstone and is mostly excavatable using tracked excavators with toothed buckets. Isolated hard strata can occur in this rock type. It is estimated that approximately 1% of the overall rock excavation may be of sufficient hardness to require pneumatic hammering to loosen prior to excavation, requiring approximately 120 hours of rock hammering activity during the course of the works.

To assess the potential noise impact from this activity, a construction noise level of 92 dB L_{Aeq} at 10m has been used in the construction noise calculations.

Site Clearance, Bulk Excavation, Road Works and Foundations

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 and apartment / commercial 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, 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 along L2998, Dunkettle Road (NSL1), located to the east of the proposed development at distances of between 20 and 25m from the closest site works.

Other adjacent sensitive locations are at The Avenue Estate to the south of the site (NSL2) approximately 40m from the closest site boundary and approximately 70m from the closest proposed buildings. To the north-west, the closest NSL is along the Glanmire Road approximately 80m from the closest site boundary and 150m from development buildings (NSL3), with dense woodland screening the site. NSL4 represents Dunkettle House which is assumed to be occupied during development of the LRD Phase 1 and LRD Phase 2 proposals. Dunkettle House is 600m from the closest site boundary of LRD Phase 1 and 670m from the nearest development buildings. It is approximately 200 metres from the nearest buildings in LRD Phase 2. Figure 12-3 illustrates the closest NSLs to the development site.

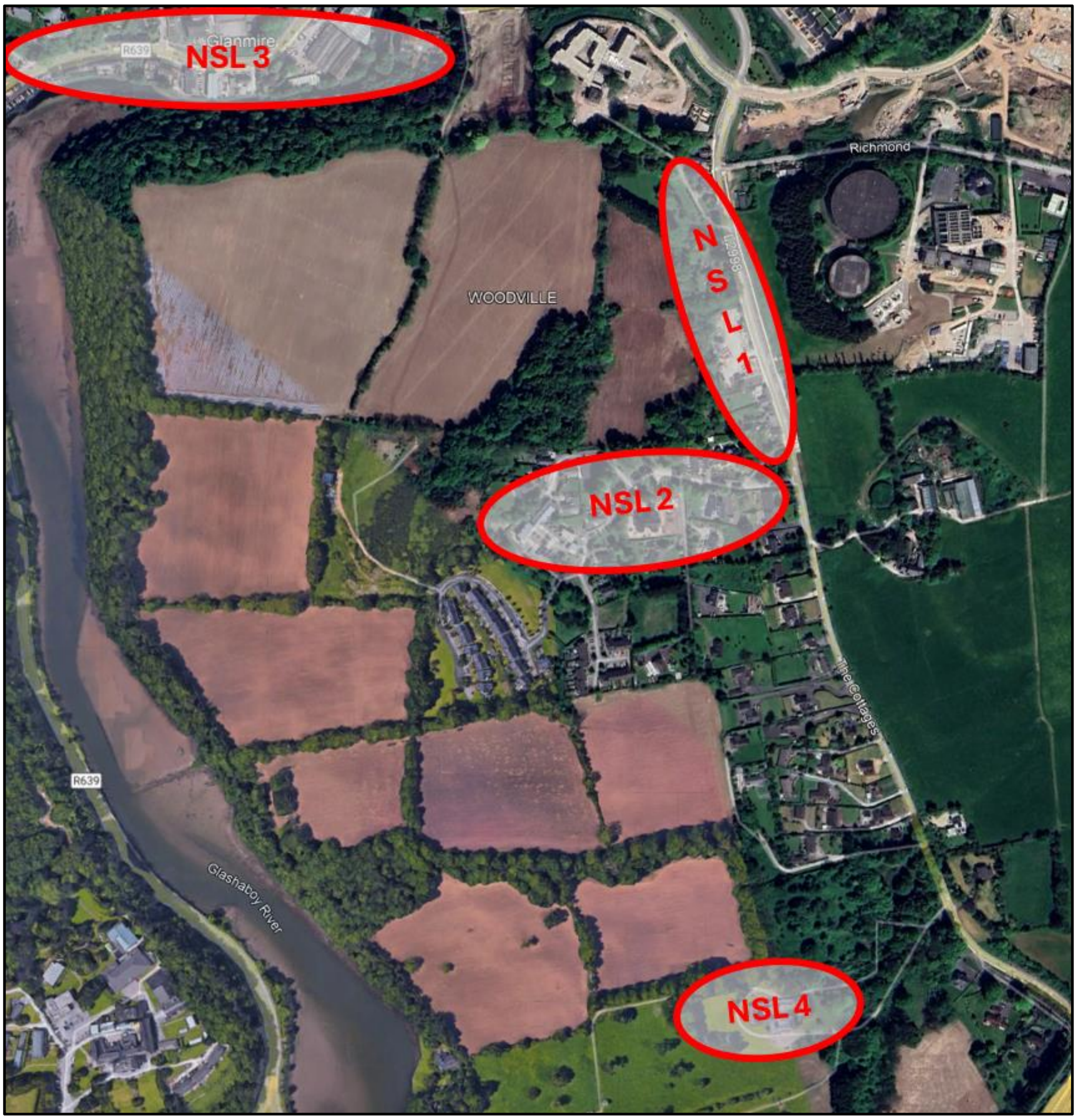

Figure 12-3 Closest NSLs to Phase 1 Development

Construction noise levels have been calculated at the closest NSLs, assuming the construction noise activities and source noise levels discussed above. For the purpose of the assessment, partial site screening (5 dB) has been assumed from the use of a standard site hoarding of 2.4 m high for noise sensitive boundaries. The calculations also assume that the equipment will operate for 66% of the working time. Table 12-13 summarises the result of this assessment.

Table 12-13 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations

Construction phase	Sound pressure level at construction works, dB L_{Aeq}	Calculated noise levels at varying distances, dB $L_{Aeq,T}$				
		NSL 1 20m	NSL 1 25m	NSL 2 70m	NSL 3 150m	NSL 4 670m

Rock Excavation using breakers	92	79	77	68	61	48
Site Clearance, bulk Excavation, foundations, and road works	85	72	70	61	54	41
Superstructure and Landscaping Works	78	65	63	54	47	34

Rock Extraction Works

During the early construction activities with higher noise emissions associated with rock breaking and rock extraction, the CNT is likely to be exceeded at NSL1 and NSL 2 located within 70m of the works. Highest noise levels are calculated at NSL 1, resulting in a negative, significant to very significant and temporary noise impact. At NSL2, impacts are categorised as negative, moderate to significant and temporary. At NSL3, noise levels associated with this activity can operate within the CNT, thus resulting in a negative, slight to moderate and temporary impact. It is noted that the majority of rock extraction will be feasible using excavators and tooted buckets which have lower noise emissions than those used in the calculations for this phase of work. The use of breakers are expected to be limited to approximately 10 days over the course of this construction phase.

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 for significant effects will be exceeded and hence the overall significance of effects are categorised as moderate.

Site Clearance, Bulk Excavation and Foundations

During the other early stage works requiring bulk excavation, site clearance and foundations noise, the CNT is likely to be exceeded at NSL1 located within 25m of the works resulting in a negative, significant to very significant and short-term noise impact.

At NSL2 and NSL3, noise levels associated with this activity can operate within the CNT, thus resulting in a negative, slight to moderate and temporary impact. At NSL 4 the noise levels associated with this activity are equal to or below the baseline noise level, and hence result in a neutral, not significant and temporary noise impact.

Superstructure and Landscaping Works

During the general construction working associated with house construction, compounds and landscaping etc. the calculated noise levels indicate that construction activities can operate within the adopted construction noise thresholds of 65 dB $L_{Aeq,T}$ at all NSLs. The resultant impact is categorised as negative, not significant to slight and short-term impact at the closest NSLs.

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 localised screening and other best practice control measures will be employed. Further discussion on construction noise and vibration control measures are included in Section 12.9.1.

12.8.1.2 Construction Traffic

Based on the information provided by the Construction Environmental Management Plan, prepared by JODA Engineering Consultants, it is anticipated that during LRD Phase 1 earthworks there will be up to 70 HGV round trips expected per day during peaks of materials exports processes. Assuming that no more than 14 HGV peak vehicle movements will be carried out in a one hour period during the construction works (70 round trips over a 10 hour period). It is assumed that all of the HGVs will enter / exit the site via L2998, Dunkettle Road. The nearest NSL to the site entrance is at 20m.

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 (20m) is in the order of 58 $L_{Aeq,1hr}$ and is therefore below the CNT of 65 dB $L_{Aeq,1hr}$ at the closest residential NSLs along Dunkettle Road. This is comparable to the baseline monitoring results that were in the order of 64 $L_{Aeq,1hr}$ at 10m from the roadside 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 medium-term impact at the closest receptors.

No further mitigation measures would therefore be required.

12.8.1.3 Construction 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 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 12-14. In terms of human response within buildings, there is potential for vibration magnitudes during rock breaking to be perceptible at low level at NSLs to the eastern and western boundaries of the site when the works are within 50m of the activity (NSL1). 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 of the activity and a negative, not significant and temporary impact at NSLs at further distances.

Mitigation measures and recommended good practices have been outlined in Section 12.9.1.

12.8.2 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 impacts 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 apartment buildings and commercial units.

Once operational, there are no noteworthy sources of vibration associated with the development site.

12.8.2.1 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 and Transportation Assessment relating to the LRD Phase 1 proposed development has been prepared by MHL Consulting Engineers to accompany the associated planning application. Figure 12-4 illustrates the road links assessed as part of this study.

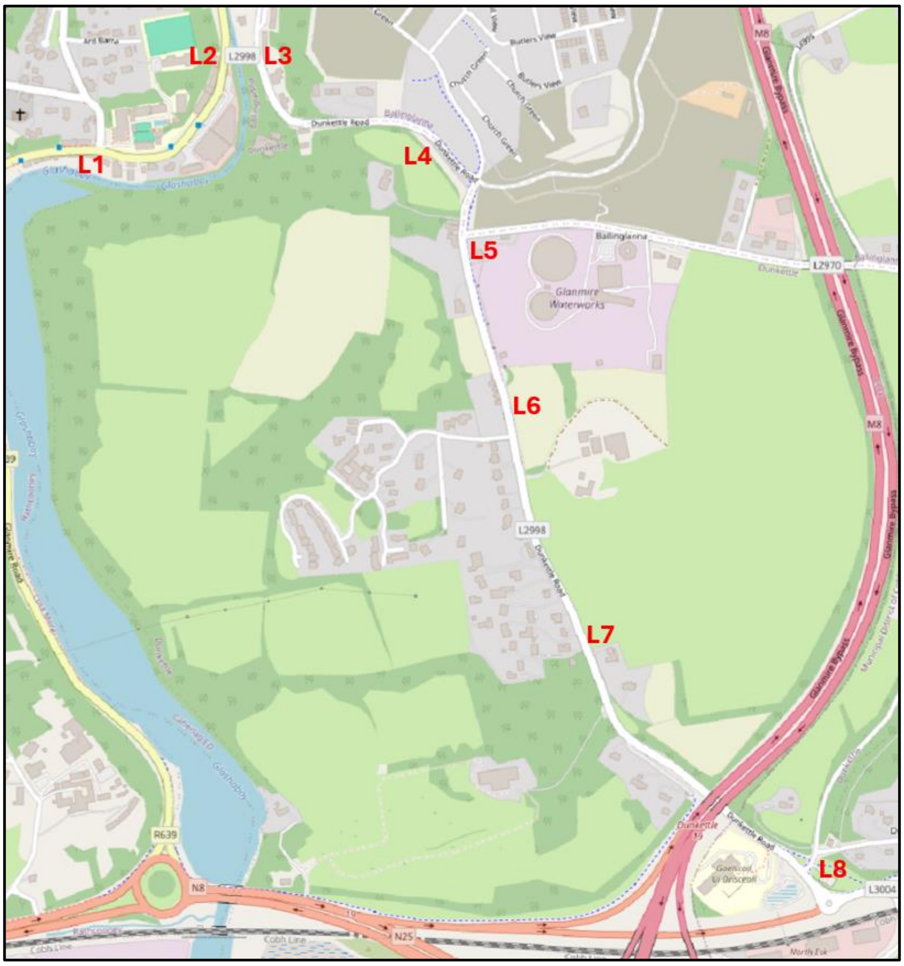

Figure 12-4 Road Links for Traffic Assessment

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.

Table 12-14 summarises the AADT for the Proposed Development DN and DS scenarios across the eight links.

Table 12-14 Summary of Change in Noise Level, for Years 2031 and 2041

Link Road	DN AADT 2031	DS AADT 2031	Increase in noise level dB	DN AADT 2041	DS AADT 2041	Increase in noise level dB
LINK 1	11,637	13,649	+0.7	12,768	14,780	+0.6
LINK 2	9,516	11,528	+0.8	10,441	12,453	+0.8
LINK 3	7,026	9,038	+1.1	7,711	9,723	+1.0

Link Road	DN AADT 2031	DS AADT 2031	Increase in noise level dB	DN AADT 2041	DS AADT 2041	Increase in noise level dB
LINK 4	10,745	12,757	+0.7	11,789	13,801	+0.7
LINK 5	9,451	11,463	+0.8	10,375	12,387	+0.8
LINK 6	1,523	3,535	+3.7	1,675	3,687	+3.4
LINK 7	10,343	12,355	+0.8	11,343	13,355	+0.7
LINK 8	11,148	13,159	+0.7	12,235	14,247	+0.7

The predicted increase in AADT traffic levels along the local road network surrounding the Proposed Development range between 0.7 to 3.7 dB(A) for the opening year 2031. During the future design year 2041, the calculated increase in traffic noise levels range between 0.6 – 3.4 dB(A). Reference to Table 12.6 confirms that the traffic noise level increases for both assessment years along the majority of road links are neutral to negative, imperceptible to not significant and long-term. At Link 6 (Richmond Hill, Dunkettle Road south) the increase in traffic noise is determined to be negative, slight to moderate and long-term. This is largely due to the increase in traffic volumes along the L2998 heading towards the M8/N8 into Cork City.

12.8.2.2 Building Services Plant

Once operational, there will be building services plant items required to serve the commercial and residential aspects of the proposed development. The specific requirements for mechanical and electrical plant items for each element of the residential buildings, commercial and crèche buildings have not yet been progressed 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 12-7.

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.

12.8.2.3 Creche Playground

Measurement of noise levels generated by children playing outdoors at several crèches indicate typical noise levels in the order of 56 dB $L_{Aeq,1hr}$ at distance of 5 metres. The nearest existing off-site noise sensitive locations to the north-west are approximately 220m from the Crèche play area. Considering the distance and screening from existing boundary treatments, activities from the crèche are calculated to be below 40 dB $L_{Aeq,1hr}$ and hence, is well below the range of baseline noise levels recorded to the north of the site at Location AT4, representing of properties set back from road traffic. The resultant noise impact is therefore neutral, not significant and long-term.

12.8.3 Cumulative Effects

For the purpose of the cumulative assessment, two scenarios have been considered.

The first scenario is a review of the cumulative construction impacts from development within the study area i.e. LRD Phase 1, LRD Phase 2 and Dunkettle House, as outlined in Chapter 2. For the construction assessment it has been assumed that LRD Phase 1 and LRD Phase 2 construction occurs consecutively, with some overlap, as outlined in Chapter 2 The concept of the future development proposals to Dunkettle House are included in this EIA Assessment , with any associated construction works taken to occur simultaneously with either LRD Phase 1 and LRD Phase 2.The closest NSLs to the cumulative site boundary have been considered.

The second scenario is a review of approved and proposed developments in the local area which are external to the study area, as summarised in Chapter 1 of this EIAR.

12.8.3.1 Cumulative Construction Noise Assessment – Scenario One

The closest residential NSLs to Phase 1 of the Proposed Development are indicated in Figure 12-5 e.g. NSL 1 to NSL 4, as previously presented in Section 12.8.1.1. Two additional NSLs have been assessed for the potential cumulative construction effects associated with both LRD Phase 1 and LRD Phase 2 to the south of the development site e.g. NSL 5 and NSL 6 are the closest off-site NSLs to the LRD Phase 2 development.

The cumulative construction noise levels associated with both LRD Phase 1 and LRD Phase 2 under construction concurrently have been calculated and are presented in Table 12-15. The calculations take account of the distance of the individual NSLs to the closest boundaries of both Phase 1 and Phase 2 and assume that each phase of work is occurring simultaneously. This is a highly conservative assessment.

Figure 12-5 Closest NSLs to Cumulative Phase Development (LRD Phase 1 and Phase 2)

Table 12-15 Cumulative Construction Noise Levels at Nearest NSLs

Construction phase	Calculated noise levels at varying distances, dB $L_{Aeq,T}$					
	NSL 1	NSL 2	NSL 3	NSL 4	NSL 5	NSL 6
Rock Excavation using breakers	79	74	62	59	51	51
Site Clearance, bulk Excavation, foundations, and road works	72	67	55	52	44	44
Superstructure and Landscaping Works	65	60	48	45	37	37

The cumulative noise levels are of a similar magnitude to those in LRD Phase 1 in isolation for NSL 1 and NSL 3. Residential properties at NSL 2 and NSL 4 are closer to LRD Phase 2 works and therefore dominated by works during this phase. In line with the Phase 1 assessment, highest noise levels will be experienced during the early stage works which are temporary in nature. At NSL 5 and NSL 6 the cumulative construction noise impacts are below the CNT and are comparable to the baseline noise environment, therefore the significance of effects at these southwestern and southeastern locations are neutral, not significant and short-term.

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 localised screening and other best practice control measures will be employed. Further discussion on construction noise and vibration control measures are included in Section 12.9.1.

12.8.3.2 Cumulative Construction Noise Assessment – Scenario Two

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 cumulative site (Phase 1 and Phase 2) should all sites progress construction simultaneously. The closest NSL with potential cumulative impacts relate to the NSLs located along the study area boundary of the cumulative site and other developments along the Dunkettle Road e.g. NSL 1.

The following developments are under consideration due to their proximity to the closest NSLs:

- Nursing home and childcare facility at the former Glanmire Rectory (Reg. Ref. No.'s 19/38900 and 21/40423);
- Residential development at Glanmire Lodge, Glanmire (Reg. Ref. No. 20/39719);
- Glanmire Roads Improvement Scheme a Project 9B (Dunkettle Road South – Woodville to Dunkettle) which has yet to commence. The construction of this element of the scheme and other remaining approved projects has the potential to overlap with the construction of the proposed cumulative development.
- Glashaboy Flood Relief Scheme - Construction of this flood relief scheme is due for completion in Q2 of 2026.

In the event that any of the developments above are under construction at the same time, there is potential for elevated construction noise emissions due to cumulative noise as well as a potential increase in the length of time that the receptor will be exposed to construction noise. As a worst case, assuming the same level of construction activity is occurring at all sites simultaneously, construction noise levels would be 3 dB higher than those in Table 12-15.

While a 3 dB increase is a doubling of sound energy, subjectively any change in noise level below 3 dB would be barely perceptible. This 3 dB increase (maximum doubling of plant items) is based on the practical number of plant and equipment items that could be reasonably assumed at the closest boundaries to the NSLs i.e. there will be a greater separation between plant / equipment and the NSL, which will result in a reduction in the predicted noise level at the closest NSL. In addition, the construction activities in the closest site to the NSL will be the dominant noise source, with very little contribution from sites at greater distances to the NSL i.e. where the contribution from the specific phase is more than 10 dB below noise contribution from the closest phase to the NSL.

Nonetheless in a highly conservative cumulative assessment of construction noise, which is unlikely to occur, the significance of effects is expected to be negative, significant to very significant and temporary if the noisiest work activities were to occur simultaneously at the closest distances to NSL1, if at all.

Notwithstanding, cumulative construction noise levels will need to be considered and managed during the construction phase.

12.8.3.3 Cumulative Construction Traffic – Scenario One

Assuming a similar level of peak vehicle movements generated for LRD Phase 1 (assessed in Section 12.8.1.2) is also generated for LRD Phase 2, there is a potential for a cumulative effect on traffic noise along the local road network. This would be a conservative assumption as the peak vehicle movements in LRD Phase 1 are based on deeper excavations on the site. Doubling the traffic flows assessed for LRD Phase 1 would result in a traffic noise level increase of the order of 3 dB. Using this assumption, the predicted cumulative noise level at the nearest residential NSLs along Dunkettle Road (20m from road edge) is in the order of 58 dB $L_{Aeq,1hr}$ and is therefore below the CNT of 65 dB $L_{Aeq,1hr}$. The calculated noise level is also below the ambient noise level measured at baseline monitoring location AT1 which is in the order of 64 dB $L_{Aeq,1hr}$ at a similar location 10m from the roadside (Refer to Table 12-11).

The impact relating to construction traffic is therefore determined to be negative, not significant and short-term at the closest receptors in the cumulative scenario.

12.8.3.4 Cumulative Construction Vibration – Scenario One

The closest NSLs in the cumulative assessment are set back at similar or further distances from the proposed construction works than those outlined in Section 12.8.1.3 . Therefore the impacts assessed for LRD Phase 1 will not be higher under the cumulative assessment. All construction works can operate within the limit values presented in Table 12-4 for buildings.

The predicted cumulative vibration impact during the construction phase is negative, slight to moderate and temporary impact at the closest receptors within 50m of the site boundaries.

Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration criteria set out in Table 12-4. Mitigation measures and recommended good practices have been outlined in Section 12.9.1.

12.8.3.5 Additional Vehicular Traffic on Surrounding Roads Cumulative Assessment – Scenario One

The calculated change in noise levels during Design Year 2041 with the cumulative site traffic in operation, are summarised in Table 12-16.

Table 12-16 Summary of Change in Noise Level, for 2041 Cumulative Site

Link Road	DN AADT 2041	% HGVs	DS AADT 2041	% HGVs	Increase in noise level (all vehicles) dB
LINK 1	12,768	2.5%	16,466	2.5%	+1.1
LINK 2	10,441	1.5%	14,138	1.5%	+1.3
LINK 3	7,711	0.9%	11,409	0.9%	+1.7
LINK 4	11,789	1.6%	15,487	1.6%	+1.2
LINK 5	10,375	2.3%	14,073	2.3%	+1.3
LINK 6	1,675	6.0%	5,373	6.0%	+5.1
LINK 7	11,343	2.6%	15,041	2.6%	+1.2
LINK 8	12,235	3.9%	15,933	3.9%	+1.1

The predicted cumulative increase in AADT traffic levels along all road links (1 to 8) are between 1.1 – 5.1 dB(A) in the vicinity of the roads assessed for the Future Design Year. Reference to Table 12-6 confirms that the increases in the Future Design Year are negative, not significant and long-term, with the exception of Link 6 along Richmond Hill where the cumulative effect is negative, moderate and long-term in terms of changes in traffic flow.

To assess the specific traffic noise level associated with the cumulative traffic flows along this road, traffic noise levels have been calculated using the same formula discussed in Section 12.8.1.2.

12.8.3.6 Building Services Plant

Once the relevant noise criteria are not exceeded within the cumulative development, the related noise impact to existing NSLs offsite will be negative, not significant and long-term.

In the same way, proposed developments external to the cumulative site will in turn be designed in order to comply with appropriate noise criteria. Any major proposed development in close proximity to the cumulative site will be required to prepare an EIAR wherein cumulative impacts will also be considered.

12.8.4 Summary

Table 12-17 summarises the identified likely significant effects during the construction phase of the proposed development before the application of mitigation measures.

Table 12-17 Summary of Construction Phase Likely Significant Effects in the Absence of Mitigation Measures

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction noise from rock excavation	Negative	NSL1, NSL2 and NSL3 – moderate	Closest receptors at NSL1 and NSL2	Likely	Temporary	Direct / Worst-Case
		NSL4 – not significant				
Construction noise from site clearance, bulk excavation, road works and foundations	Negative	NSL1 – significant to very significant	Closest receptors at NSL1	Likely	Short- term	Direct / Worst-Case
		NSL 2/3 – slight to moderate				
	Neutral	NSL4 – not significant				
Construction noise from superstructure and landscaping works	Negative	Not significant to slight	At all receptors	Likely	Short- term	Direct / Worst-Case
Construction traffic noise	Negative	Not significant	Closest receptors at NSL1	Likely	Medium-term	Direct / Worst-Case
Construction vibration damage to buildings	Negative	Not significant	At all receptors	Likely	Temporary	Direct / Worst-Case
Construction vibration human perception	Negative	Slight to moderate	NSL1 within 50m of site boundary	Likely	Temporary	Direct / Worst-Case
		Not significant	All other receptors	Likely	Short-term	
Cumulative construction noise scenario 1	Negative	Slight to moderate	NSL1, NSL2,NSL3 and NSL4	Likely	Temporary	Direct / Worst-Case
	Neutral	Not significant	NSL5 and NSL6	Likely	Short-term	
Cumulative construction noise scenario 2	Negative	Significant to very significant	NSL1	Unlikely	Temporary	Direct / Worst-Case
Cumulative construction traffic noise	Negative	Not significant	All receptors	Likely	Short-term	Direct / Worst-Case
Cumulative construction vibration human perception	Negative	Slight to moderate	NSL1 within 50m of site boundary	Likely	Temporary	Direct / Worst-Case
		Not significant	All other receptors	Likely	Short-term	

The following Table summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 12-18 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Additional vehicular traffic noise	Negative	Link Road 6 – slight to moderate	All receptors	Likely	Long-term	Direct / Worst-Case
		All other link roads – imperceptible to not significant				
Building services plant noise	Negative	Not significant	Closest receptors at NSL1 and NSL2	Likely	Long-term	Direct / Worst-Case
Creche playground noise	Neutral	Not significant	Closest receptors at NSL3	Likely	Long-term	Direct / Worst-Case
Cumulative additional vehicular traffic noise	Negative	Link Road 6 – moderate	All receptors	Likely	Long-term	Direct / Worst-Case
	Negative	All other link roads –not significant				
Cumulative building services plant noise	Negative	Not significant	All receptors	Likely	Long-term	Direct / Worst-Case

12.9 Mitigation Measures

The following mitigation measures are outlined for the Proposed Development but are also applicable in the overall development of the Study Area.

12.9.1 Construction Phase Mitigation

Mitigation measures for the construction phase are set out below in order to reduce potential impacts as far as practicable to within the adopted design goals for noise and vibration.

12.9.1.1 Construction Stage

The assessment detailed in Section 12.8.1 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 45m from the main phases of the construction works. During periods of rock extraction using breakers, the CNT has the potential to be exceeded at distances of 100m from this activity.

Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 12-4 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 locations 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 percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker tool and ensuring any leaks in the air lines are sealed.

- Erecting localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- 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.

Construction noise calculations have assumed 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

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. If piling / rock breaking/rock excavation works are in progress on another site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities. This will be reviewed in relation to cumulative works within the site and at any other potential external sites with potential to generate significant noise effects in close proximity to noise sensitive locations.

12.9.2 Operational Phase Mitigation

Mitigation measures for the operational phase are set out below.

12.9.2.1 Operational Stage

During the operational phase of the development, noise mitigation measures with respect to the impact of traffic from the development are not deemed necessary.

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 12-7 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.

In terms of the inward noise impact of road traffic on the development buildings and amenity areas, Appendix 12.1 sets out the approach for controlling noise levels across the site.

The majority of the Proposed LRD Phase 1 Development site has been categorised as a ***Negligible** to* ***Low Risk*** in accordance with ProPG (see further details in Appendix 12.1). Review of the location of residential buildings on site and the external noise levels, the assessment has determined that specific noise mitigation measures are not required to the site boundary or site buildings to control noise intrusion to internal spaces or to control noise in the external amenity spaces.

The exception to the statement above are the Duplexes and House Types F and G in LRD Phase 1, located immediately to the east of the site within 60m of the Dunkettle Road, which have been categorised as a ***Low to Medium Risk*** in accordance with ProPG (see further details in Appendix 12.1). Consideration will therefore be given to the provision of upgraded glazing to the northern, eastern and southern facades of the H1/H2 Duplexes and House Types Fb and G located within 60m of the Dunkettle Road, achieving the sound insulation performance outlined in the Table below (and further detailed in Appendix 12.1).

Table 12-19 Sound Insulation Performance Requirements for Glazing, SRI (dB)

Nominal R_w (Db)	Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
35	23	23	30	39	36	43

Test data should be sought from the supplier of the glazing at detailed design stage to ensure that the acoustic specification is met.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. The over-riding requirement is that the internal noise criteria is achieved, other combinations of upgraded glazing may provide the same or better performance than those outlined in the Table above.

12.9.3 Cumulative Mitigation

The same design guidance applies to all elements of the development within the study area as a whole. In this instance, there are no additional noise mitigation measures over and above those set out in Sections 12.9.1 and 12.9.2 for the construction and operational phases, however once detailed design is available on LRD Phase 2 and Dunkettle House, if residential development is proposed, a further review of the inward impact assessment would be required.

12.10 Residual Impact Assessment

This section assesses whether there are any potential significant environmental impacts which remain after mitigation measures are implemented.

12.10.1 Construction Phase

During the construction phase of the proposed development, there is the potential for temporary to short-term noise impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of work, 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. Along with the 5 dB reduction from partial screening from a suitable site hoarding it would be expected that a further 5 dB reduction would be achieved through on-site control measures, selection of quiet plant etc as per the mitigation described in Section 12.9.1.

During rock breaking, the residual effect is negative, significant to very significant and temporary at distances up to 25m (NSL 1) 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 greater than 55m the CNT would not be exceeded and the residual significance of effect is **negative, slight to moderate and temporary**.

During site clearance the residual effect is negative, moderate and temporary at distances up to 25m (NSL 1). At all other NSLs at distances greater than 25m the CNT would not be exceeded and the residual significance of effect is **negative, slight to moderate and short-term**.

During super structure and compounds the residual effect is **negative, not significant to slight and short-term** at all NSLs.

Vibration impacts during the construction phase will be **neutral, slight to moderate and temporary.**

12.10.2 Operational Phase

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 moderate, and long-term**.

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 12-7. 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.**

The results of the baseline survey have determined the noise climate along the eastern and northern site boundaries bordering the L2998 and the R639 Glanmire Road respectively, have the highest daytime noise levels measured during the baseline study (AT1 and AT4). The measured noise levels and published noise maps (see Appendix 12.1 for full details) indicate that with standard double glazing and mechanical ventilation good and reasonable internal noise levels can be achieved with windows open for all dwellings with the exception of those located to the northern, eastern and southern facades of the H1/H2 Duplexes and House Types Fb and G located within 60m of the Dunkettle Road, which require glazing with an enhanced sound insulation performance. With the suitable mitigation measures outlined in Section 12.9.2 and further detailed in Appendix 12.1, good internal levels can be achieved in all dwellings with windows closed. The resultant residual inward noise effect will be of **neutral, not significant and long term**.

12.10.3 Summary of Post-mitigation Effects

The following Table summarises the residual effects during the construction phase of the proposed development following the application of mitigation measures for effects identified as significant pre-mitigation.

Table 12-20 Summary of Construction Phase Effects Post-Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction noise from rock excavation	Negative	NSL1, NSL2 and NSL3 – slight to moderate	Closest receptors at NSL1 and NSL2	Likely	Temporary	Direct / Worst-Case
		NSL4 – not significant				
Construction noise from site clearance, bulk excavation, road works and foundations	Negative	NSL1 – moderate	Closest receptors at NSL1	Likely	Short- term	Direct / Worst-Case
		NSL 2/3 – slight to moderate				
Construction vibration human perception	Negative	Slight to moderate	NSL1 within 50m of site boundary	Likely	Temporary	Direct / Worst-Case
		Not significant	All other receptors	Likely	Short-term	

The following Table summarises the residual effects during the operational phase of the proposed development following the application of mitigation measures for effects identified as significant pre-mitigation.

Table 12-21 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Building services plant noise	Negative	Not significant	Closest receptors at NSL1 and NSL2	Likely	Long-term	Direct / Worst-Case
Inward impact noise	Neutral	Not significant	H1/H2 Duplexes and House Types Fb and G located within 60m of the Dunkettle Road	Likely	Long-term	Direct / Worst-Case

12.10.4 Cumulative Residual Effects

12.10.4.1 Construction Stage

The similar magnitude of residual noise and vibration impacts discussed in Section 12.10.1 for the proposed development are relevant to the cumulative site, given the same construction noise and vibration criteria will apply to all phases. Table 12-22 below summarises the cumulative residual effects post mitigation.

Table 12-22 Summary of Cumulative Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Cumulative construction noise scenario 2	Negative	Moderate	NSL1	Unlikely	Temporary	Direct / Worst-Case
Cumulative construction vibration human perception	Negative	Slight to moderate	NSL1 within 50m of site boundary	Likely	Temporary	Direct / Worst-Case
		Not significant	All other receptors	Likely	Short-term	

12.10.4.2 Operational Stage

There were no significant effects identified for the cumulative operational phase pre-mitigation. The similar magnitude of residual noise and vibration impacts discussed in Section 12.10.2 for the proposed development are relevant to the cumulative site given the same operational noise criteria will apply to all phases.

12.11 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.

12.12 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 12.8.1). 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.

12.13 Interactions

Interaction between noise and vibration and other specialist chapters in the EIAR is primarily linked to Chapter 4 (Population & Human Health), Chapter 11 (Biodiversity) and Chapter 6 (Traffic & Transportation). 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. The traffic flow projections associated with the development provided by the traffic consultants in Chapter 6 (Traffic & Transportation) has been utilised in the construction and operational noise calculations in this Chapter of the EIAR report.

12.14 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.

12.14.1 Noise Monitoring

During the 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 NSL1 and NSL2 to the eastern site boundary.

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.

12.14.2 Vibration Monitoring

Where the excavation works take place within 50m of vibration-sensitive locations (VSLs) e.g. NSL1 and NSL2 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.

12.15 Summary of Mitigation and Monitoring

There are no significant residual effects during the construction or operational phases of the development. The following Table summarises the construction phase mitigation and monitoring measures.

Table 12-23 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Rock excavation	Selection of quiet plant; control of noise sources; screening, controlling; hours of work; liaison with the public.	NSL1 and NSL2
Site clearance, bulk excavation, road works and foundations.	Selection of quiet plant; control of noise sources; screening, controlling; hours of work; liaison with the public.	NSL1 and NSL2
Vibration	Liaison with the public; appropriate vibration isolation shall be applied to plant; monitoring will be undertaken at eastern site boundary in close proximity to NSL1	NSL1 and NSL2

The following Table summarises the operational phase mitigation and monitoring measures.

Table 12-24 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Building services plant noise	Selection of quiet plant at detailed design stage to ensure adherence to criteria outlined in Table 12-7.	Not applicable
Inward impact noise	For H1/H2 Duplexes and House Types Fb and G located within 60m of the Dunkettle Road only - selection of suitable enhanced glazing specification as per Table 12-19, to be confirmed at detailed design stage to ensure adherence to criteria outlined in Table 12-7.	Not applicable

12.16 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 and operational stage. Noise and vibration monitoring has been identified during the 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.

The ProPG inward impact assessment has identified that the proposed duplexes and houses located at the immediate eastern edge of the development boundary will require enhanced sound insulation specifications for glazing to achieve suitable internal noise levels. The resultant residual inward noise effect will be of neutral, not significant and long term.

12.17 References & Sources

- Action Planning Authority Working Group supported by Noise Consultants Limited (2024). 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: 1996: 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).

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 13

Air Quality

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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13 Air Quality

13.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects on air quality due to the proposed development located at Dunkettle, Co. Cork.

It should be read in conjunction with Chapter 6 Material Assets: Traffic and Transport and the standalone Traffic and Transportation Assessment (MHL Consulting Engineers, 2024) submitted as part of the LRD Phase 1 planning application.

13.2 Expertise & Qualifications

This chapter was completed by Aisling Cashell, an Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds a BA and an MAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. She is a member of Engineers Ireland. She has been specialising in the area of air quality, climate and sustainability for 1 year and has prepared air quality and climate assessments for inclusion within EIARs for residential and commercial developments such as Twenties Lane (Planning Application Ref: 22713), Cherrywood T13 (Planning Application Ref: DZ23A/0028), Corballis Donabate LRD (Planning Application Ref: LRD0017/S3), The Paddocks (Planning Application Ref: 2360349), and Dublin Airport Authority.

13.3 Proposed Development

Chapter 2 of this EIAR provides a full description of the proposed development.

13.3.1 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 medium-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 NO_2, PM_{10} and $PM_{2.5}$. Operational phase impacts will be long-term in duration.

13.4 Methodology

13.4.1 Relevant Legislation & Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on air quality is summarised below.

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government (DHPLG), 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022);
- Guidance on the Assessment of Dust from Demolition and Construction Version 2.2 (Institute of Air Quality Management (IAQM), 2024);
- A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020);
- TII Guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 and TII Road Emissions Model (REM) online calculator tool (TII, 2022); and
- TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107 (TII, 2024).

13.4.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland (DEHLG, 2004) and the European Parliament and Council of the European Union, 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 based on compliance with the appropriate standards or limit values. The applicable standards in Ireland are set out in Directive 2024/xx/EC *of the European Parliament and of the Council of* (date to be confirmed) *on ambient air quality and cleaner air for Europe*. The EU formally adopted this directive on 14 October 2024. This directive supersedes 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* and 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.

The Air Quality Standards Regulations 2022 (S.I. 739 of 2022) transposed EU Directive 2008/50/EC. With the adoption of Directive 2024/xx/EC, Ireland must transpose this directive into national law (i.e. update the Air Quality Standards Regulations) before October 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 13-1. The limit values set out in Directive 2024/xx/EC 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.

Table 13-1 Ambient Air Quality Limit Values

Pollutant	2008/50/EC Limit Type	2008/50/EC Limit Value (applicable until 2030)	2024/xx/EC Limit Type	2024/xx/EC 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/m^3	Hourly limit for protection of human health - not to be exceeded more than 3 times/year	200 µg/m^3
	n/a	n/a	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	50 µg/m^3
	Annual limit for protection of human health	40 µg/m^3	Annual limit for protection of human health	20 µg/m^3
NO_X	Annual limit for protection of vegetation	30 µg/m^3	Annual limit for protection of vegetation	30 µg/m^3
Particulate Matter (as PM_{10})	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45 µg/m^3
	Annual limit for protection of human health	40 µg/m^3	Annual limit for protection of human health	20 µg/m^3
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/m^3
	Annual limit for protection of human health	25 µg/m^3	Annual limit for protection of human health	10 µg/m^3

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, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 13-2). 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/m^3 (WHO, 2021). 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 2024/xx/EC gives assessment thresholds which align with the clean air strategy final 2040 WHO targets. Directive 2024/xx/EC 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.*"

The applicable air quality limit values for the purposes of this assessment are those outlined in Table 13-1. The limit values stipulated under Directive 2008/50/EC and the Air Quality Standards Regulations 2022 are applicable for the construction phase of the proposed development. The limit values stipulated by Directive 2024/xx/EC are applicable for the opening year 2031 and the design year 2041 for the proposed development.

Table 13-2 WHO Air Quality Guidelines

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	-	-	25µg/m^3
		Annual limit for protection of human health	20µg/m^3	-	10µg/m^3
PM (as PM_{10})		24-hour limit for protection of human health	75µg/ m^3	50µg/m^3	45µg/m^3
		Annual limit for protection of human health	30µg/ m^3	20µg/ m^3	15µg/m^3
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m^3	25µg/m^3	15µg/m^3
		Annual limit for protection of human health	15µg/m^3	10µg/m^3	5µg/m^3

13.4.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust, which are less than 10 microns, and the EU ambient air quality standards outlined in Table 13-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard 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.

However, guidelines for 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/m^2/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/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust effects from construction of the proposed development.

13.4.1.3 Air Quality and Traffic Impact Significance Criteria

The TII 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 13-3. These criteria have been adopted for the proposed development to predict the effect of NO_2, PM_{10} and $PM_{2.5}$ emissions as a result of the proposed development.

Table 13-3 Air Quality 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 13-3 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 (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 (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 13-3 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).

13.4.2 Construction Phase Methodology

13.4.2.1 Construction Traffic Assessment

Construction phase traffic has the potential to affect 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.

The construction stage traffic will not change by more 1,000 AADT or 200 HDV AADT and does not meet the above scoping criteria. In addition, there are no proposed changes to the traffic speeds or road alignment. As a result, a detailed air 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.

13.4.2.2 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 effect 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 effects. 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 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.

13.4.3 Operational Phase Methodology

Operational phase traffic has the potential to affect local air quality as a result of increased vehicle movements associated with the proposed development. The TII scoping criteria detailed in Section 13.4.2.1 were used to determine if any road links are affected by the proposed development and require inclusion in a detailed air quality modelling assessment. The proposed development will result in the operational phase traffic increasing by more than 1,000 AADT on eight road links. Therefore, a detailed air quality modelling assessment of operational phase traffic emissions was conducted.

The impact to air quality due to changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The receptor locations are discussed in further detail within Section 13.4.3.1 and shown graphically in Figure 13-4.

The TII guidance (TII, 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) and Do Something 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 tire 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.

13.4.3.1 Traffic Data used in Modelling Assessment

Traffic flow information was obtained from MHL Consulting Engineers (MHL Consulting Engineers, 2024) for the purposes of this assessment. Data for the Base Year 2024 and the Do Nothing and Do Something scenarios for the Opening Year 2031 and Design Year 2041 were provided. In order to assess the full cumulative impact of the development, the traffic data has included specific cumulative developments within the area (see Traffic and Transportation Assessment for further details).

The traffic data are detailed in Table 13-4. Eight road links met the TII scoping criteria and were within 200m of receptors therefore, these links were included in the modelling assessment. Background concentrations have been included as per Section 13.4.3.2 of this chapter based on available EPA background monitoring data (EPA, 2024).

Table 13-4 Traffic Data Used in Air & Climate Modelling Assessments

Road Name	Speed (kph)	Base Year 2024	Opening Year 2031		Design Year 2041	
			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)
R639	50	10125 (261)	11345 (292)	13306 (343)	12448 (320)	16053 (413)
Glanmire Bridge	50	8367 (127)	9373 (143)	11355 (173)	10284 (157)	13926 (212)
East Cliff Road	50	6219 (56)	6963 (63)	8957 (81)	7642 (69)	11306 (103)
L2998 Ballinglana	50	9439 (153)	10573 (172)	12553 (204)	11600 (189)	15239 (248)
L2998 Dunkettle Road	50	8245 (194)	9234 (217)	11199 (264)	10136 (239)	13749 (324)
Richmond Hill	50	1277 (82)	1432 (91)	3323 (212)	1575 (101)	5051 (322)
L2998 The Cottages	50	8993 (240)	10074 (269)	12034 (321)	11048 (295)	14650 (391)
L2998 Roundabout	50	9772 (397)	10713 (435)	12646 (513)	11758 (477)	15312 (621)

13.4.3.2 Air Quality Impacts on Sensitive Ecology

In addition to assessing the impact to people as a result of air quality, the impact to sensitive ecosystems must also be assessed as per the TII guidelines (TII, 2022; 2024). The EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the *'Habitats Directive'*) requires an Appropriate Assessment to be carried out where there is likely to be a significant impact upon a European protected site. TII requires the Air Quality Specialist to liaise with an ecologist on schemes where there is a European protected site within 2km of the proposed development site. However, as the potential impact of a scheme is limited to local level, detailed consideration need only be given to roads where there is a significant change to traffic flows and the designated site lies within 200m of the road centre line. Where these two requirements are fulfilled, the assessment involves a calculation of nitrogen oxides (NOx) and ammonia (NH_3) concentrations to determine the N deposition and acid deposition rates using the methodology set out in TII Guidance document PE-ENV-01106 (TII, 2022).

Sections of the Cork Harbour SPA (Site Code 004030) and Glanmire Wood pNHA (Site Code 001054) are within 200m of a road link impacted by the proposed development. Therefore, an assessment of air quality impacts to ecology was carried out within sections of these sites closest to the impacted roads. The relevant designated sites included in the assessment are shown in Figure 13-3.

The TII REM was used to calculate the NO_X and NH_3 concentrations and N deposition and acid deposition rates within the sections of the identified ecological sites that are within closest proximity to the road alignments. Pollutant concentrations will be greatest closest to the road, with concentrations decreasing with increased distance from the road. Therefore, by assessing the impact at the point within the designated site that is closest to the road, the worst-case impact can be determined. The inputs into the REM are the same as those outlined for the local air quality assessment. Modelling of the Opening Year 2031 and the Design Year 2041 was conducted for both the Do Nothing and Do Something scenarios in order to determine the degree of change in air quality.

Impacts in relation to NO_X concentrations were compared against the annual mean ambient air quality standard of 30 $\mu g/m^3$ for the protection of ecology. Impacts in relation to NH_3 concentrations were compared against the annual mean limit value of 3 $\mu g/m^3$. The impact of N and acid deposition were assessed using the criteria in Table 13-5, which are based on Table 3.24 of PE-ENV-01107. The project ecologist was consulted to determine if impacts are significant where N deposition and acid deposition rates were greater than 1% of the critical load for the identified habitat type.

Background NO_X and NH_3 concentrations as well as background N deposition and acid deposition rates for the area of the Cork Harbour SPA and Glanmire Wood pNHA within the study area were determined using the Air Pollution Information System (APIS) web GIS based portal (CEH, 2022). The APIS site was also used to determine the relevant critical loads for various habitat types within the designated sites. The critical loads for the sensitive habitat types within the designated sites are detailed in Table 13-6. There are a wide number of bird species which the Cork Harbour SPA is protected for, however, according to the APIS website, all of these species have the same critical load range for N deposition. Therefore, the species listed in Table 13-6 are used as an example of the species present in order to present the critical load range used in the assessment but do not represent the entirety of the protected species. The critical load ranges for the most sensitive habitat or species were used in the current assessment as a conservative approach regardless of whether the sensitive habitat or species was present in the impacted location.

Table 13-5 Significance of Effects at Sensitive Designated Habitats

Description of Results	Significance
Total N deposition and acid deposition are more than 1% of the critical load.	Discuss further with project biodiversity practitioners
The total N deposition and acid deposition are less than 1% of the critical load.	Not significant

Source: PE-ENV-01107 Air Quality Assessment Standard for Proposed National Roads, Table 3.24 (TII, 2024).

Table 13-6 Critical Loads (APIS, 2024)

Pollutant	Designated Site	Potential Sensitive Ecology Present for Determining Critical Load	Critical Load Range
N deposition	Cork Harbour SPA	Podiceps cristatus (North-western Europe - wintering), Anas crecca (North-western Europe) Pluvialis apricaria (North-western Europe)	5 – 10 kgN/ha/yr

Pollutant	Designated Site	Potential Sensitive Ecology Present for Determining Critical Load	Critical Load Range
	Glanmire Wood pNHA	Wood Fescue (Festuca altissima) and Wood Millet (Milium effusum)	10 – 15 kgN/ha/yr
Acid deposition	Cork Harbour SPA	Calcareous grassland (using base cation), acid grassland, Dwarf shrub heath	0.174 – 5.962 keqN/ha/yr
	Glanmire Wood pNHA	Oak (Quercus spp.), Beech (Fagus sylvatica) and Sycamore (Acer pseudoplatanus)	0.714 –6.805 keqN/ha/yr

13.5 Difficulties Encountered

There were no difficulties encountered in compiling this assessment.

13.6 Description of Baseline Environment

13.6.1 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 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, which is located approximately 10km south-west 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 (see Figure 13-1). For data collated during five representative years (2019 – 2023), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.0 m/s over the 30-year period 1991– 2020 (Met Éireann, 2024).

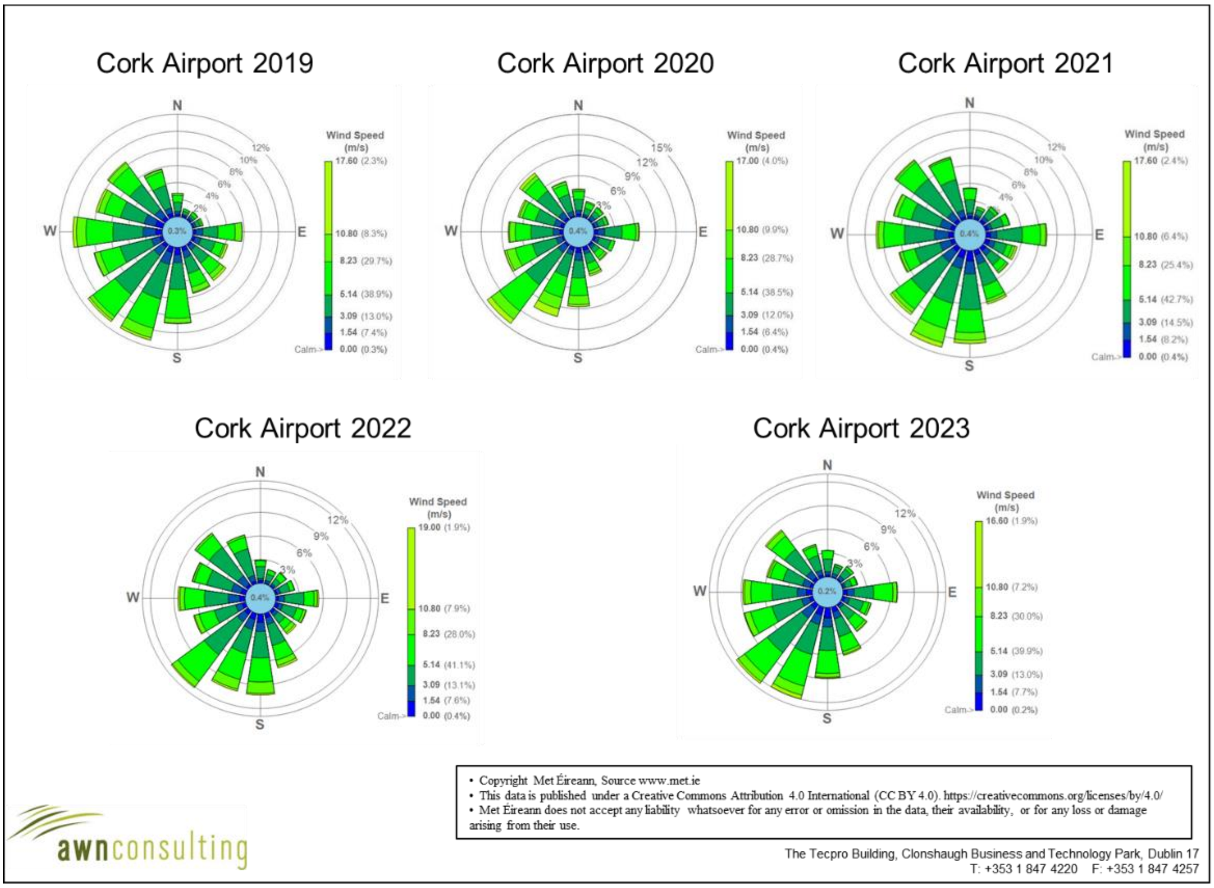

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Figure 13-1 Windrose 2019-2023 (Met Éireann, 2024)

13.6.2 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 (EPA, 2024).

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), 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 study area 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.). Data for 2020 has been included for indicative purposes only, it has not been used in determining background pollutant levels as the data is not considered representative due to the COVID-19 restrictions that were in place at the time.

13.6.2.1 NO_2

Long-term NO_2 monitoring was carried out at the Zone B suburban background locations of UCC Distillery Fields and South Link Road which are considered representative of the area of the proposed development for the period 2019 – 2023 (EPA, 2024). Long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. Sufficient data is available for UCC Distillery Fields and South Link Road to observe the long-term trend over the period 2019 – 2023, with annual average results ranging from 8 – 21 µg/m^3 (Table 13-7). A conservative estimate of the background NO_2 concentration, for the region of the proposed development is 13 µg/m^3, as derived from these long-term trends.

Table 13-7 Trends in Air Quality – Nitrogen Dioxide (NO_2)

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
UCC Distillery Fields	Annual Mean NO_2 (µg/m^3)	10	8	9	9	8
South Link Road	Annual Mean NO_2 (µg/m^3)	21	13	16	18	15

13.6.2.2 PM_{10}

Long-term PM_{10} monitoring was carried out at the Zone B suburban background locations of Bishopstown MTU, Heatherton Park, South Link Rad and Glanmire, which are considered representative of the area of the proposed development for the period 2019 – 2023 (EPA, 2024).

The PM_{10} annual average over this five-year period for Bishopstown MTU and Glanmire ranged from 11 µg/m^3 to 15 µg/m^3. Therefore, long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. In addition, there were at most 6 exceedances (at the South Link Road) of the 24-hour limit value of 50 µg/m^3 in 2019, albeit 35 exceedances are permitted per year (EPA, 2024) (Table 13-8). A reasonably conservative estimate of the background PM_{10} concentration, for the region of the proposed development is 13 µg/m^3, as derived from these long-term trends.

Table 13-8 Trends in Air Quality – PM_{10}

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
Bishopstown MTU	Annual Mean PM_{10} (µg/m^3)	15	14	13	14	11
	24-hr Mean > 50 µg/m^3 (days)	1	0	1	1	0
Heatherton Park	Annual Mean PM_{10} (µg/m^3)	-	11	11	12	11
	24-hr Mean > 50 µg/m^3 (days)	1	2	1	0	1
South Link Road	Annual Mean PM_{10} (µg/m^3)	18	15	18	16	-
	24-hr Mean > 50 µg/m^3 (days)	6	2	2	2	-
Glanmire	Annual Mean PM_{10} (µg/m^3)	15	14	13	14	13
	24-hr Mean > 50 µg/m^3 (days)	1	0	1	0	2

13.6.2.3 $PM_{2.5}$

Long-term $PM_{2.5}$ monitoring was carried out at the Zone B suburban background locations of UCC Distillery Fields and Heatherton Park which are considered representative of the area of the proposed development for the period 2019 – 2023 (EPA, 2024).

The $PM_{2.5}$ annual average over the five-year period for suburban background locations UCC Distillery Fields and Heatherton Park ranged from 4.8 µg/m^3 to 8.0 µg/m^3. Therefore, long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 25 µg/m^3 (Table 13-9). A conservative estimate of the background $PM_{2.5}$ concentration, for the region of the proposed development is 7 µg/m^3, as derived from these long-term trends.

Table 13-9 Trends in Air Quality – $PM_{2.5}$

Station	Averaging Period	Year				
		2019	2020	2021	2022	2023
UCC Distillery Fields	Annual Mean $PM_{2.5}$ (µg/m^3)	8.0	6.7	6.7	4.8	-
Heatherton Park	Annual Mean $PM_{2.5}$ (µg/m^3)	8.0	7.7	7.7	5.4	5.8

13.6.2.4 Summary

Based on the above information the air quality in Zone B locations, such as the Dunkettle area, is generally good, with concentrations of the key pollutants generally well below the currently applicable limit values set out in Directive 2008/50/EC and the Ambient Air Quality Standards Regulations 2022. However, there are some instances where concentrations are approaching or in exceedance of the updated limit values set out under Directive 2024/xx/EC. 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).

The current background concentrations have been used in the operational phase air quality assessment for both the Opening Year and Design Year as a conservative approach to predict pollutant concentrations in future years. This is in line with the TII methodology (TII, 2022).

13.6.2.5 Sensitive Designated Ecological Habitats

Background concentrations for NO_X, NH_3, and nitrogen and acid deposition at the identified designated habitats (Cork Harbour SPA and Glanmire Wood pNHA) were derived from the 1 km grid square concentrations provided on the Air Pollution Information System (APIS) website (APIS, 2024), in line with UK Environment Agency (2014) and UK DEFRA (2016) guidance, and are shown in Table 13-10.

The background concentrations have been added to the modelled REM outputs in Section 13.8.2.1.5.

Table 13-10 Background Concentrations for NO_X, NH_3, N Deposition and Acid Deposition

Sensitive Designated Habitat	NO_X (µg/m^3)	NH_3 (µg/m^3)	Nitrogen Deposition (kg/ha/yr)	Acid Deposition (keqN/ha/yr)
Cork Harbour SPA	3.9	2.5	6.2	0.44
Glanmire Wood pNHA	3.9	2.5	6.2	0.44

13.6.3 Sensitivity of the Receiving Environment

13.6.3.1 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, as well as schools and hospitals.

In terms of receptor sensitivity to dust soiling, there are approximately between 10 and 100 high sensitivity residential properties within 20m of the site boundary (see Figure 13-2). Therefore, the overall sensitivity of the area to dust soiling impacts is considered **high** based on the IAQM criteria outlined in Table 13-11.

Table 13-11 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

Source: Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

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 effects. 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 and there are between 10 and 100 no. high sensitivity receptor within 20m of the proposed development boundary (see Figure 13-2). Based on the IAQM criteria outlined in Table 13-12, the worst-case sensitivity of the area to dust-related human health effects is considered **low**.

Table 13-12 Sensitivity of the Area to Dust Related Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)			
			<20	<50	<100	<250
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	**Low**	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

Source: Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2024)

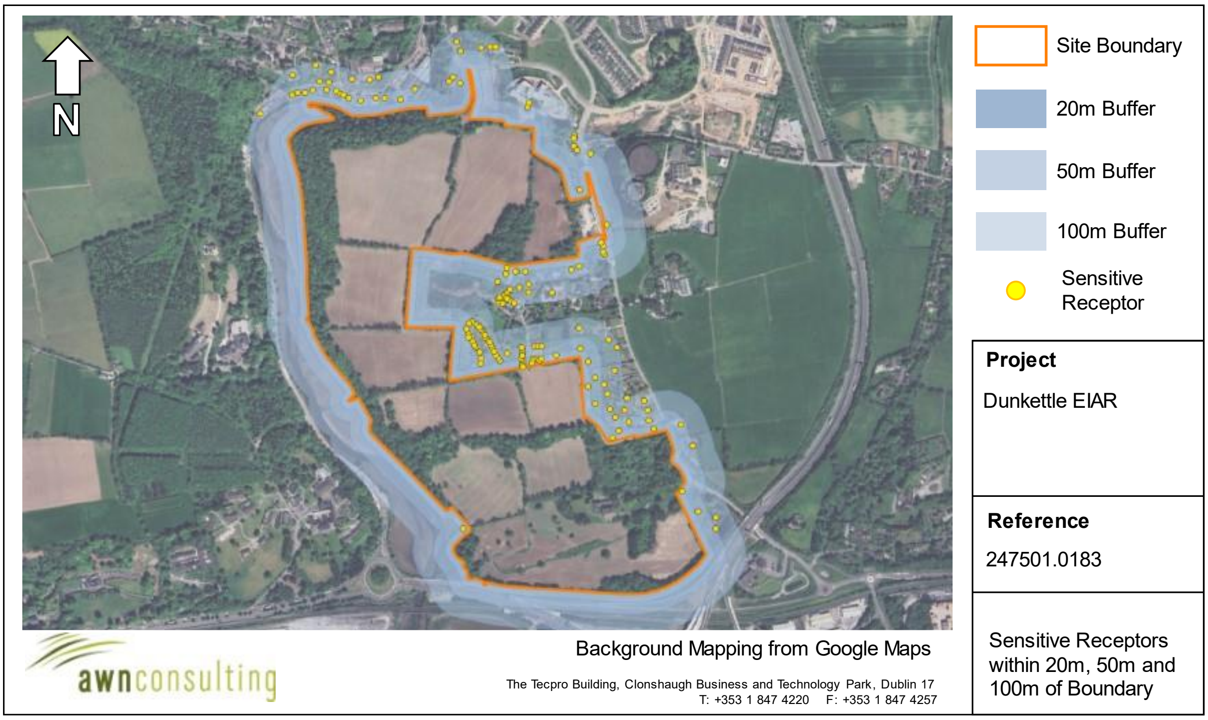

Figure 13-2 Sensitive Receptors within 20m, 50m and 100m of Site Boundary

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological effects. 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 50m from the site and 50m from site access roads, up to 250m 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.

Designated sites within 50m of the proposed development include the Glanmire Wood pNHA, Cork Harbour SPA and Dunkettle Shore pNHA (see Figure 13-3). High sensitivity ecological receptors are sites with European or National designation with particularly dust sensitive species present. Based on the IAQM criteria outlined in Table 13-13, the worst-case sensitivity of the area to dust-related ecological effects is considered **high.**

Table 13-13 Sensitivity of the Area to Dust Related Ecological Impacts (IAQM, 2024)

Receptor Sensitivity	Distance from Source (m)	
	<20	<50
High	**High**	Medium
Medium	Medium	Low
Low	Low	Low

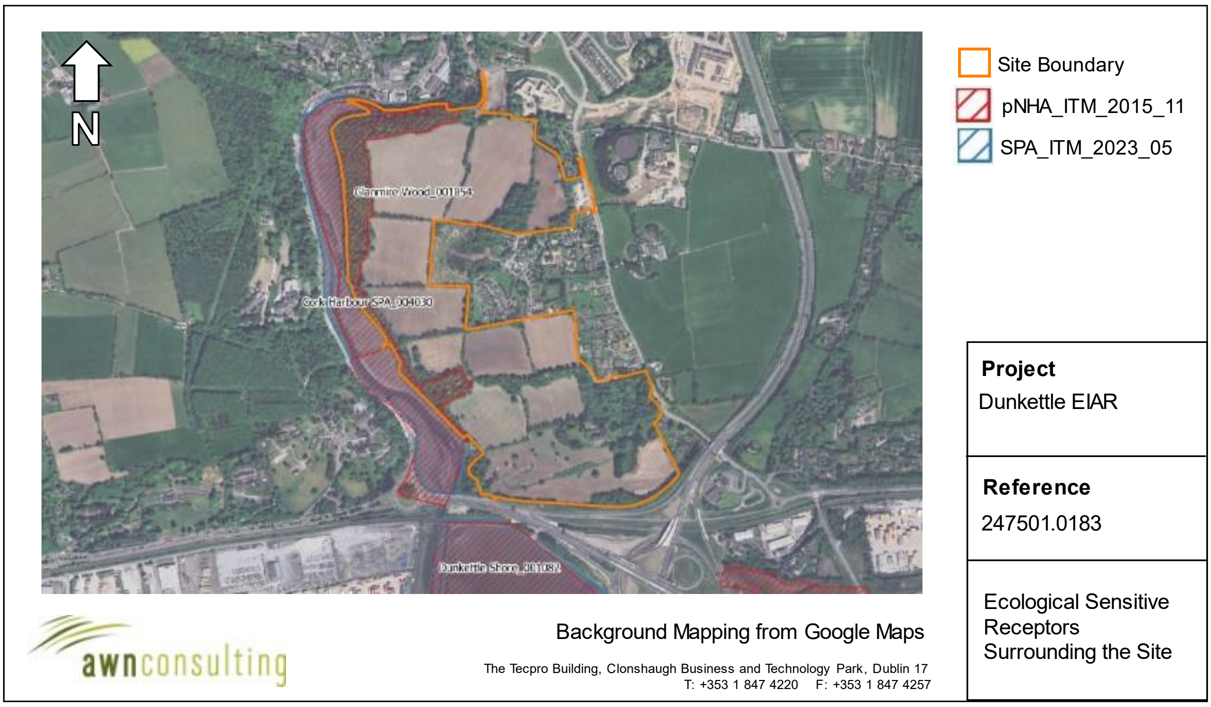

Figure 13-3 Ecological Sensitive Receptors surrounding the Site Boundary

13.6.3.2 Operational Phase

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (TII, 2022) states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling. The TII criteria state that receptors within 200m of affected road links should be assessed; roads which are greater than 200m from receptors will not affect pollutant concentrations at that receptor. The TII guidance (TII, 2022) defines sensitive receptor 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 7 no. high sensitivity residential receptors (R1, R2, R3, R4, R5, R6 and R7) were included in the modelling assessment. Figure 13-4 shows the location of sensitive receptors used in the operational phase air quality assessment.

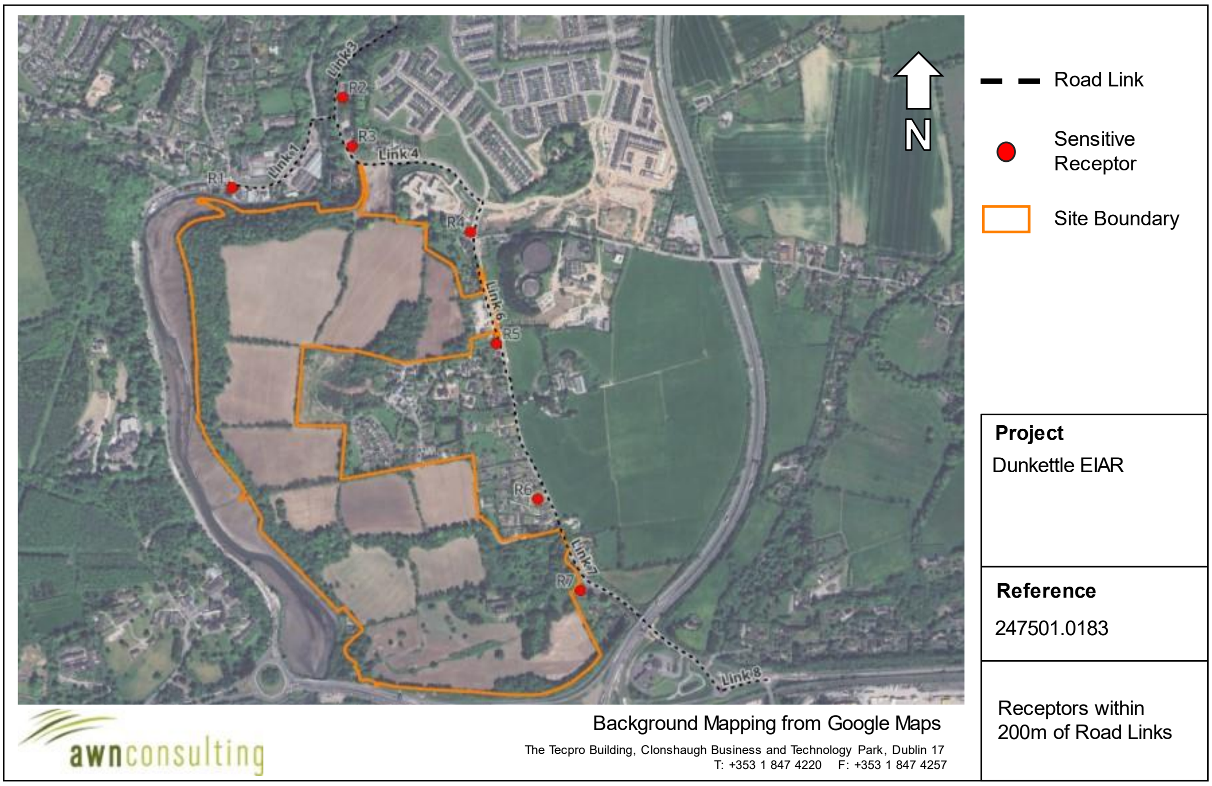

Figure 13-4 Approximate Location of Receptors used in Local Air Quality Modelling Assessment

13.7 The 'Do Nothing' Scenario

The Do Nothing scenario includes retention of the current site without the proposed development in place. In this 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).

As the proposed site is zoned for development, 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 proposed development.

13.8 Potential Significant Effects

13.8.1 Construction Phase

13.8.1.1 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 250m of a construction site, the majority of the deposition occurs within the first 50m. 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 (see Section 13.6.1). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2mm. A review of historical 30 year average data for Cork Airport meteorological station indicates that on average 218 days per year have rainfall over 0.2mm (Met Éireann, 2024) and it can be determined that 60% of the time dust generation will be reduced.

In order 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 (see Section 13.6.3). As per Section 13.4.2, the major dust generating activities are divided into four types within the IAQM guidance 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).

13.8.1.1.1 Demolition

There is minimal demolition associated with the proposed development, comprising of the demolition of the existing ruins. This demolition will result in a volume of 350m^3 of material. This is significantly below the 'small' demolition category set out in the IAQM guidance (2024) of 12,000 m^3 and has been scoped out as any dust emissions will be negligible. Therefore, there is no demolition impact predicted as a result of the works.

13.8.1.1.2 Earthworks

Earthworks primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Excavated topsoil and subsoils required for re-use on site will be temporarily stored on site for re-use otherwise it will be exported. Rock excavated on site will be crushed and re-used on site for filling where suited. Activities such as levelling the site and landscaping works are also considered under this category. Topsoil will be stored in an appropriate manner on site for the duration of the construction works.

The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed:

- **Large** Total site area > 110,000 m^2, 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 > 6m in height;
- **Medium** Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 3m – 6m in height;
- **Small** 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 < 3m in height.

The dust emission magnitude for the proposed earthwork activities can be classified as **large** as the total site area is greater than 110,000m^2. The sensitivity of the area, as determined in Section 13.6.3, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 13-14 and Table 13-15, combining the large dust emission magnitude with a high sensitivity to dust soiling, low sensitivity to human health and high sensitivity to ecological health impacts results in a high risk of dust soiling impacts, a low risk of dust-related human health impacts and a high risk of ecological health impacts. This is as a result of the proposed earthworks activities in the absence of mitigation.

Table 13-14 Criteria for Rating Risk of Dust Impacts – Earthworks (IAQM, 2024)

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-15 Risk of Dust Impacts – Earthworks

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Earthworks	Risk of Dust-Related Impacts
Dust Soiling	High	Large	High Risk
Human Health	Low		Low Risk
Ecological	High		High Risk

13.8.1.1.3 Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed:

- **Large** Total building volume > 75,000 m^3, on-site concrete batching, sandblasting;
- **Medium** Total building volume 12,000m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;

- **Small** Total building volume < 12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as **large** as the total volume of buildings to be constructed is more than 75,000 m^3. As outlined in Table 13-16 and Table 13-17, combining the large dust emission magnitude with a high sensitivity to dust soiling, low sensitivity to human health and a high sensitivity to ecological health impacts results in a high risk of dust soiling impacts, a low risk of dust-related human health impacts and a high risk of ecological health impacts. This is as a result of the proposed construction activities in the absence of mitigation.

Table 13-16 Criteria for Rating of Risk of Dust Impacts – Construction (IAQM, 2024)

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-17 Risk of Dust Impacts – Construction

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Construction	Risk of Dust-Related Impacts
Dust Soiling	High	Large	High Risk
Human Health	Low		Low Risk
Ecological	High		High Risk

13.8.1.1.4 Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed:

- **Large** > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium** 20 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small** < 20 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The dust emission magnitude for the proposed trackout can be classified as **large**, as at worst-case peak periods there will be more than 50 outward HGV movements per day. As outlined in Table 13-18 and Table 13-19, combining the large dust emission magnitude with a high sensitivity to dust soiling, low sensitivity to human health impacts and a high sensitivity to ecological health impacts results in an overall high risk of dust soiling impacts, a low risk of dust-related human health impacts and a high risk of ecological health impacts. This is as a result of the proposed trackout activities in the absence of mitigation.

Table 13-18 Criteria for Rating of Risk of Dust Impacts – Trackout (IAQM, 2024)

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-19 Risk of Dust Impacts – Trackout

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Trackout	Risk of Dust-Related Impacts
Dust Soiling	High	Large	High Risk
Human Health	Low		Low Risk
Ecological	High		High Risk

13.8.1.1.5 Summary of Dust Emission Risks

The risk of dust impacts as a result of the proposed development are summarised in Table 13-20 for each activity. The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity to prevent significant impacts occurring.

There is at most a high risk of dust soiling, at most a low risk of human health impacts and at most a high risk of ecological impacts associated with the proposed works. Best practice dust mitigation measures appropriate for high risk sites 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, medium-term, negative*** and ***slight***, which is overall ***not significant*** in EIA terms.

Table 13-20 Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Emission Magnitude	N/A	Large	Large	Large
Dust Soiling Risk	N/A	High Risk	High Risk	High Risk
Human Health Risk	N/A	Low Risk	Low Risk	Low Risk
Ecological Risk	N/A	High Risk	High Risk	High Risk

13.8.1.2 Construction Traffic Assessment

There is also the potential for traffic emissions to affect air quality in the medium-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 affected by the proposed development satisfy the TII scoping assessment criteria in Section 13.4.2.

It can be determined that the construction stage traffic will have a ***direct, medium-term, negative*** and ***imperceptible*** impact on air quality, which is overall ***not significant*** in EIA terms.

13.8.2 Operational Phase

13.8.2.1 Operational Phase Traffic Assessment

The potential effects of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development using the TII Road Emissions Model (TII, 2024). The traffic data includes the Do Nothing and Do Something scenarios. The impact of NO_2, PM_{10} and $PM_{2.5}$ emissions for the modelled Opening Year and Design Year was predicted at the nearest sensitive receptors to the development. 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 effects 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.

13.8.2.1.1 NO_2

The results of the assessment of the effects of the proposed development on NO_2 in the Opening Year 2031 and Design Year 2041 are shown in Table 13-21. The annual average concentration at all receptors assessed is in compliance with the annual mean limit value of 20 µg/m^3 set out under Directive 2024/xx/EC in both the opening year 2031 and design year 2041. Concentrations of NO_2 are at most 77% of the annual limit value in 2031 and 75% of the annual limit value in 2041. In addition, the TII guidance (TII, 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. It can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations.

The effects of the proposed development on annual mean NO_2 concentrations can be assessed relative to 'Do Nothing' levels. NO_2 concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. The predicted increases in concentrations are considered 'neutral' to 'slight adverse' based on the TII criteria in Table 13-3. There will be at most an increase of 0.39 µg/m^3 at receptor R2 in the opening year 2031, this is a 1.95% change compared with the annual mean limit value of 20 µg/m^3. In the design year 2041 there will be at most an increase of 0.51 µg/m^3 at receptor R2, which is a 2.55% change when compared with the annual mean limit value of 20 µg/m^3.

Table 13-21 Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	Impact Opening Year						
	DM	% of AQLV	DS	% of AQLV	DS-DM	% Change of AQLV	Description
R1	15.1	75%	15.4	77%	0.36	1.80%	Slight Adverse
R2	14.5	73%	14.9	75%	0.39	1.95%	Neutral
R3	14.8	74%	15.1	76%	0.33	1.65%	Slight Adverse
R4	14.7	74%	15.1	75%	0.36	1.80%	Slight Adverse
R5	13.3	66%	13.7	68%	0.38	1.90%	Neutral
R6	14.4	72%	14.7	74%	0.28	1.40%	Neutral
R7	14.2	71%	14.4	72%	0.21	1.05%	Neutral
Receptor	Impact Design Year						
	DM	% of AQLV	DS	% of AQLV	DS-DM	% Change of AQLV	Description
R1	14.6	73%	15.0	75%	0.35	1.75%	Neutral
R2	14.2	71%	14.7	73%	0.51	2.55%	Neutral
R3	14.4	72%	14.8	74%	0.40	2.00%	Neutral
R4	14.3	72%	14.8	74%	0.47	2.35%	Neutral
R5	13.2	66%	13.7	69%	0.49	2.45%	Neutral
R6	14.1	71%	14.5	72%	0.36	1.80%	Neutral
R7	13.9	70%	14.2	71%	0.23	1.15%	Neutral

13.8.2.1.2 PM_{10}

In relation to changes in PM_{10} concentrations as a result of the proposed development, the results of the assessment can be seen in Table 13-22 for the Opening Year 2031 and Design Year 2041. The annual average concentration is in compliance with the annual mean limit value of 20 µg/m^3 at the worst-case receptors in the year 2031 and 2041. Concentrations of PM_{10} are at most 88% of the annual limit value in 2031 and 83% of the annual limit value in 2041. In addition, the proposed development will result in one additional day of exceedance of the daily PM_{10} limit value (Table 13-1) at receptors R1, R2, R3 and R4. However, there are 18 allowable exceedances per year under Directive 2024/xx/EC, therefore the additional day of exceedance is not considered significant in the context of the proposed development.

The effects of the proposed development on annual mean PM_{10} concentrations can be assessed relative to 'Do Nothing' levels. PM_{10} concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. The predicted increases in concentrations are considered 'neutral' to 'slight adverse' based on the TII criteria in Table 13-3. In the opening year 2031, there will be at most an increase of 0.74 µg/m^3 at receptor R2, which is a 1.85% change when compared with the ambient air quality limit value of 20 µg/m^3.In the design year 2041, there will be a maximum increase of 0.95 µg/m^3 at receptor R2, which is a 4.75% increase when compared with the annual mean limit value.

Table 13-22 Predicted Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor	Impact Opening Year						
	DM	% of AQLV	DS	% of AQLV	DS-DM	% Change of AQLV	Description
R1	16.9	85%	17.6	88%	0.67	3.35%	Slight Adverse
R2	15.9	79%	16.6	83%	0.74	1.85%	Slight Adverse
R3	16.4	82%	17.0	85%	0.63	1.58%	Slight Adverse
R4	16.2	81%	16.9	84%	0.69	1.73%	Slight Adverse
R5	13.5	68%	14.2	71%	0.70	1.75%	Neutral
R6	15.7	78%	16.2	81%	0.53	1.33%	Slight Adverse
R7	15.2	76%	15.6	78%	0.40	1.00%	Slight Adverse
Receptor	Impact Design Year						
	DM	% of AQLV	DS	% of AQLV	DS-DM	% Change of AQLV	Description
R1	16.0	80%	16.7	83%	0.66	3.30%	Slight Adverse
R2	15.2	76%	16.1	81%	0.95	4.75%	Slight Adverse
R3	15.6	78%	16.3	82%	0.75	3.75%	Slight Adverse
R4	15.5	77%	16.3	82%	0.88	4.40%	Slight Adverse
R5	13.4	67%	14.3	72%	0.91	4.55%	Neutral
R6	15.1	75%	15.7	79%	0.67	3.35%	Slight Adverse
R7	14.7	74%	15.2	76%	0.44	2.20%	Slight Adverse

13.8.2.1.3 $PM_{2.5}$

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 13-23 for the modelled Opening Year 2031 and Design Year 2041.

In the Opening Year 2031 the annual average concentration is in exceedance of the annual mean limit value of 10 µg/m^3 set out under Directive 2024/xx/EC at receptor R1, predicted concentrations at all other receptors assessed are in compliance with the limit value. Concentrations in the Opening Year 2031 reach a maximum of 104% of the annual mean limit value of 10 µg/m^3. This is primarily attributed to the background $PM_{2.5}$ concentration of 7 µg/m^3. There are predicted to be some increases in $PM_{2.5}$ concentrations at the worst-case receptors assessed in the Opening Year when compared with the Do-Nothing scenario (see Table 13-23). The predicted increases in concentrations are considered 'slight adverse' to 'moderate adverse' based on the TII criteria in Table 13-3. Concentrations are predicted to increase by at most 0.56 µg/m^3 at receptor R5. When comparing the change in concentration with the air quality limit value, it results in a maximum change of 5.6% at receptor R5. All other receptors will experience similar or lesser impacts.

In the Design Year 2041 predicted annual mean $PM_{2.5}$ concentrations are in exceedance of the limit value of 10 µg/m^3 set out under Directive 2024xx/EC, at receptors R1 – R4. The limit value is complied with at all other receptors assessed. The proposed development will result in 'slight adverse' to 'substantial adverse' impacts at the worst-case receptors assessed according to the TII significance criteria in Table 13-3. Concentrations will increase by at most 1.03 µg/m^3 as a result of the proposed development (at receptor R5, see Table 13-23), which is an increase of 10.3% when compared with the annual mean limit value of 10 µg/m^3 for $PM_{2.5}$.

Table 13-23 Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Impact Opening Year						
	DM	% of AQLV	DS	% of AQLV	DS-DM	% Change of AQLV	Description
R1	9.9	99%	10.4	104%	0.50	5.00%	Moderate Adverse
R2	9.1	91%	9.6	96%	0.54	5.40%	Moderate Adverse
R3	9.5	95%	9.9	99%	0.46	4.60%	Moderate Adverse
R4	9.4	94%	9.9	99%	0.50	5.00%	Moderate Adverse
R5	7.4	74%	8.0	80%	0.56	5.60%	Moderate Adverse
R6	9.0	90%	9.4	94%	0.39	3.90%	Slight Adverse
R7	8.7	87%	9.0	90%	0.31	3.10%	Slight Adverse
Receptor	**Impact Design Year**						
	DM	**% of AQLV**	**DS**	**% of AQLV**	**DS-DM**	**% Change of AQLV**	**Description**
R1	10.2	102%	10.9	109%	0.70	7.00%	Substantial Adverse
R2	9.3	93%	10.2	102%	0.98	9.80%	Moderate Adverse
R3	9.7	97%	10.5	105%	0.77	7.70%	Substantial Adverse
R4	9.6	96%	10.5	105%	0.93	9.30%	Substantial Adverse
R5	7.5	75%	8.5	85%	1.03	10.30%	Moderate Adverse
R6	9.2	92%	9.9	99%	0.71	7.10%	Moderate Adverse
R7	8.9	89%	9.3	93%	0.48	4.80%	Slight Adverse

13.8.2.1.4 Significance of Predicted Changes in NO_2, PM_{10} and $PM_{2.5}$

As outlined in Section 13.4.1.3, the TII guidance (2022) states that 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 and PM_{10}, 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 13.4.1.3, the impact is not significant.

With regard to changes in $PM_{2.5}$ concentrations as a result of the proposed development, there are predicted to be some 'slight adverse', and 'moderate adverse' impacts localised at the worst-case receptors assessed in the opening year. However, the proposed development is not predicted to significantly contribute to increased $PM_{2.5}$ concentrations and the primary contribution to the predicted modelled concentrations is the estimated background concentration. The increases in $PM_{2.5}$ concentrations in the opening year of the proposed development are considered overall 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 explicit 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 is assumed. As a result, the opening year predicted concentrations are the most appropriate for determining the significance of effects as per Section 13.4.1.3.

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, slight to moderate***, and overall ***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 2024/xx/EC 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. Therefore, as pollutant background concentrations in future years are expected to decrease there is potential for the impact of the proposed development to reduce to 'neutral'.

13.8.2.1.5 Ecological Impacts

An assessment of the impact of the proposed project has been undertaken using the approach outlined in the IAQM guidance document (IAQM, 2020) and the TII guidance (TII, 2022). An assessment of the ecologically sensitive sites has been carried out. As outlined in Section 13.6.3, sections of Cork Harbour SPA and Glanmire Wood pNHA are within 200m of the boundary of the proposed project.

Annual mean NO_x and ammonia concentrations, as well as nitrogen and acid deposition levels have been compared to the relevant critical levels and loads in Table 13-24 for the Opening Year 2031 and in Table 13-25 for Design Year 2041 for the worst-case ecologically sensitive receptors. The ground level concentrations, nitrogen deposition flux and acid deposition flux are presented for the closest locations within the ecological sites nearest to the affected road.

The results in Table 13-24 include background concentrations as per Table 13-10. With respect to both Total Nitrogen Deposition Flux and Total Acid Deposition Flux there are both a lower and an upper critical load thresholds (see Table 13-6). With respect to NO_X and NH_3, results have been compared against the appropriate limit value of 30 µg/m^3 and 3 µg/m^3, respectively.

Table 13-24 Opening Year 2031 Maximum Predicted NO_X and NH_3 Concentrations, and Nitrogen and Acid Deposition Rates at Closest Point within Ecological Sites to Road

<table>
<tr><th colspan="5">Cork Harbour SPA</th></tr>
<tr><th></th><th>Predicted Ground Level NO_X Concentration (including background) µg/m^3</th><th>Predicted Ground Level NH_3 Concentration (including background) µg/m^3</th><th>Total Nitrogen Deposition Flux (kg/ha/yr)</th><th>Total Acid Deposition Flux (keq/ha/yr)</th></tr>
<tr><td>Do-Nothing</td><td>4.28</td><td>2.58</td><td>6.65</td><td>0.47</td></tr>
<tr><td>Do-Something</td><td>4.34</td><td>2.59</td><td>6.7</td><td>0.48</td></tr>
<tr><td>Difference between Do-Something and Do-Minimum</td><td>0.060</td><td>0.010</td><td>0.050</td><td>0.010</td></tr>
<tr><td>Change relative to lower critical load (%)</td><td rowspan="2">0.20%</td><td rowspan="2">0.33%</td><td>1.00%</td><td>1.40%</td></tr>
<tr><td>Change relative to upper critical load (%)</td><td>0.50%</td><td>0.23%</td></tr>
<tr><th colspan="5">Glanmire Wood pNHA</th></tr>
<tr><th></th><th>Predicted Ground Level NO_X Concentration (including background) µg/m^3</th><th>Predicted Ground Level NH_3 Concentration (including background) µg/m^3</th><th>Total Nitrogen Deposition Flux (kg/ha/yr)</th><th>Total Acid Deposition Flux (keq/ha/yr)</th></tr>
<tr><td>Do-Nothing</td><td>5.02</td><td>2.72</td><td>7.43</td><td>0.47</td></tr>
<tr><td>Do-Something</td><td>5.22</td><td>2.75</td><td>7.6</td><td>0.48</td></tr>
<tr><td>Difference between Do-Something and Do-Minimum</td><td>0.200</td><td>0.030</td><td>0.170</td><td>01.0</td></tr>
<tr><td>Change relative to lower critical load (%)</td><td rowspan="2">0.67%</td><td rowspan="2">1.00%</td><td>1.70%</td><td>1.40%</td></tr>
<tr><td>Change relative to upper critical load (%)</td><td>1.13%</td><td>0.21%</td></tr>
</table>

Table 13-25 Design Year 2041 Maximum Predicted NO_X and NH_3 Concentrations, and Nitrogen and Acid Deposition Rates at Closest Point within Ecological Sites to Road

Cork Harbour SPA				
	Predicted Ground Level NO_X Concentration (including background) µg/m^3	Predicted Ground Level NH_3 Concentration (including background) µg/m^3	Total Nitrogen Deposition Flux (kg/ha/yr)	Total Acid Deposition Flux (keq/ha/yr)
Do-Nothing	4.19	2.59	6.69	0.48
Do-Something	4.25	2.61	6.8	0.48
Difference between Do-Something and Do-Minimum	0.06	0.02	0.11	0.000
Change relative to lower critical load (%)	0.20%	0.67%	2.20%	0.00%
Change relative to upper critical load (%)			1.10%	0.00%
Glanmire Wood pNHA				
	Predicted Ground Level NO_X Concentration (including background) µg/m^3	Predicted Ground Level NH_3 Concentration (including background) µg/m^3	Total Nitrogen Deposition Flux (kg/ha/yr)	Total Acid Deposition Flux (keq/ha/yr)
Do-Nothing	4.76	2.74	7.51	0.53
Do-Something	4.96	2.81	7.89	0.56
Difference between Do-Something and Do-Minimum	0.200	0.070	0.380	0.030
Change relative to lower critical load (%)	0.67%	2.33%	3.80%	4.20%
Change relative to upper critical load (%)			2.53%	0.62%

The annual mean NO_X concentrations (including background) are below the critical level of 30 µg/m^3 at all modelled habitats, in both the DN and the DS scenarios, in both the Opening and Design Years. The annual mean NH_3 concentrations (including background) are below the critical level of 3 µg/m^3 at all modelled habitats, in both the DN and the DS scenarios, in both the Opening and Design Years.

Nitrogen deposition levels (including background) are within the range of critical loads for nitrogen deposition (see Table 13-6) at all modelled habitats, in both the DN and the DS scenarios, in both the Opening and Design Years. The acid deposition (as N) levels are within the range of critical loads for acid deposition (as N) (see Table 13-6) at all modelled designated sites, in both the DM and the DS scenarios, in both the Opening and Design Years.

The TII PE-ENV-01106 guidance referenced in Section 13.4.3.2 states that if the total N deposition and acid deposition (due to the proposed development plus background concentrations) are more than 1% of the critical loads then the modelled results should be discussed further with the project ecologist. The project ecologist was advised of these results to ensure a robust EIAR assessment. The project ecologist has reviewed the above results for the impacted ecological sites. In relation to the Glanmire Wood pNHA, the ecologist has concluded that impacts are considered slight. Additionally, according to the ecologist, given the management of the site, overall design, landscape plan, effects on Glanmire Wood will be offset and buffered making them slight over the long-term. Effects on Cork Harbour SPA will also be slight, and in some cases effects could be viewed as positive for most of the wintering birds designated as SCIs.Therefore, in accordance with the EPA Guidelines (EPA, 2022) the ecological impacts associated with the operational phase traffic emissions are overall ***direct, long-term, negative*** and ***slight***.

13.8.3 Cumulative Effects

13.8.3.1 Construction Phase

According to the IAQM guidance (IAQM, 2024) should the construction phase of the proposed development or proposed development coincide with the construction phase of any other development within 500m then there is the potential for cumulative construction dust impacts.

A review of relevant planning applications within 500m of the site was conducted to identify sites with the potential for cumulative impacts. There was no. 1 site identified within 500m of the site which may have coinciding construction phases with that of the proposed development and result in cumulative dust impacts to sensitive receptors. This is the Residential development at Glanmire Lodge, Glanmire (Reg. Ref. No. 20/39719).

A review of projects listed in Chapter 1 of the EIAR, within the vicinity of the proposed development, was also conducted.

- Ballinglanna residential development (ABP Ref. SHD ABP-300543-18, Reg. Ref. No.’s 20/39179 and 23/42154).
- Nursing home and childcare facility at the former Glanmire Rectory (Reg. Ref. No.’s 19/38980 and 21/40423).
- Glanmire Roads Improvement Scheme.

The proposed development has been assessed as having a high risk of dust soiling impacts and a low risk of dust-related human health impacts during the construction phase. However, as stated above a high level of dust control will be implemented across the full proposed development site which will avoid significant dust emissions. The dust mitigation measures outlined in Section 13.9.1 will be applied during the construction phase which will avoid significant cumulative impacts on air quality. Provided these mitigation measures are in place for the duration of the construction phase cumulative dust related impacts to nearby sensitive receptors will not be significant. Cumulative impacts to air quality will be ***medium-term, localised, negative*** and ***imperceptible*.**

There are no significant cumulative impacts to air quality predicted for the construction phase.

13.8.3.2 Operational Phase

The traffic data reviewed for the operational phase impacts to air quality included the cumulative traffic associated with other existing and permitted developments in the local area as well as traffic associated with the proposed development. The traffic model is intended to predict and assess future growth and is not a static model. Therefore, the cumulative impact is included within the operational stage impact for the proposed development. The impact is predicted to be ***long-term, localised, negative*** and ***slight to moderate*** but overall ***not significant*** with regards to air quality

13.8.4 Summary

The following Table summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 13-26 Summary of Construction Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Dust Impact	Negative	Not significant - slight	Localised	Likely	Medium-term	Direct
Construction Traffic Impacts	Negative	Not significant - imperceptible	Localised	Likely	Medium-term	Direct

The following Table summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 13-27 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Traffic Impacts	Negative	Not significant – slight to moderate	Localised	Likely	Long-term	Direct
Operational Ecological Impacts	Negative	Not significant - slight	Localised	Likely	Long-term	Direct

13.9 Mitigation Measures

13.9.1 Construction Phase

The proposed development has been assessed as having a worst-case high risk of dust impacts during the demolition and construction phase activities (see Section 13.8.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the development. These measures are appropriate for sites with a high 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), 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 overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

13.9.1.1 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions to minimise the potential for significant dust nuisance (see Figure 13-1). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised.
- The appointed contractor will provide a site hoarding along boundaries where works are taking place adjacent to ecological sensitive receptors and at the main construction compound which will assist in minimising the potential for dust impacts off- site.
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions.
- 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.
- Community engagement will be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses.

- 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.
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein.
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

13.9.1.2 Preparing and Maintaining the Site

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

13.9.1.3 Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary to avoid idling of vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 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).

13.9.1.4 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.

13.9.1.5 Waste Management

- No bonfires and burning of waste materials.

13.9.1.6 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.

13.9.1.7 Measures Specific to Construction

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

13.9.1.8 Measures Specific to Trackout

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25% to 80% (UK ODPM, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. If sweeping using a road sweeper is not possible due to the nature of the surrounding area, then a suitable smaller scale street cleaning vacuum will be used.

- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10m from receptors where possible.

13.9.1.9 Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

13.9.2 Operational Phase

No site-specific mitigation measures are proposed for the operational phase. The significance of the impact of traffic emissions on air quality is assessed for the opening year only according to the TII guidance (2022) which results in some ‘slight’ to ‘moderate’ adverse increases in pollutant concentrations, however, the impact overall is considered not significant.

The measures set out in the Clean Air Strategy for Ireland (Government of Ireland 2023) aim 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 improvements in air quality in future years to meet the objectives of the Clean Air Strategy for Ireland (Government of Ireland, 2023) and to comply with the ambient air quality limit values set out in Directive 2024/xx/EC. These measures must be set at a national level. In relation to the proposed development, the inclusion of bike parking facilities and electric vehicle charging infrastructure as well as the availability of public transport routes will all help in promoting more sustainable modes of transportation and reducing private vehicle trips which will have the benefit of reducing air emissions from traffic.

13.10 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

13.10.1 Construction Phase

13.10.1.1 Air Quality

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared which will be incorporated into the construction environmental management plan (CEMP) for the site. Provided the dust minimisation measures outlined in Section 13.9.1 are adhered to, the air quality impacts during the construction phase will be ***medium-term, localised, negative,*** and ***imperceptible***, which is overall ***not significant*** in EIA terms.

The impact to ecological receptors from dust emissions during the construction stage is ***medium-term, localised, direct, negative, imperceptible*** and ***not significant*** as per Section 13.8.1.2.

The impact to air quality from traffic emissions during the construction stage is ***long-term, localised, direct, negative*** and ***imperceptible,*** which is overall ***not significant*** as per Section 13.8.1.2.

13.10.1.2 Human Health

Dust emissions from the demolition and construction phase of the implementation of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Section 13.6.3 and Table 13-12, the surrounding area is considered of low sensitivity to dust related human health impacts. It has been assessed within Section 13.6.3 that there is at most a low risk of dust-related human health impacts as a result of the earthworks, construction and trackout activities associated with the proposed development.

Best practice mitigation measures are proposed for the construction phase of the development which will focus on the pro-active 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 of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health (see Table 13-1). Therefore, the impact of construction of the proposed development is ***medium-term, localised, direct, negative*** and ***imperceptible*** with respect to human health, which is overall ***not significant*** in EIA terms.

Traffic emissions from construction vehicles also have the potential to impact human health. However, as per Section 13.8.1.2, the change in local air quality as a result of construction traffic is considered ***medium-term, localised, direct, negative*** and ***imperceptible***, which is overall ***not significant*** in EIA terms.

13.10.2 Operational Phase

13.10.2.1 Air Quality

Dispersion modelling of traffic emissions at sensitive receptors in proximity to impacted road links during the operational phase was undertaken to predict pollutant concentrations in future years.

Section 13.8.2.1 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 ***slight to moderate*** for the opening year, at the receptors assessed. The overall impact is considered ***not significant*** in EIA terms. 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 2024/xx/EC are achieved.

With respect to ecological impacts due to operational phase traffic, impacts are overall ***direct, localised, negative, slight*** and ***long-term*** which is ***not significant*** in EIA terms.

13.10.2.2 Human Health

Traffic related air emissions have the potential to impact human health if they do not comply with the ambient Air Quality Standards detailed in Table 13-1. There are predicted to be some exceedances of the annual mean limit value of 10 µg/m^3 for $PM_{2.5}$ in the opening and design years as a result of traffic emissions associated with the proposed development. However, background values are having the largest impact on the predicted future pollutant concentrations, with the proposed development contributing minor amounts. There is the potential for reductions in pollutant background concentrations in future years which may lead to reduced impacts. Considering the changes in pollutant concentrations the overall impact on human health was assessed as ***long-term, localised, direct, negative*** and ***slight to moderate*** but overall ***not significant*** in EIA terms.

13.10.3 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 13-28 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Impact of construction dust from demolition, earthworks, construction and trackout in terms of dust soiling, human health and ecosystems	Negative	Not significant - imperceptible	Study area as per Section 13.6.3.	Likely	Medium-term	Direct
Impact of construction phase traffic on air quality	Negative	Not significant - imperceptible	Detailed assessment and study area scoped out as per Section 13.4.2.	Likely	Medium-term	Direct

The following Table summarises the identified likely residual significant effects during the operational phase of the proposed development post mitigation.

Table 13-29 Summary of Operational Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Impact of operational phase traffic on air quality	Negative	Not significant – slight to moderate	Localised, within 200m of impacted roads as per Section 13.4.3.	Likely	Long-term	Direct

13.10.4 Cumulative Residual Effects

13.10.4.1 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 13.9, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. Cumulative residual effects are predicted to be ***direct, medium-term, negative, localised*** and ***not significant***.

13.10.4.2 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 ***slight to moderate***. The operational phase effects to air quality is ***long-term, direct, negative***, and ***not significant***.

13.11 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.

13.12 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 to determine the highest level of mitigation required in relation to potential dust impacts (see Section 13.8.1). The proposed development is the worst-case scenario in terms of dust emissions.

Worst-case traffic data was used in the assessment of construction and operational phase impacts. In addition, conservative background concentrations were used 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.

13.13 Interactions

13.13.1 Air Quality and Population & Human Health

13.13.1.1 Construction Phase

An adverse air quality impact during the construction phase can cause health and dust nuisance issues. 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 ***medium-term, negative*** and ***imperceptible*** with respect to Population and Human Health during the construction phase, which is overall ***not significant*** in EIA terms.

13.13.1.2 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 ***imperceptible***, which is overall ***not significant*** in EIA terms.

13.13.2 Air Quality and Climate

13.13.2.1 Construction Phase

Air quality and climate have interactions as the emissions from the burning of fossil fuels during the construction phase 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.

13.13.2.2 Operational Phase

Air Quality and climate have interactions as the emissions from the burning of fossil fuels during the operational phase 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.

13.13.3 Air Quality and Land & Soils and Hydrogeology

13.13.3.1 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 and hydrogeology 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.

13.13.3.2 Operational Phase

There are no potentially significant interactions identified between air quality, and land, soils and hydrogeology during the operational phase.

13.13.4 Air Quality and Biodiversity

13.13.4.1 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 two designated ecological sites within 250m 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 13.9.1. With the implementation of these mitigation measures dust emissions will be minimised and impacts will be ***medium-term, negative and imperceptible*** with respect to biodiversity, which is overall ***not significant*** in EIA terms. Effects on Biodiversity are considered by the project ecologist in Chapter 11 of this EIAR.

13.13.4.2 Operational Phase

There are interactions between air quality and biodiversity during the operational phase. There are two designated ecological sites within 250m of the proposed development site area. Emissions generate by operational traffic have the potential to impact ecological receptors. An assessment of the air quality impacts on ecological receptors as a result of the change in annual average daily traffic on roads close to the site was conducted. The impact of the interactions between air quality and biodiversity are considered to be ***direct, long-term, negative*** and ***slight*** during the operational phase, which is overall ***not significant*** in EIA terms***.***

13.13.5 Air Quality and Material Assets – Traffic & Transport

13.13.5.1 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 considered to be ***medium-term, direct, negative*** and ***imperceptible*** during the construction phase.

13.13.5.2 Operational Phase

The impact of the interactions between traffic and air quality are considered ***long-term, direct, negative, localised, slight to moderate*** but overall ***not significant*** during the operational phase.

13.14 Monitoring

13.14.1.1 Construction Stage

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days). Monitoring shall ensure that the dust mitigation measures are working satisfactorily as construction works progress.

13.14.1.2 Operational Stage

There is no monitoring recommended for the operational phase of the development as impacts to air quality are predicted to be ***imperceptible***.

13.15 Summary of Mitigation and Monitoring

The following Table summarises the Construction Phase mitigation and monitoring measures.

Table 13-30 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Impact of construction dust from demolition, earthworks, construction and trackout in terms of dust soiling, human health and ecosystems	Dust control measures as per IAQM Guidance (IAQM, 2024) and Section 13.9.1.	Monitoring of construction dust deposition as per Section 13.14.1.1.

The following Table summarises the Operational Phase mitigation and monitoring measures.

Table 13-31 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
No mitigation or monitoring required for the operational phase of the development.		

13.16 Conclusion

This chapter has reviewed and analysed the potential and the predicted impacts of the proposed development with regards to air quality. These impacts have been considered for both the construction and operational phases of the proposed development. The cumulative impact of the proposed development and surrounding developments have also been considered.

Provided all mitigation measures as set out in this chapter, the overall predicted effect of the proposed development is ***not significant***.

13.17 References and Sources

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- Transport Infrastructure Ireland (2022) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 and TII Road Emissions Model (REM) Online Calculator Tool
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- UK DEFRA (2016) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. TG (16)
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- USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
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Dunkettle EIAR

Volume II

Main Statement

CHAPTER 14

Climate

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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14 Climate

14.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects on climate due to the proposed development at Dunkettle, Co. Cork.

It should be read in conjunction with Ch. 13 Air Quality, Ch. 6 Material Assets: Traffic and Transport and the Traffic and Transportation Assessment (MHL Consulting Engineers, 2024), Ch. 8 Material Assets: Waste, and Flood Risk Assessment (JODA Engineering Consultants, 2024) submitted with the planning application.

14.2 Expertise and Qualifications

This chapter was completed by Aisling Cashell, an Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds a BA and an MAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. She is a member of Engineers Ireland. She has been specialising in the area of air quality, climate and sustainability for 1.5 years and has prepared air quality and climate assessments for inclusion within EIARs for residential and commercial developments such as Twenties Lane (Planning Application Ref: 22713), Cherrywood T13 (Planning Application Ref: DZ23A/0028), Corballis Donabate LRD (Planning Application Ref: LRD0017/S3), The Paddocks (Planning Application Ref: 2360349), and Dublin Airport Authority.

14.3 Proposed Development

Chapter 2 of this EIAR provides a full description of the proposed development.

14.3.1 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 climate assessment is divided into two distinct sections; a Greenhouse Gas Assessment (GHGA) and a Climate Change Risk Assessment (CCRA).

- Greenhouse Gas Emissions Assessment 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 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.

14.4 Methodology

The assessment of potential impacts on climate has been prepared taking the relevant legislation, policy and guidance described in the following sections into consideration.

14.4.1 Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the 2015 Climate Act). The purpose of the 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 Climate Act as the *'National Transition Objective'*. The 2015 Climate Act made provision for a national low carbon transition and mitigation plan (now known as a Climate Action Plan), and a national adaptation framework. In addition, the 2015 Climate 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 (CAP19) outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture. It also 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 current Climate Action Plan is CAP24, published in December 2023 (DECC, 2023).

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 published the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act) in March 2021 (Government of Ireland, 2021). The Climate Act was signed into Law on the 23rd of July 2021, giving statutory effect to the core objectives stated within the first Climate Action Plan.

The purpose of the 2021 Climate Act is to provide for the approval of plans *"to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy"*. This is known as the *'National Climate Objective'*, which supersedes the 2015 Climate Act *'National Transition Objective'*. The 2021 Climate Act will also *"provide 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"*.

The second National Adaptation Framework (NAF) (DECC, 2024) was published in June 2024 in line with the five-year requirement of the 2015 Climate and Low Carbon Development Act (the Climate 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."*

The NAF highlights that there is a projected increased frequency of droughts, coupled with higher evapotranspiration rates, which could cause reduced river flow, groundwater recharge, and reservoir refill capacity, leading to potential water supply shortages. The NAF warns that national long-term water supply projects must be planned for within budgets to ensure the adaptation required to make Ireland resilient by 2050 and beyond is funded.

The National Climate Change Risk Assessment (NCCA) was published in May 2024 (EPA, 2024a). The NCCA was required to be developed under Action 457 from the 2021 Climate Action Plan. Action 457 states "*Further develop Ireland's national climate change risk assessment capacity to identify the priority physical risks of climate change to Ireland."*. The NCCA uses definitions of the risk determinants from the Intergovernmental Panel on Climate Change (IPCC) Risk Framework (IPCC, 2023), which are outlined below.

- **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 NCCA assess exposure and vulnerability for two future climate change scenarios or Representative Concentration Pathways (RCPs).

- RCP4.5 was selected as it represents an alignment with the global temperature trajectory; and
- 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

2024 NAF. In addition to the future climate scenarios, the NCCA assesses risk on the future climate during the following timeframes:

- Present (~2030),
- Medium-Term (~2050) and
- Long-Term (~2100).

In relation to carbon budgets, the 2021 Climate Action and Low Carbon Development (Amendment) Act 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, as shown in Table 14.1. 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, 2024) and are shown in Table 14.2. Industry and Buildings (Residential) have a 35% and 40% reduction requirement respectively and a 2030 emission ceiling of 4 Mt CO_2e[1].

Table 14.1 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

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 14.2 Sectoral Emission Ceilings 2030

Sector	Baseline (MtCO2e)	Carbon Budgets (MtCO2e)		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

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[1] Mt CO_2e denotes million tonnes carbon dioxide equivalent

Sector	**Baseline (MtCO2e)**	**Carbon Budgets (MtCO2e)**		**2030 Emissions (MtCO$_2$e)**	**Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)**
	2018	**2021-2025**	**2026-2030**		
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**

14.4.2 Policy

In December 2023 the current Climate Action Plan, CAP24, was published (DECC, 2024). This CAP builds on the progress of CAP23, which first published carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030 and 2050 net zero goal. The CAP has six vital high impact sectors where the biggest savings can be made. These are renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use. CAP24 states that the decarbonisation of Ireland's manufacturing industry is key for Ireland's economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP24 states that these reductions can be brought about by product substitution for construction materials and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report *Modern Methods of Construction*. The IDA Ireland will also seek to attract businesses to invest in decarbonisation technologies to ensure economic growth can continue alongside a reduction in emission.

In August 2024, the Government published a *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (Department of the Environment, Climate and Communications, 2024) prepared under *Ireland's Climate Action and Low Carbon Development Acts 2015 to 2021*. This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050 covering a 30-year period, achieving the interim targets set out in the Climate Action Plan 2024. It conforms to both EU and national requirements, and as such, will replace the 2023 Strategy that was submitted to the EU Commission and UNFCCC. The strategy aligns with Ireland's National Energy and Climate Plan. The strategy states that the main challenges facing decarbonisation of the transport sector include decoupling travel demand from economic growth, the absence of suitable alternatives to the car at a national level, associating car ownership with perceptions of freedom and convenience and addressing the significant lead-in times associated with the delivery of major transport infrastructure and rollout of additional public transport services as attractive and compelling alternatives to private car use. The strategy notes that the process of electrifying the light truck and bus fleet will accelerate throughout the 2020s assisting with achieving milestones. The strategy states that cities will lead in transport innovation away from the private car as the population densities assist with the proximity to schemes. The strategy aims to lead to large improvements in the quality of urban living in the coming decades.

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.

The Cork City Climate Action Plan 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

14.4.3 Guidance

The assessment of potential impacts on climate has been prepared in accordance with the most relevant principal guidance and best practice documents:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- GE-GEN-01101: Guide to the Implementation of Sustainability for Transport Infrastructure Ireland Projects (TII, 2023);
- PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a);
- PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (TII, 2022b);
- GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2022c);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013);
- 2030 Climate and Energy Policy Framework (European Commission, 2014);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);

- Technical guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).
- 2030 EU Climate Target Plan (European Commission, 2021b);
- Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) (Government of Ireland, 2021).
- Climate Action Plan 2024 (DECC, 2024);
- National Adaptation Framework (NAF) (DECC, 2023)
- Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a);
- GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b); and
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (Institute of Environmental Management & Assessment (IEMA), 2022).

14.4.4 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 14.3).

14.4.4.1 Construction Phase

The Green House Gas (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 50 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. This has been included within the scope of the assessment.
- **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 GHG emissions, including embodied carbon, using the TII Online Carbon Tool (TII, 2022c). 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 TII Online Carbon Tool (TII, 2022c) has been commissioned by TII to assess GHG emissions associated with road or rail projects in Ireland. The TII Carbon Tool (TII, 2022c) 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 use of the TII carbon tool is considered appropriate for certain elements of the proposed development as the material types and construction activities employed by the proposed development are accounted for in the tool. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase. The outputs are expressed in terms of tCO_2e (tonnes of carbon dioxide equivalent).

The use of the TII Carbon Tool is not considered suitable for the building elements of the proposed development. As the TII Carbon Tool was developed for road and infrastructure projects, the material types within the tool are specific to these types of developments. These material types are not fully appropriate for assessing the embodied carbon associated with the construction of buildings. Therefore, the carbon impact of the buildings was carried out using an alternative tool; the Carbon Designer for Ireland tool.

The Irish Green Building Council in partnership with One Click LCA Ltd. have developed the Carbon Designer for Ireland tool (One Click LCA Ltd., 2023) for use on Irish specific building projects. The Carbon Designer tool is promoted by the EPA and the Land Development Agency. One Click LCA Ltd. 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 an early stage using typical default materials and values. Inputs to the tool include the gross floor area and number of stories above ground level along with the building frame type. Once the baseline is established using generic data, 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. The Carbon Designer for Ireland tool has been used to assess the embodied carbon impact of the proposed development.

Reasonable conservative estimates have been used in this assessment where necessary to provide an estimate of the GHGs associated with the proposed development.

Information on the material quantities, site clearance activities, land clearance, excavations, fuel usage during construction, waste quantities and construction traffic (material, staff and waste transport) were provided by the design team for input into the TII carbon tool and are also discussed in Chapter 6 Material Assets: Traffic and Transport and Chapter 8 Material Assets: Waste. This information was used to determine an estimate of the GHG emissions associated with the development.

Embodied carbon is carbon dioxide emitted during the manufacture, transport and construction of building materials, together with site activities. As part of the proposed development, construction stage embodied GHG emissions have been calculated under the following headings within the TII Carbon Tool (TII, 2022c) where applicable:

- Pre-Construction;
- Embodied Carbon of Materials;
- Construction Activities;
- Construction Waste; and
- Maintenance.

Pre-construction includes land-use changes and site clearance activities which includes demolition works. There are some minor site clearance works associated with the proposed extension to the existing facility. However, these are minor as the majority of the land is already suitably prepared for construction to commence.

Transport GHG emissions associated with delivery of materials to site and removal of waste materials off site were included in the calculator. In addition, construction worker travel to site was also included within the calculations. The exact location of all facilities to be used is not known at this stage. Therefore, an approximate radius from the site was used for the purposes of this assessment. Where specific locations were known the exact transport distance was included within the calculations.

14.4.4.2 Operational Phase

14.4.4.2.1 Operational 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, 2022d), 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. 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.

There are a number of road links that will experience a change of over 1,000 AADT during the operational phase as a result of 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 obtained from an Air Quality Practitioner to show future user emissions during operation without the development in place. The Air Quality Practitioner calculated the traffic related emissions through the use of the TII REM tool (TII, 2022d) which includes detailed fleet predictions for age, fuel technology, engine size and weight based on available national forecasts. The output is provided in terms of CO_2e for the Base Year 2024, Opening Year 2031 and Design Year 2041. Both the Do Nothing and Do

Something scenarios are quantified in order to determine the degree of change in emissions as a result of the proposed development.

Traffic data was obtained from MHL Consulting Engineers for the purpose of this 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. In order to assess the full cumulative impact of the development, the traffic data has included specific cumulative developments within the area (see Traffic and Transportation Assessment prepared by MHL Consulting Engineers and submitted with this planning application for further details).

The traffic data is detailed in Table 14.3. Only road links that met the TII scoping criteria were included in the modelling assessment. See Chapter 13 Air Quality and Chapter 6 Material Assets: Traffic & Transport for further details on the traffic data.

Table 14.3 Traffic Data used in Operational Phase Climate Assessment

Road Name	Speed (k/h)	Base Year 2024	Do Minimum 2031	Do Something 2031	Do Minimum 2041	Do Something 2041
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
R639	50	10125 (261)	11345 (292)	13306 (343)	12448 (320)	16053 (413)
Glanmire Bridge	50	8367 (127)	9373 (143)	11355 (173)	10284 (157)	13926 (212)
East Cliff Road	50	6219 (56)	6963 (63)	8957 (81)	7642 (69)	11306 (103)
L2998 Ballinglanna	50	9439 (153)	10573 (172)	12553 (204)	11600 (189)	15239 (248)
L2998 Dunkettle Road	50	8245 (194)	9234 (217)	11199 (264)	10136 (239)	13749 (324)
Richmond Hill	50	1277 (82)	1432 (91)	3323 (212)	1575 (101)	5051 (322)
L2998 The Cottages	50	8993 (240)	10074 (269)	12034 (321)	11048 (295)	14650 (391)
L2998 Roundabout	50	9772 (397)	10713 (435)	12646 (513)	11758 (477)	15312 (621)

14.4.4.2.2 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. There are a number of measures that can be incorporated into the design to reduce the development's impact on climate during its operational phase. Information on commonly adopted measures in relation to operational energy usage and sustainability practices has been considered to inform the climate assessment (see Climate Resilience Statement prepared by DMNA Architects, prepared for the LRD Phase 1 application and replicated for the purposes of assessing the LRD phase 2 scheme).

14.4.4.3 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 broadly consistent with the terminology contained within Figure 3.4 of the EPA's *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022).

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 IEMA 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. In line with IEMA Guidance (IEMA, 2022), TII state 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*[2] *by 2050".*

Significance is determined using the criteria outlined in Table 14.4 (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.

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[2] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first educed in line with a *'science-based'* trajectory with any residual emissions neutralised through offsets.

Table 14.4 GHGA Significance Criteria

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.

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, 2023). 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 relevant sector budgets are the Industry, Buildings (Residential) sector, Transport sector, Electricity sector and Waste sector.

14.4.5 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 14.3, future climate change modelling and input from other experts working on the proposed development (i.e. hydrologists) should be used in order 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.

- **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 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.

14.4.5.1 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. The vulnerability assessment takes any proposed mitigation into account.

Vulnerability = Sensitivity x Exposure

Table 14.5 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. A risk that is low or medium is classed as non-significant, while a high or extreme risk is classed as a significant risk.

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 a development would be considered not significant.

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. An assessment of construction phase CCRA impacts is only required according to the TII guidance (TII, 2022a) if a detailed CCRA is required.

Table 14.5 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 14.5.2, 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 14.6.1.

14.5 Difficulties Encountered

There were no difficulties encountered when compiling this assessment.

14.6 Baseline Environment

PE-ENV-01104 (TII, 2022c) 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.

14.6.1 Current Greenhouse Gas Assessment (GHGA) Baseline

Data published in July 2024 (EPA, 2024), indicates that Ireland exceeded, without the use of flexibilities, its 2023 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 2.27 Mt CO_2e. However, the 2023 emissions were the first time that Irelands emission were below (-1.2%) 1990 levels. ETS emissions decreased (-17.0%) and ESR emissions decreased (-3.4%). 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 2023 total national GHG emissions, excluding LULUCF, have decreased by 6.8% on 2022 levels to 55.01 Mt CO_2e, with a 2.2 Mt CO_2e (-21.6%) reduction in electricity industries alone. This was driven by a 40.7% share of energy from renewables in 2023 and by increasing our imported electricity. Manufacturing combustion and industrial processes decreased by 5.1% to 6.3 Mt CO_2e in 2023 due to declines in fossil fuel usage. The sector with the highest emissions in 2023 was agriculture at 37.6% of the total, followed by transport at 21.4%. For 2023, total national emissions (including LULUCF) were 60.62 Mt CO_2e (EPA, 2024), as shown in Table 14.6.

The provisional 2023 figures indicate that Ireland has used 63.9% of the 295 Mt CO_2e Carbon Budget for the five-year period 2021-2025.

Table 14.6 Trends in Total National GHG Emissions 2021 – 2023

Sector *Note 1*	2021	2022	2023	Total Budget (Mt CO2e) (2021-2025)	% Budget 2021-2025 Used	Annual Change 2022 to 2023
Electricity	9.893	9.694	7.558	40.0	67.9%	-22.0%
Transport	11.089	11.760	11.791	54.0	64.1%	0.3%
Buildings (Residential)	6.868	5.753	5.346	29.0	62.0%	-7.1%
Buildings (Commercial and Public)	1.444	1.447	1.409	7.0	61.4%	-2.6%
Industry	7.093	6.622	6.288	30.0	66.7%	-5.0%
Agriculture	21.940	21.795	20.782	106.0	60.9%	-4.6%
Other Note 2	1.864	1.931	1.832	9.0	62.5%	-5.1%
LULUCF	4.628	3.983	5.614	–	–	40.9%
Total including LULUCF	**64.819**	**62.986**	**60.620**	**295.0**	**63.9%**	**-3.8%**

Note 1 Reproduced from latest emissions data on the EPA website July 2024 (EPA, 2024).

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).

14.6.2 Future Greenhouse Gas Assessment (GHGA) 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, 2022c) 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 CAP24, and future CAPs, alongside binding 2030 EU targets. In order to meet the commitments under the Paris Agreement, 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). 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 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.

14.6.3 Current Climate Change Risk Assessment (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 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 (Met Éireann, 2024) indicates that the wettest months at Cork Airport Metrological Station was December, and the driest month on average was May. 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, 2023a) 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 14.1).

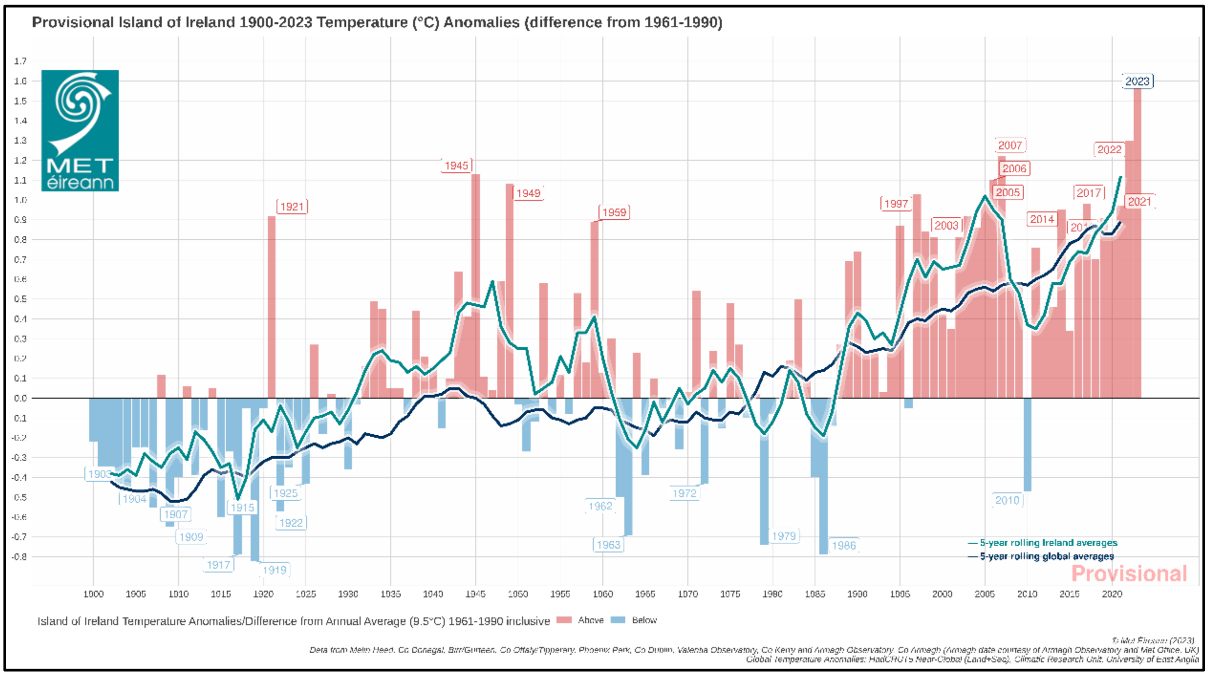

Figure 14.1 1900-2023 Temperature (°C) Temperature Anomalies (Differences from 1961-1990)

The year 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[3] to the west of Ireland during the June 2023. This marine heatwave contributed to the record rainfall in July.

Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. Considering the extraordinary 2023 data, Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. The record temperatures mean 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.

14.6.4 Future Climate Change Risk Assessment (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

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[3] https://www.met.ie/marine-heat-wave-2023-a-warning-for-the-future

climate change including the following which may be of relevance to the proposed development (EPA, 2021a):

- 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.

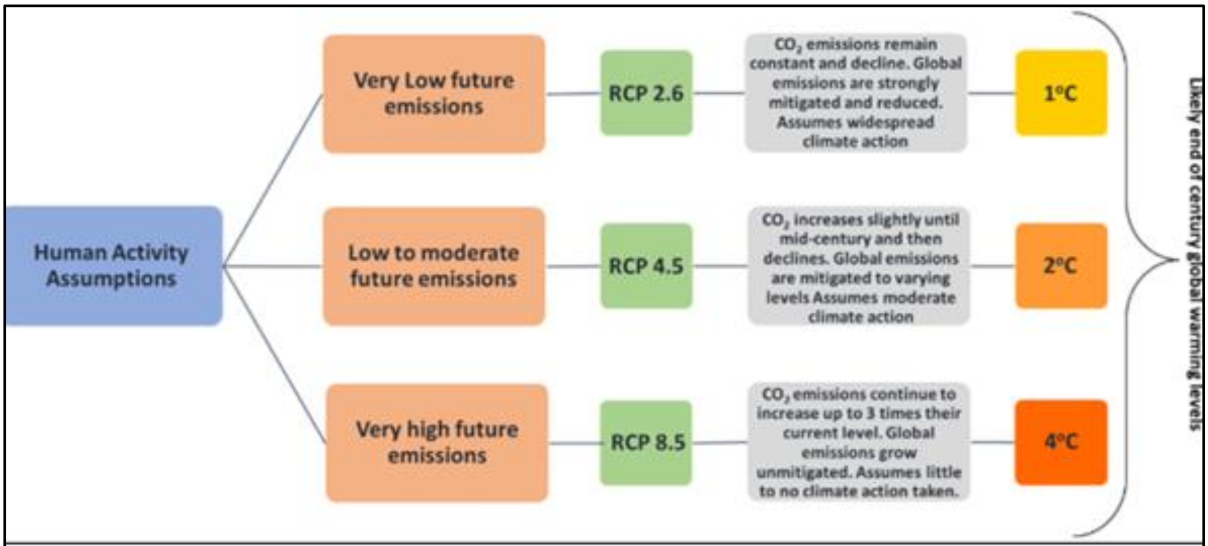
The EPA's *State of the Irish Environment Report (Chapter 2: Climate Change)* (EPA, 2020a) notes that projections show that full implementation of additional policies and measures, outlined in the 2019 Climate Action Plan, will result in a reduction in Ireland's total GHG emissions by up to 25% by 2030 compared with 2020 levels. Climate change is not only a future issue in Ireland, as a warming of approximately 0.8°C since 1900 has already occurred. The EPA state that it is critically important for the public sector to show leadership and decarbonise all public transport across bus and rail networks to the lowest carbon alternatives. The report (EPA, 2020a) underlines that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change to achieve these targets and that Ireland must accelerate the rate at which it implements GHG emission reductions. The report states that mid-century mean annual temperatures in Ireland are projected to increase by between 1.0°C and 1.6°C (subject to the emissions trajectory). In addition, heat events are expected to increase by mid-century (EPA, 2020a). While individual storms are predicted to have more severe winds, the average wind speed has the potential to decrease (EPA, 2020a).

TII's Guidance document PE-ENV-01104 (TII, 2022c) 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.

Future climate predictions undertaken by the EPA have been published in *'Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach'* (EPA, 2020b). The future climate was simulated under both Representative Concentration Pathway 4.5 (RCP4.5) (Medium-Low) and RCP8.5 (High) scenarios. This study indicates that by the middle of this century (2041 – 2060), mid-century mean annual temperatures are projected to increase by 1 to 1.2°C and 1.3 to 1.6°C for the RCP4.5 and RCP8.5 scenarios, respectively, with the largest increases in the east. Warming will be enhanced at the extremes (i.e. hot days and cold nights), with summer daytime and winter night-time temperatures projected to increase by 1 to 2.4°C. There is a projected substantial decrease of approximately 50%, for the number of frost and ice days. Summer heatwave events are expected to occur more frequently, with the largest increases in the south. In addition, precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events. Climate change also has the potential to impact future energy supply which will rely on renewables such as wind and hydroelectric power. Wind turbines need a specific range of wind speeds to operate within and droughts or low ground water levels may impact hydroelectric energy generating sites. More frequent storms have the potential to damage the communication networks requiring additional investment to create resilience within the network.

The EPA's *Critical Infrastructure Vulnerability to Climate Change* report (EPA, 2021b) assesses the future performance of Irelands critical infrastructure when climate is considered. With respect to road infrastructure, fluvial flooding and coastal inundation/coastal flooding are considered the key climate change risks with snowstorm and landslides being medium risks. Extreme winds and heatwaves/droughts are considered low risk to road infrastructure. One of the key outputs of the research was a framework that will provide quantitative risk-based decision support for climate change impacts and climate change adaptation analysis for infrastructure.

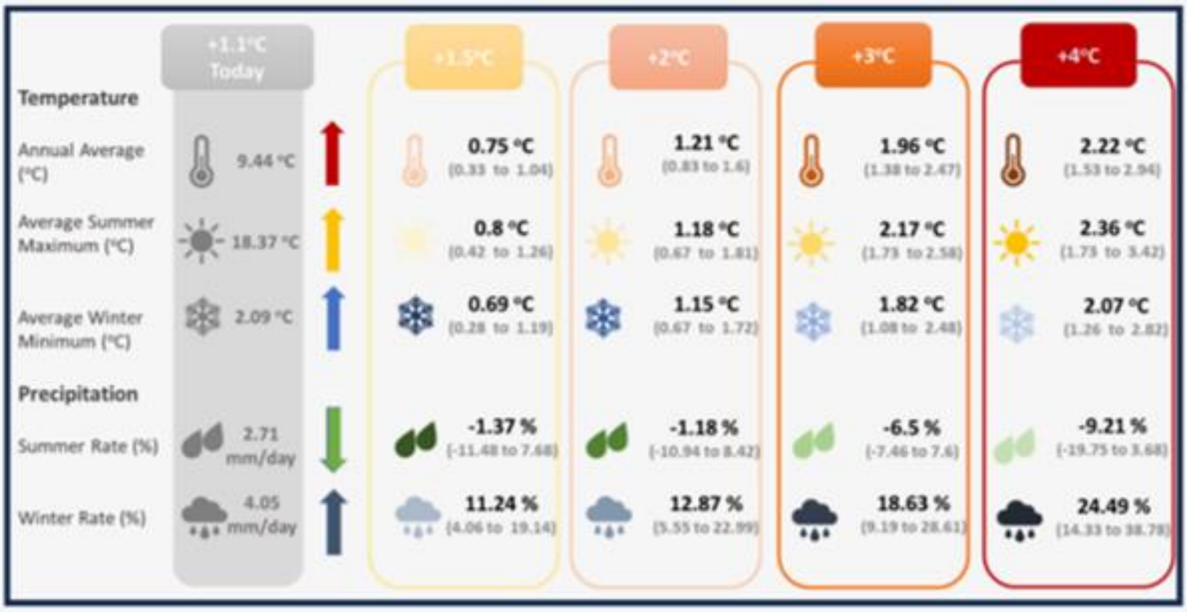
National Framework for Climate Services (NFCS) was founded in June 2022 to streamline the provision of climate services in Ireland and will be led by Met Éireann. The aim of the NFCS is to enable the co-production, delivery and use of accurate, actionable and accessible climate information and tools 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 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 14.2.



Source TRANSLATE Project Story Map (Met Éireann, 2023b)

Figure 14.2 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 (see Figure 14.3). 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 (SST)s (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%. 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.



	+1.1°C Today	+1.5°C	+2°C	+3°C	+4°C
Temperature					
Annual Average (°C)	9.44 °C	0.75 °C (0.33 to 1.04)	1.21 °C (0.83 to 1.6)	1.96 °C (1.38 to 2.47)	2.22 °C (1.53 to 2.94)
Average Summer Maximum (°C)	18.37 °C	0.8 °C (0.42 to 1.26)	1.18 °C (0.67 to 1.81)	2.17 °C (1.73 to 2.58)	2.36 °C (1.73 to 3.42)
Average Winter Minimum (°C)	2.09 °C	0.69 °C (0.28 to 1.19)	1.15 °C (0.67 to 1.72)	1.82 °C (1.08 to 2.48)	2.07 °C (1.26 to 2.82)
Precipitation					
Summer Rate (%)	2.71 mm/day	-1.37 % (-11.48 to 7.68)	-1.18 % (-10.94 to 8.42)	-6.5 % (-7.46 to 7.6)	-9.21 % (-19.75 to 3.68)
Winter Rate (%)	4.05 mm/day	11.24 % (4.06 to 19.14)	12.87 % (5.55 to 22.99)	18.63 % (9.19 to 28.61)	24.49 % (14.33 to 38.78)

Source TRANSLATE Project Story Map (Met Éireann, 2023b)

Figure 14.3 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.

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.

14.7 The ‘Do-Nothing’ Scenario

Under the ‘Do-Nothing’ Scenario, construction works associated with the proposed development will not take place. Impacts from increased traffic volumes and associated emissions from the proposed development will also not occur. The climate baseline will continue to develop in line with the identified trends (see Section 14.3).

As the proposed site is zoned for development, 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 proposed development.

14.8 Potential Significant Effects

14.8.1 Greenhouse Gas Assessment

14.8.1.1 Construction Phase

Embodied carbon is carbon dioxide emitted during the manufacture, transport and construction of building materials, together with site activities. The most significant proportion of carbon emissions tend to occur during the construction phase because of embodied carbon in construction materials and emissions from construction activities. Therefore, the assessment has included the construction phase embodied carbon for the purposes of the EIAR. The assessment is broken down into the following stages as per Section 14.2.2.1:

- Product stage (A1 – A3);
- Transportation to site (A4);
- Site operations (construction activities) (A5); and
- Material replacement & refurbishment (B4 – B5).

The construction phase embodied carbon emissions comprise stages A1 – A5 include 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 50-year lifetime. Figure 14.4 shows the embodied carbon for the proposed development per life-cycle stage with both the output from the OneClick tool and TII Carbon Tool assessments included.

Construction materials make up the majority of carbon emissions for the proposed development making up approximately 72% of the total construction phase embodied carbon emissions across the different buildings and the relevant infrastructure. The external walls as well as the beams, floors and roofs are the areas with the highest carbon impact, based on the general default values and assumptions made for the carbon calculations. Transportation to site, site operations and material replacement make up the remainder of the construction embodied carbon emissions.

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 based on standard default materials for the various building types within the OneClick tool as detailed material information was not available at this stage in the project. Additionally, the average material types within the TII Carbon Tool were used for the purposes of this assessment in the absence of more detailed information.

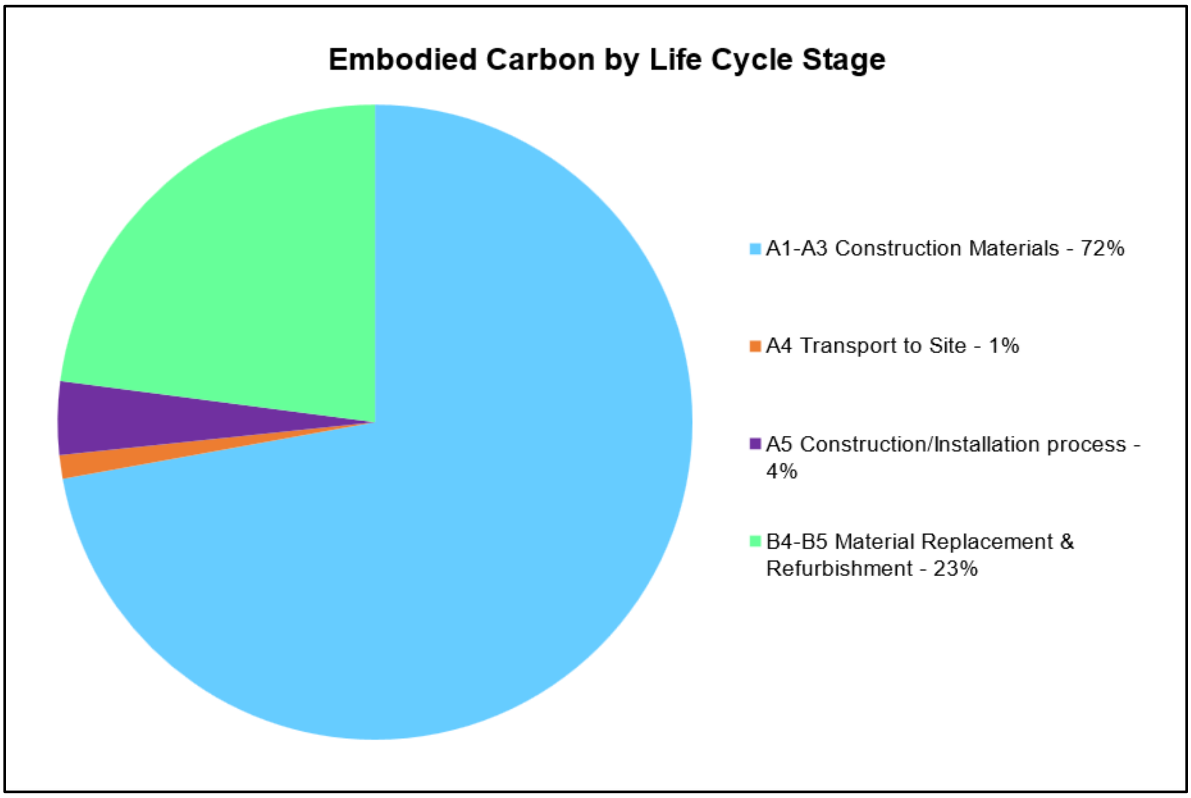


Figure 14.4 Embodied Carbon by Life-Cycle Stage

It has been calculated that the total construction phase embodied carbon (including maintenance and replacement of materials over the development lifetime) will be 89,626 tonnes CO_2e (see Table 14.7). The GHG emissions from the development as a total cannot be compared against one specific sector 2030 carbon budget. Therefore, the emissions are broken down into different assessment categories and must be compared separately to the relevant sectoral emissions budget which are detailed in Table 14.2. The relevant sectoral emissions for the proposed development comparison include the Industry Sector, Transport Sector, Electricity Sector and Waste Sector. The predicted emissions for the proposed development are annualised over the assumed 50-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 14.7 GHG Assessment Results

Stage	GHG Assessment Category	Predicted GHG Emissions (tCO2e)	Relevant Sector for Carbon Budget Comparison	Annualised GHG Emissions as % of Relevant Carbon Budget
A1-A3	Materials	74,981	Industry	0.04%
A4	Material Transport	342	Transport	0.0001%
A5	Clearance and demolition	13.3	Industry	0.00001%
A5	Excavation	3,137	Industry	0.002%
A5	Plant Use	4,001	Electricity	0.003%
A5	Construction Worker Travel to Site	295	Transport	0.0001%
A5	Construction Waste Disposal	648	Waste	0.001%
A5	Construction Waste Transport	73	Transport	0.00002%
B4-B5	Maintenance Material	6,134	Industry	0.003%
Total		**89,626**	**-**	**-**

Note 1 Project lifespan assumed 50 years for calculation purposes in line with best practice guidance

The predicted GHG emissions (as shown in Table 14.7) can be averaged over the full lifespan of the proposed development to give the predicted annual emissions to allow for direct comparison with national annual emissions and targets.

The GHG emissions from the development as a total cannot be compared against one specific sector 2030 carbon budget. Therefore, the emissions are broken down into different assessment categories and compared separately to the relevant sectoral emissions budget which are detailed in Table 14.2. The relevant sectoral emissions for the proposed development comparison include the industry sector, transport sector, waste sector and electricity sector. In Table 14.8, GHG emissions have been compared against the carbon budget for the electricity, transport, industry and waste sectors in 2030 (DECC, 2023), 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 (33 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 50-year proposed development lifespan, are equivalent to 0.003% of Ireland's total GHG emissions in 2023 and 0.005% of Ireland's non-ETS 2030 emissions target. The estimated GHG emissions associated with energy use during the construction phase are equivalent to 0.003% of the 2030 Electricity budget, while the total GHG emissions associated with transport-related activities are 0.0002% of the 2030 Transport budget, construction waste GHG emissions are 0.001% of the Waste budget and industry-related activities are 0.08% of the 2030 Industry budget (DECC, 2023).

Table 14.8 Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline

Target/Sectoral Budget (tCO2e)		Sector Annualised Proposed Development GHG Emissions	Annualised Proposed Development GHG Emissions as % of Relevant Target/Budget
Ireland's 2023 Total GHG Emissions (existing baseline)	60,620,000	Total GHG Emissions	0.003%
Non-ETS 2030 Target	33,000,000	Total GHG Emissions	0.005%
2030 Sectoral Budget (Industry Sector)	4,000,000	Total Industry Emissions	0.08%
2030 Sectoral Budget (Transport Sector)	6,000,000	Total Transport Emissions	0.0002%
2030 Sectoral Budget (Electricity Sector)	3,000,000	Total Electricity Emissions	0.003%
2030 Sectoral Budget (Waste Sector)	1,000,000	Total Waste Emissions	0.001%

14.8.1.2 Operational Phase

Ongoing maintenance of the proposed development materials has been accounted for within Section 14.5.1.1. The following sections outline the impact of operational energy use and traffic on GHG emissions.

14.8.1.2.1 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 14.9.

14.8.1.2.2 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 Traffic & Transportation Assessment (MHL Consulting Engineers, 2024) for further details).

The predicted concentrations of CO_2e for the future years of 2031 and 2041 are detailed in Table 14.9. These are significantly less than Ireland's national 2030 targets set out under EU legislation (targets beyond 2030 are not available) and the 2030 sectoral emissions ceilings. It is predicted that in 2031 the proposed development will decrease CO_2 emissions by 13 tonnes CO_2e. This equates to 0.00004% of the 2030 national emission ceiling or 0.0002% of the 2030 Transport sector emissions ceiling (see Table 14.2). Similarly low increases in CO_2 emissions are predicted to occur in 2041 with emissions increasing by 416 tonnes CO_2e. This equates to 0.001% of the 2030 national emission ceiling or 0.007% of the 2030 Transport sector emissions ceiling (see Table 14.2).

In addition, 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 14.9 Traffic Emissions GHG Impact Assessment

Year	Scenario	CO2e (tonnes/annum)
2031	Do Minimum	1,104
	Do Something	1,091
2041	Do Minimum	1,109
	Do Something	1,525
Increment Change in 2031		247
National Emission Ceiling 2030 (Tonnes) *Note 1*		**33,381,312**
Impact in 2031 (as % of National Emissions Ceiling)		-0.00004%
Transport Sector 2030 Emission Ceiling		**6,000,000**
Impact in 2031 (as % of Transport Sector Emissions Ceiling)		-0.0002%
Increment Change in 2041		416
National Emission Ceiling 2030 (Tonnes) *Note 1*		**33,381,312**
Impact in 2041 (as % of National Emissions Ceiling)		0.001%
Impact in 2041 (as % of Transport Sector Emissions Ceiling)		0.007%

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.

14.8.1.3 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 14.1.1 has been taken into account when determining the significance of the proposed development's GHG emissions. According to the TII significance criteria described in Section 14.2.2.2.2 and Table 14.4 the significance of the GHG emissions during the construction and operational phase is minor adverse**.**

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 ***slight***, which is overall ***not significant*** in EIA terms.

14.8.2 Climate Change Risk Assessment

14.8.2.1 Construction Phase

A detailed CCRA of the construction phase has been scoped out, as discussed in Section 14.2.3 and Section 14.5.2.2, which state that there are no residual medium or high-risk vulnerabilities to climate change hazards. Therefore, a detailed CCRA is not required (TII, 2022a). 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 14.6.1:

- Flood Risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding. The Site Specific Flood Risk Assessment (SSFRA) carried out for the proposed development by JODA Engineering Consultants concluded that the site is considered to be within Flood Zone C which indicates that coastal, fluvial or pluvial flooding is not a significant risk at the project location. However, best practice mitigation measures are to be implemented as per Section 14.6.1;
- 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.

14.8.2.2 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. The climate hazards flooding (coastal, pluvial, fluvial), extreme heat, extreme cold, wildfire, drought, extreme wind, lightning, hail, landslides and fog have been considered in the context of the proposed development.

The sensitivity of the proposed development to climate hazards is assessed irrespective of the project location. Table 14.10 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 14.5. The results of the vulnerability assessment are detailed in Table 14.10.

Table 14.10 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 proposed development does not have any significant vulnerabilities to the identified climate hazards as described in the following sections. All vulnerabilities are classified as low. There are no residual medium- or high-risk vulnerabilities to climate change hazards. Therefore, a detailed CCRA is not required (TII, 2022a).

14.8.2.2.1 Flooding

The Site-Specific Flood Risk Assessment (SSFRA) concluded that the site is located within Flood Zone C, indicating that coastal, fluvial, or pluvial flooding is not a risk at the project location. The drainage system for the development has been designed to accommodate a 20% increase in rainfall, aligning with future climate projections under the *'Medium Risk'* RCP4.5 scenario. Consequently, the site's sensitivity to pluvial flooding is classified as 2 (Medium), as the design mitigates the medium-risk future scenario. Allowing an additional 30% for climate change-related rainfall would align with the *'High Risk'* RCP8.5 scenario. Appropriate Sustainable Drainage Systems (SuDS) measures have been incorporated into the development's design. These include permeable paving, bioretention areas, a detention basin, and other features such as attenuation tanks, which work together to limit the flow discharge using hydro brake flow control systems. Additionally, rainwater from impermeable surfaces, if any surcharging occurs, will be guided along kerbed edges toward breaks in the kerb, ultimately flowing into existing attenuation tanks or other SuDS features. Due to the site's natural sloping topography, overland flow from extreme storm events will be effectively controlled and contained within the site. This design ensures no risk to the residential buildings from pluvial or fluvial flooding. As a result, the overall flood risk at the proposed development is considered low.

14.8.2.2.2 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. If required as part of the building design, lightning protection shall be provided for. Hail and fog are not predicted to significantly affect the buildings due to their design.

14.8.2.2.3 Wildfires

In relation to wildfires, the Think Hazard! tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR, 2023), 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 problematic wildfire in the project area that may cause disruptions and low but tangible risk of 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. The project is located in an area currently used for agriculture, which will transition to suburban use. However, since there is no heath or furze vegetation—both of which are more prone to wildfires—the risk of wildfire is significantly reduced. Given the suburban nature of the project location, it can be concluded that the proposed development has a low vulnerability to wildfires.

14.8.2.2.4 Landslides

Landslide susceptibility mapping developed by Geological Survey Ireland (GSI, 2024) indicates that the proposed development location is within an area that has a low susceptibility to landslides and there are no recorded historical landslide events at the project location. It can be concluded that landslides are a low risk to the proposed development site.

14.8.2.2.5 Extreme Temperatures (Heat & Cold) & Drought

In relation to extreme temperatures, both extreme heat and extreme cold, these have the potential to impact the building materials and some related infrastructure. However, the building materials selected at the detailed design stage will be of high quality and durability. Therefore, extreme temperatures are not considered a significant risk.

In relation to drought, planting material for the proposed development landscaping is typical of the locality and is generally tolerant of climatic zones which experience variable warmer and cooler conditions. An existing hedgerow system with established young/semi-mature trees will be retained and its presence is indicative of tolerance of the drier conditions county Cork experiences (relative to the remainder of Ireland). Therefore, the sensitivity to drought is considered low and the vulnerability is also low.

14.8.2.2.6 Summary

Overall, the proposed development has at most low vulnerabilities to the identified climate hazards. Therefore, no detailed risk assessment is required.

14.8.2.3 CCRA 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***.***

14.8.3 Cumulative Effects

A list of planning applications in the vicinity of the proposed development is listed in Section 1.9 of the EIAR.

With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII, 2022) states that *"for 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."*

However, 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. Therefore, the assessment approach is considered to be inherently cumulative.

14.8.4 Summary

The following Table summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 14.11 Summary of Construction Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Proposed project on climate change	Negative	Not significant - slight	Local	Likely	Long-term	Direct
Climate change on the proposed project	Negative	Not significant - slight	Local	Likely	Long-term	Direct

The following Table summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 14.12 Summary of Operational Phase Likely Significant Effects in the absence of mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Proposed project on climate change	Negative	Not significant - slight	Local	Likely	Long-term	Direct
Climate change on the proposed project	Negative	Not significant - slight	Local	Likely	Long-term	Direct

14.9 Mitigation Measures

14.9.1 Construction Phase

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled;
- Materials will be reused on site where possible – the applicant has identified a goal of 50% of materials will be re-used on site;
- 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; and
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

There is also the potential to reduce carbon emissions through the use of alternative materials with lower embodied carbon emissions. For example, the developer has considered the use of concrete with a GGBS replacement and a recycled rebar type. The houses will all be constructed using timber frame.

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.

14.9.2 Operational Phase

The proposed development has been designed to minimise the impact to climate where possible during operation.

The buildings are aspiring to meet a Net Zero Carbon strategy to align with the aspirations set out by Cork City Council within Chapter 6 (Visions, Goals and Objectives) of the CCC Development Plan 2022-2028.

The design intent at present for hot water, heating and cooling system designs are based on a combination of highly efficient air source and water to water heat pumps with no fossil fuels being consumed throughout the proposed development, avoiding the production of large amounts of local pollution within an urban environment.

- The buildings will meet and exceed the new NZEB (Nearly Zero Energy Buildings) requirements set out in the revised Part L document.
- The proposed development will achieve an A rated energy certificate for all buildings.
- The proposed development has benchmarked itself against Sustainability Assessments including; BREEAM, LEED, WELL Building Standard, WIRED Score and Passive House. As a minimum, the scheme will adopt the principles of all and pursuing the formal rating and certification will be subject to cost / benefit feasibility post planning. The project will also seek a HPI Certificate.

Due to the location of the proposed development within Cork City Centre the site has a number of sustainable travel options such as bus and cycling. Sustainable travel modes will be encouraged through support facilities for cycling, minimal onsite parking and infrastructure for electrical vehicle charging points. It is also proposed to retain high quality buildings and facades to reduce the environmental impact and embodied carbon of the development. With the inclusion of these sustainability measures the impact to climate during the operational phase will be reduced.

Some measures have been incorporated into the design of the proposed development to mitigate the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated to avoid potential flooding impacts due to increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the Proposed Development to climate.

14.10 Residual Impact Assessment

14.10.1 Construction and Operational Phases

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 state 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. As per the assessment criteria in Table 14.4 the residual impact of the proposed development in relation to GHG emissions is considered ***direct, long-term, negative*** and ***slight***, which is overall ***not significant*** in EIA terms.

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.

14.10.2 Summary of Post-mitigation Effects

The following Table summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 14.13 Summary of Construction Phase Effects Post Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Impact of proposed development greenhouse gas emissions on climate	Negative	Not significant - slight	Ireland's climate, specifically Ireland's CAP24 targets	Likely	Long-term	Direct
Impact of climate change hazards on proposed development during construction phase	Negative	Not significant - imperceptible	Proposed development	Likely	Short-term	Direct
Impact of climate change hazards on proposed development during operational phase	Negative	Not significant - imperceptible	Proposed development	Likely	Long-term	Direct

14.10.3 Cumulative Residual Effects

As previously discussed in Section 14.8.3, the assessment approach and climatic effects of the proposed development is inherently cumulative.

14.11 Risk of Major Accidents and Disasters

As detailed in Section 14.8.2, 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.

The proposed development has been assessed as having only low vulnerabilities to various climate change related hazards and there is no significant risk to the site as a result of climate change. Therefore, the impact will be ***neutral*** and ***imperceptible.***

14.12 Worst Case Scenario

Worst case estimates have been used as part of this assessment. As a result, Section 14.5 details the worst-case impact for the proposed development.

14.13 Interactions

Climate has the potential to interact with a number of other environmental attributes.

14.13.1 Land & Soils, Water & 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 (Chapter 9) and Water & Hydrology (Chapter 10) 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.

14.13.2 Air Quality

Air Quality (Chapter 13) 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.

14.13.3 Traffic and Transportation

During the construction and operational phase, there is the potential for interactions between climate and traffic (for more information see Chapter 6 Material Assets: Traffic and Transport). Vehicles accessing the site will result in emissions of CO_2, a greenhouse gas. The effects 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 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.

14.13.4 Waste

Waste (Chapter 8) 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 significant*** during the operational phase, which is overall ***not significant*** in EIA terms.

14.14 Monitoring

There is no monitoring proposed in relation to climate.

14.15 Summary of Mitigation and Monitoring

The following Table summarises the Construction Phase mitigation measures. As noted above there is no monitoring proposed in relation to climate.

Table 14.14 Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Impact of proposed development greenhouse gas emissions on climate.	Mitigation measures as per Section 14.9.1.	No monitoring is required for the development during the construction phase.
Impact of climate change hazards on proposed development.	Mitigation measures, as per Section 14.9.1.	No monitoring is required for the development during the construction phase.

The following Table summarises the Operational Phase mitigation measures. As noted above there is no monitoring proposed in relation to climate.

Table 14.15 Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Impact of proposed development greenhouse gas emissions on climate.	Mitigation measures as per Section 14.9.2.	No monitoring is required for the development during the operational phase.
Impact of climate change hazards on proposed development.	Mitigation measures, primarily relating to drainage, as per Section 14.9.2.	No monitoring is required for the development during the operational phase.

14.16 Conclusion

This chapter has reviewed and analysed the potential and the predicted impacts of the proposed development with regards to climate. These impacts have been considered for both the construction and operational phases of the proposed development. The cumulative impact of the proposed development and surrounding developments have also been considered.

Provided all mitigation measures as set out in this chapter, the overall predicted effect of the proposed development is not significant in relation to GHG emissions and climate change risk.

14.17 References and Sources

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Dunkettle EIAR

Volume II

Main Statement

CHAPTER 15

Cultural Heritage

November 2024

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CHARTERED PLANNING CONSULTANTS

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15.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development on the cultural heritage resource. The term ‘Cultural Heritage’ encompasses heritage assets relevant to both the tangible elements of this resource (archaeology, architecture/built heritage); as well as non-tangible elements (including history, folklore, tradition, language, and place names).

This chapter should be read in conjunction with Chapter 1 (Introduction of the EIAR), Chapter 2 (Development Description) and Chapter 5 (Landscape & Visual).

15.2 Expertise & Qualifications

This chapter was prepared by John Cronin and Tony Cummins of John Cronin and Associates. Mr Cronin holds qualifications in archaeology (B.A. (University College Cork (UCC), 1991), regional and urban planning (MRUP (University College Dublin (UCD) 1993) and urban and building conservation (MUBC (UCD), 1999). Mr Cummins holds primary and postgraduate degrees in archaeology (B.A. 1992 and M.A. 1994 (UCC)). Both individuals have extensive experience in the compilation of archaeological, architectural and cultural heritage impact assessments and have been involved in the preparation of EIARs for the following projects:

- Large-Scale Residential Development, Gouldings Site, Centre Park Road, Cork City, and
- Strategic Housing Development, Ballinglanna, Glanmire, Cork City.

15.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 ‘Development Description’ of this EIAR.

15.3.1 Aspects Relevant to this Assessment

The aspects of the proposed development relevant to this assessment includes changes to the existing landscape and built character within its environs and onsite excavation works required to facilitate the development during the construction phase.

15.4 Methodology

The assessment was based on a programme of desktop research combined with field surveys, a geophysical survey and targeted archaeological test trenching within the proposed development site. These inputs were carried out in order to identify any features of archaeological, architectural or cultural heritage significance likely to be impacted by the proposed development. The recorded and potential cultural heritage resource within a study area encompassing the area within the EIAR site boundary as detailed in Chapter 1 (Introduction of the EIAR) and surrounding lands extending for 1km in all directions from this boundary was reviewed. This review was carried out to compile a detailed cultural heritage context for the location of the proposed development and surrounding lands in order to inform the assessment of potential impacts.

15.4.1 Relevant Legislation & Guidance

The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995)[1] (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the European Convention on the Protection of Architectural Heritage (Granada Convention, 1985)[2], ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015.

The EIA Directives (from 1985 to 2014) set out the requirement for an EIA in European law. This assessment has been prepared in accordance EIA requirements of codified Council Directive 2011/92/EU as amended by EIA Council Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended). Ireland has transposed EU Directive 2014/52/EU by way of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which came into operation on 1st September 2018. The Regulations provide for the transposition of the 2014 EIA Directive and give further effect to the 2011 EIA Directive by way of extensive amendments to existing planning law.

The national legal statutes and guidelines relevant to this assessment include:

- Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023;
- National Monuments Act 1930 (as amended);
- Heritage Act 1995 (as amended);
- National Cultural Institutions Act 1997;
- Architectural Heritage (National Inventory) and Historic Monuments (Misc) Provisions Act (1999);
- Planning and Development Act 2000 (as amended);
- Department of Arts, Heritage, and Gaeltacht (2011) Architectural Heritage Protection: Guidelines for Planning Authorities;
- Department of Arts, Heritage, Gaeltacht, and the Islands (1999) Framework and Principles for the Protection of Archaeological Heritage;
- International Council on Monuments and Sites (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties;
- Office of the Public Regulator (2022) A Guide to Architectural Heritage;
- Office of the Public Regulator (2021) Archaeology in the Planning Process;
- Environment Protection Agency (2022) Guidelines on the information to be contained in EIARs;

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[1] https://www.coe.int/en/web/culture-and-heritage/valletta-convention

[2] https://www.coe.int/en/web/culture-and-heritage/granada-convention

- Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment; and
- European Union (2017) Environmental Impact Assessment of Projects: Guidance on the Preparation on the Environmental Impact Assessment Report.

The following section presents a summary of the legal and policy frameworks designed to protect the Irish cultural heritage resource and further information is available in the *Framework and Principles for the Protection of the Archaeological Heritage* (Department of Arts, Heritage, Gaeltacht and the Islands (1999) and the *Architectural Heritage Protection Guidelines for Local Authorities* (Department Arts, Heritage and the Gaeltacht 2011).

The administration of national policy in relation to archaeological heritage management is the responsibility of the National Monuments Service (NMS) which is currently based in the Department of Housing, Local Government and Heritage (DHLGH).

The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law in October 2023. The DHLGH published an online guidance document in relation to this Act in November 2023[3] which provides an overview of its current status. While the Act is now law most of its provisions will not enter into force until the Minister has made one or more “Commencement Orders”. This means that section 7 of the Act (which provides for the repeal of the National Monuments Acts 1930 (as amended) and related legislation) has not entered into force. Accordingly, the National Monuments Acts 1930 (as amended) remain fully in force and will continue to do so for the time being. The Act contains transitional provisions which will, if necessary, enable certain aspects of the existing National Monuments Act 1930 (as amended) to continue in operation notwithstanding their repeal post-commencement of the Act while successor provisions are being brought fully into operation. This includes provisions enabling the Record of Monuments and Places to continue to have effect pending the establishment of a new Register of Monuments.

The National Monuments Act of 1930 (as amended), therefore, remains the primary means of ensuring the protection of the archaeological resource and includes a number of provisions that are applied to secure the protection of archaeological monuments. These include the designations of nationally significant sites as National Monuments as well listing sites in the Register of Historic Monuments, the Record of Monuments and Places, the Sites and Monuments Record as well as the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Section 2 of the National Monuments Act, 1930 defines a National Monument as ‘a monument or the remains of a monument, the preservation of which is a matter of national importance’. The State may acquire or assume guardianship of National Monuments through agreement with landowners or under compulsory orders. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument in the ownership or guardianship of the State, the Minister or a local authority, or those which are subject to a Preservation Order. There are no National Monuments or archaeological sites subject to Preservation Orders located within the study area.

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[3] https://www.archaeology.ie/news/enactment-of-historic-and-archaeological-heritage-and-miscellaneous-provisions-act-2023-and

The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO in 2022 were also reviewed and none are located within the vicinity of the study area.

The National Monuments (Amendment) Act, 1994 made provision for the establishment of the Record of Monuments and Places (RMP) which comprises the known archaeological sites within the State. The RMP, which is based on the earlier Register of Historic Monuments (RHM) and Sites and Monuments Record (SMR), provides county-based lists of all recorded archaeological sites with accompanying location maps. All archaeological sites listed in the RMP receive statutory protection under the National Monuments Act 1930 (as amended) and the DHLGH must be given two months' notice in advance of any works proposed at their locations.

The *Cork City Development Plan 2022-2028* includes a range of objectives in relation to the protection of the archaeological resource within the Cork City Council administrative area and these comprise: Objective 8.1 (Strategic Archaeology Objective), Objective 8.2 (Protection of the Archaeological Resource), Objective 8.3 (The Value of Archaeological Knowledge), Objective 8.4 (Protection of the Medieval Historic Core), Objective 8.5 (Protection of Cork's Medieval City Wall and Defences), Objective 8.6 (Objective 8.6 (Protection of Burial Grounds), Objective 8.7 (Industrial Archaeology) Objective 8.8 (Underwater Archaeology), Objective 8.9 (Preservation of Archaeology within Open Space in Developments) and Objective 8.10 (Archaeological Management Strategy for the City).

The full descriptions of each of these archaeological planning objectives are available at https://www.corkcity.ie/en/cork-city-development-plan/volume-1-written-statement/ (pages 272-274).

The administration of national policy in relation to archaeological heritage management is the responsibility of the National Built Heritage Service (NBHS) which is currently based in the DHLGH.

The protection of the architectural heritage resource is provided for through a range of legal instruments that include the Heritage Act 1995 (as amended), the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999, and the Planning and Development Act 2000 (as amended). The Planning and Development Act 2000 (as amended) requires all Planning Authorities to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st of January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. A protected structure may also include the lands and other structures within its curtilage. While the term 'curtilage' is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Department Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. In addition, Local Authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance through designation of Architectural Conservation Areas (ACAs).

The National Inventory of Architectural Heritage (NIAH) was established under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 to record architectural heritage structures within the State. While inclusion in the NIAH does not provide statutory protection to a structure it is intended to advise Local Authorities on compilation of their Record of Protected Structures. The NIAH also includes a Designed Landscapes and Historic Gardens Survey which comprises a non-statutory, desk-based survey of such lands.

Details on the architectural heritage resource within the study area are provided in Section 15.6.2 of this chapter.

The *Cork City Development Plan 2022-2028* presents a number of objectives intended to protect the architectural heritage resource within the Cork City Council administrative area and these comprise: Objective 18.17 (Conservation of the City's Built Heritage), Objective 8.18 (Reuse & Refurbishment of Historic Buildings), Objective 18.19 (Record of Protected Structures), Objective 8.20 (Historic Landscapes), Objective 8.21 (Enabling Development), Objective 8.22 (National Inventory of Architectural Heritage), Objective 8.23 (Development in Architectural Conservation Areas), Objective 8.24 (Demolition in Architectural Conservation Areas), Objective 8.25 (Recording of Structures in Architectural Conservation Areas), Objective 8.26 (Individual Buildings of Character in Suburban Areas and Villages), Objective 18.27 (Elements of Built Heritage), Objective 18.28 (Separate Access to the Upper Floors of Buildings) and Objective 8.29 (Historic Town Centre Supports).

The descriptions of each of these built heritage planning objectives are available at https://www.corkcity.ie/en/cork-city-development-plan/volume-1-written-statement/ (pages 276-280).

15.4.2 Site Investigations and Research

15.4.2.1 Desktop Research

Documentary research on the recorded and potential cultural heritage resource within the study area was carried out to identify any recorded archaeological, architectural heritage and other cultural heritage constraints. This information has provided an insight into the development of the study area over time and also assisted in an evaluation of the potential for the presence of hitherto unrecorded cultural heritage constraints within the proposed development site.

The principal sources reviewed for the assessment of the recorded archaeological resource were the SMR and the RMP which are maintained by the NMS, DHLGH. The current Record of Protected Structures (RPS) for County Cork and structures and lands listed in the National Inventory of Architectural Heritage (NIAH) were reviewed in order to assess the designated architectural heritage resource within the study area.

Other sources consulted as part of the assessment included the following:

- Development Plans: These publications are published by Local Authorities and include lists the buildings and structures included in Record of Protected Structures (RPS) and the extent of Architectural Conservation Areas (ACAs) and Zones of Archaeological Potential (ZAPs). They also detail the policies and objectives designed for the protection of the archaeological and architectural heritage resources within their administration areas. The proposed development site is located within the Cork City Council administrative area and the *Cork City Development Plan 2022-2028* was consulted as part of the desktop study;

- Archaeological Inventory of County Cork Vol. 2: South and East Cork: This publication presents summary descriptions of the recorded archaeological sites within this area of County Cork. In addition, the current national database (online) resources pertaining to same were accessed: Historical Environment Viewer (available at www.archaeology.ie) in October 2024;
- National Monument Service Wreck Viewer: This online mapping resource provides access to the records of wrecks held by the National Monuments Service and a review of the sections of the River Lee and Glashaboy River located within the study area was carried out.
- UNESCO World Heritage Sites and Tentative List: UNESCO seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. There are currently two World Heritage Sites in Ireland while a number of other significant sites are included in a Tentative List (2022) that has been put forward by Ireland for inclusion. There are no World Heritage or Tentative List sites located within County Cork;
- National Inventory of Architectural Heritage (NIAH): The NIAH provides a comprehensive catalogue of significant architectural heritage structures within Ireland. While inclusion in the inventory does not provide statutory protection to a structure it is used to advise local authorities on compilation of their Record of Protected Structures. Relevant current national datasets were accessed via www.buildingsofireland.ie in October 2024;
- Database of Irish Excavation Reports: This database contains summary accounts of all licensed archaeological excavations carried out in Ireland (North and South) from 1970 to present. Current data was accessed via www.excavations.ie in October 2024;
- Historical publications and cartographic sources: various published and unpublished sources and historical maps were consulted. The historical maps and other figures are presented within the chapter and a list of consulted publications is provided in Section 15.17. Of particular interest to Dunkettle is a historic landscape assessment prepared by Dr Finola O'Kane Crimmins (2004).
- Cork City Library and National Library of Ireland: The online catalogues of these libraries were consulted, including historic map and photograph records;
- Digital Atlas of Cork: This interactive map contains early maps of varying dates and historical information for 6,245 sites, including undesignated features of cultural heritage interest. This online resource was reviewed in October 2024;
- Aerial/Satellite Imagery: available online imagery of the study area (Tailte Éireann, Google Earth, Bing Maps) was consulted to determine if any traces of unrecorded, sub-surface archaeological sites were evident;
- Placenames Database of Ireland: this current online database provides a comprehensive management system for data, archival records and place names research conducted by the State and was consulted in October 2024;
- Ireland's National Inventory of Intangible Cultural Heritage: this inventory was established to protect, promote and celebrate Irish living cultural heritage practices, customs, crafts and traditions; and

- Irish National Folklore Collection: transcribed material from the National Folklore Collection archive has been digitised and published at www.duchas.ie. This online resource was reviewed in October 2024.

15.4.2.2 Field Surveys

Field-walking surveys of the proposed development site were carried out in January and July 2024. The lands were systematically walked and assessed in terms of landscape, land use, vegetation cover and the potential presence of any previously unrecorded features of cultural heritage interest. A photographic record of the field surveys is provided in Appendix 15.4.

15.4.2.3 Geophysical Survey

A programme of geophysical survey of the greenfield areas within the proposed development site was carried out by Target Archaeological Geophysics in January 2024 (Detection Licence 24R0003). In summary, the survey did not identify any traces of potential unrecorded, sub-surface archaeological sites within the proposed development site. Details on the results of the geophysical survey are provided in Section 15.6.2 and a full copy of the survey report is provided in Appendix 15.2.

15.4.2.4 Archaeological Test Trenching

John Cronin & Associates undertook a programme of archaeological test trenching within the proposed development site in April 2024 (Excavation Licence 24E0395). In summary, nothing of archaeological significance was identified during this program of site investigations. Details on the results of the test trenching are provided in Section 15.6.3 and a full copy of the test trenching report is provided in Appendix 15.3.

15.4.3 Consultation

Cork City Council have provided high-level advice and commentary during the pre-planning process and within the Large-scale Residential Development (LRD) Opinion. Much of the commentary was raised in relation to the future LRD Phase 2 residential development and the potential for negative impacts on a walled garden to the north and rear of Dunkettle House, that is located outside the boundary of the LRD Phase 1 development, arising from upgrading the existing access to facilitate vehicular, pedestrian and cyclist movements. The design and specification of this second access are currently being developed in consultation with Cork City Council officials.

In relation to Dunkettle House itself, an inspection of the house, immediate grounds and the walled garden was undertaken on the 29th of February by Ms Ashleigh Murray, Executive Architectural Conservation Officer of Cork City Council with John Cronin of John Cronin & Associates and Stephen Doyle of Doyle McDonogh Nash Architects. The visit confirmed that the house is occupied and in good repair. The Council have been made aware that the applicant is committed to undertaking a capacity and feasibility study to inform possible future development options for this building.

15.4.4 Assessment of Impacts

The methodology used for the assessment of potential impacts has been informed by the Environmental Protection Agency (EPA 2022) *Guidelines for Information to be Contained in EIAR*, in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended).

The following summation of the criteria used to assess impacts is provided to concisely outline the methodology specifically applied to the cultural heritage resource. Assessment is achieved by a consideration of the duration, quality, type, value and magnitude of effect(s) on the cultural heritage resource:

The Duration of Effect is assessed based on the following criteria:

- Momentary (seconds to minutes);
- Brief < 1 day;
- Temporary <1 year;
- Short-term 1-7 years;
- Medium Term 7-15 years;
- Long Term 15-60 years;
- Permanent > 60 years; and
- Reversible: Effects that can be undone through remediation or restoration.

The Quality of Effect on the cultural heritage resource can be positive, neutral or negative:

- Positive: a change which improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation and re-use of an otherwise vulnerable derelict structure);
- Neutral: no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment; and
- Adverse: a change which reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of a site and/or physical intrusion on features/setting of a site).

The Type of Effect on the cultural heritage resource can be described as following:

- Direct Effect: where a cultural heritage site is physically located within the footprint of a proposed development, which will result in its complete or partial removal;
- Indirect Effect: Effects on the setting of the cultural heritage environment often produced away from the footprint of a proposed development site or because of a complex pathway; and
- None predicted: where a proposed development will not adversely or positively affect a cultural heritage site.
- Cumulative: Effects The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects;
- 'Do-nothing Effects': The cultural heritage environment as it would be in the future should the project not be carried out;
- 'Worst-case' Effects: The effects arising from a Project in the case where mitigation measures substantially fail;

- Irreversible Effects: When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost; and
- Residual Effects: The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

The Magnitude of Effect is based on the degree of change, incorporating any mitigation measures, and is based on a consideration of the character, duration, probability and consequences. The magnitude can be negative or positive and is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible. The descriptions of magnitudes presented in Table 15-1 are based on guidance published in the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011).

Table 15-1 Magnitude of Effect Criteria

Magnitude	Description
High	Most or all key archaeological or architectural materials affected such that the resource is totally altered. Comprehensive changes to setting. Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character. Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Medium	Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified. Considerable changes to setting that affect the character of the archaeological asset. Changes to the setting of a historic building, such that it is significantly modified. Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character. Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Low	Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different. Slight changes to setting of an archaeological monument. Change to setting of a historic building, such that it is noticeably changed. Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character. Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Negligible	Very minor changes to key archaeological materials or setting. Slight changes to historic building elements or setting that hardly affect it. Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access. Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation

The Values assigned to cultural heritage constraints for the purposes of this assessment are intended as indicators which contribute to a wider judgment based on the individual circumstances of each example. Other than the level of legal designations, e.g., National Monuments and recognition as World Heritage Sites, there is no formal grading or rating system for Irish archaeological monuments or architectural heritage structures. The non-statutory National Inventory of Architectural Heritage (NIAH) does apply a ranking system (Local, Regional, National and International) to structures included in that inventory and, while these rankings do not confer a graduated level of statutory protection they have been utilised as a value indicator for NIAH-listed structures for the purpose of this assessment.

The criteria for assessing the value of archaeological and other cultural heritage constraints as part of this assessment has been informed by the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 14-16). The Value of known or potential cultural heritage assets are ranked according to the following scale: Very High, High; Medium; Low and Negligible (Table 15-2). Generally, the more criteria that are evident for a given asset, the higher in scale its respective Value is deemed to be. Criteria considered in addition to legal designations include condition / preservation; documentary / historical significance; group value; rarity; visibility in the landscape; fragility / vulnerability and amenity value. The values assigned to the known cultural heritage constraints within the study area were determined following the completion of the desktop study combined with site inspections and are identified in Section 15.6 of this chapter.

Table 15-2 Value Assessment Criteria

Value	Description
Very High	World Heritage Sites (including Tentative List properties). Sites, buildings or landscapes of acknowledged international importance. Intangible associations with individuals or innovations of global significance.
High	Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance. Undesignated assets of the quality and importance to be designated. Assets that can contribute significantly to acknowledged national research objectives. Archaeological Landscapes with significant group value. Intangible associations with individuals or innovations of national significance.
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character. Intangible associations with individuals or innovations of regional significance.
Low	Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives. Historic Townscape or built-up areas of limited historic integrity in their buildings and settings. Intangible associations with individuals or innovations of local significance.
Negligible	Assets with very little or no surviving archaeological interest. Landscapes little or no significant historical interest. Buildings or urban areas of no architectural or historical note; buildings of an intrusive character.
Unknown	Assets whose importance has not been ascertained.

Value	Description
	Buildings with some hidden (i.e., inaccessible) potential for historic significance.

The significance of effects is assessed based on a consideration of the magnitude of impact combined with the value of the cultural heritage constraint. The significance of effect can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Tables 15-3 and Table 15-4).

Table 15-3 Significance of Effects (per 2022 EPA EIAR Guidelines)

Significance	Description
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
Slight	An effect which causes noticeable changes in the character of the environment but without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

Table 15-4 Significance of Effects Matrix (per 2022 EPA EIAR Guidelines

Magnitude of Impact	**High**	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	**Low**	**Medium**	**High**
	Value of the Asset				

15.5 Difficulties Encountered

There were no difficulties encountered during compilation of this assessment.

15.6 Baseline Environment

15.6.1 Desktop Study

15.6.1.1 Archaeological and Historical Context

The following section presents a description of the archaeological context of the study area and identifies the recorded archaeological sites and structures located within the area. Datasets have been interrogated and retrieved from Local Authority and State organisations and are considered accurate and current per publicly available information. The dating framework used for archaeological periods is based on the *Guidelines for Authors of Reports on Archaeological Excavations* published by the National Monuments Service (2006).

There are 14 recorded archaeological monuments located within the study area, and these are listed in Table 15-5 and mapped on Figure 15-1. The Archaeological Survey of Ireland inventory descriptions of each of these sites are provided in Appendix 15.1. A number of recorded archaeological sites within the study area are buildings which are also listed as Protected Structures, and these are identified in Section 15.6.1.1.7 of this chapter. A review of the National Monuments Service Wreck Viewer revealed that it does not identify the recorded known locations of any wrecks within the sections of the River Lee and the Glashaboy River located within the study area.

Table 15-5 Recorded Archaeological Sites in Study Area

Monument no.	Class	Townland	Condition*	Period* (if known)	Approx. distance from development (Phases 1 & 2)
CO074-026----	Country House	Lotamore	Extant	Post Medieval	260m west
CO074-052----	Tower House	Mahon	Extant / Modified	Medieval and Post Medieval	920m southwest
CO074-071----	Mound	Poulacurry South	Extant	Unknown	760m north
CO074-104----	Church	Poulacurry South	Extant	Post Medieval	115m northwest
CO075-001----	Cloth Mill	Poulacurry South	Extant	Post Medieval	625m north
CO075-002001-	Corn Mill	Ballinglanna	Extant	Post Medieval	50m west
CO075-002002-	Lime Kiln	Dunkettle	Partially collapsed	Post Medieval	15m north
CO075-048----	Bridge	Ballinglanna, Poulacurry South	Extant	Post Medieval	145m northwest
CO075-049----	Designed landscape - belvedere	Kilcoolishal	Extant	Post Medieval	860m east
CO075-069----	Coach House	Ballinglanna	Extant	Post Medieval	920m north
CO075-075----	Country House	Dunkettle	Extant	Post Medieval	150m southwest
CO075-080----	Icehouse	Dunkettle	Extant	Post Medieval	5m west
CO075-094001-	Architectural Fragment	Ballinglanna	Extant	Potential Medieval	290m northeast
CO075-094002-	Architectural Fragment	Ballinglanna	Extant	Post Medieval	290m northeast

**Condition and potential periods are based on Archaeological Survey of Ireland descriptions (see Appendix 15.1)*

Figure 15-1 Locations of Recorded Archaeological Sites within Study Area (yellow circles indicate Zones of Notification)

15.6.1.1.1 Prehistoric Periods

Until the recent identification of Palaeolithic human butchery marks on animal bones recovered from cave sites in Munster, the earliest recorded evidence for human activity in Ireland dated to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers lived on the heavily wooded island. The archaeological record indicates that these mobile groups tended to favour coastal, lake and river shores which provided a transport resource and also provided elements of their varied diet. These groups did not construct any settlements or monuments that have left above ground traces although their presence in an area can often be identified by scatters of worked flints in ploughed fields or during earth-moving works undertaken as part of development projects. The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns in farmlands within areas of cleared forestry. As a consequence of the more settled nature of agrarian life, new archaeological site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, begin to appear in the archaeological record during this period. Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC) and saw the introduction of a new artefactual assemblage and was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and burnt mounds known as fulachta fiadh. The development of new burial practices during this period also saw the construction of funerary monuments such as wedge tombs, cairns, barrows, ring-ditches, boulder burials and cists. The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). This period has traditionally been associated with a Celtic 'invasion', although recent archaeological evidence points instead to a gradual development following centuries of contacts with Celtic-type cultures in Europe. Relatively little was known about Iron Age settlement and ritual practices in Ireland until recent decades when the corpus of evidence has been greatly increased by the discovery of sub-surface sites dating to this period during archaeological site investigations carried out as part of development projects.

There are no recorded archaeological sites of definitive prehistoric date located within the study area although the setting of the area in a location overlooking a river valley is a landscape setting that has been commonly utilised as a settlement location since early prehistory. The study area does contain one recorded archaeological site that is of potential prehistoric date, and this comprises a mound site (CO074-071---) located in the townland of Poulacurry South. While it is not possible date this mound without recourse to archaeological excavation, the Archaeological Survey of Ireland records that it is regarded locally as an ancient site (see Appendix 15.1).

While the settlement sites of the prehistoric periods were typically timber-built and leave no above ground traces, sub-surface remains of features such as structure foundations, occupational deposits and archaeological objects can survive. The discovery of previously unrecorded, sub-surface remains of Mesolithic, Neolithic and Bronze Age sites has occurred in recent decades during a number of developments elsewhere within south County Cork. These include prehistoric sites uncovered during archaeological investigations undertaken as part of the construction of the N8 Glanmire-Watergrasshill road scheme in lands located 4km to the north of the study area and also during development works on Fota Island, which is located c.4.5km to the east. In addition, a disturbed burnt mound of potential Bronze Age date was uncovered in the south end of the study area during archaeological investigations carried out as part of the N25 Dunkettle Interchange Motorway Improvement Scheme.[4]

15.6.1.1.2 Early Medieval Period

The early medieval period (c. AD 400 – 1169) in Ireland broadly commenced with the arrival of Christianity to Ireland. While this period saw the emergence of the first phases of urbanisation around the large monasteries and the Hiberno-Norse ports, such as Cork city, the dominant settlement pattern of the period continued to be rural-based and centred on enclosed farmsteads known as

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[4] https://excavations.ie/report/2018/Cork/0027264/

ringforts. The ubiquity of ringforts within the Irish landscape is attested to by the fact that their original Gaelic names (rath/lios) still form some of the most common placename elements in the country. Archaeological excavations have demonstrated that the majority comprised enclosed farmsteads containing evidence for occupational, agricultural and craft/industrial activities. While there are no recorded ringforts, or other early medieval sites, located within the study area there are numerous examples present in the wider landscape.

15.6.1.1.3 High and Late Medieval Periods

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th century broadly marks the advent of the high medieval period which continued to c.1400 AD, which was followed by the late medieval period which extended to c. AD 1550. These periods saw the continuing expansion of Irish urbanisation as many of the port cities developed into international trading centres and numerous villages and towns began to develop throughout the island as local or regional market centres. While earlier masonry castles were already in existence by the 15th century, the descendants of the Anglo-Norman gentry began the widespread construction of tower-houses as fortified residences within their landholdings at the start of this century and this trend was subsequently adopted by wealthy Irish families within areas under Gaelic control. The study area is located c. 5km to the east of the medieval core of Cork City and likely formed part of the agricultural hinterland of the city during the high and late medieval periods. There is a paucity of historical references to the Glanmire area during these periods although the Justiciary Rolls of AD 1295 record that the general area formed part of the holdings of Thomas de Saresfeld at that time (O' Flanaghan 1993). The study area contains one known medieval archaeological fortification site, and this comprises a tower house (CO074-052---), known as Blackrock Castle, located in Mahon townland on the opposite (south) bank of the River Lee. This is a rare example of a circular tower house, and it was built in the 16th century by the citizens of Cork to defend the river approaches to the city. The structure was significantly altered during recent centuries and is now in use as an observatory centre run by the Munster Technological University. While there are no other known late medieval settlement or fortification sites located within the study area, architectural fragments that are inset into a later well structure (CO075-094001-) and an icehouse (CO075-094002-) within the Ballinglanna House lands to the north of the proposed development have been dated to the 15th century by the Archaeological Survey of Ireland (Appendix 15.1).

15.6.1.1.4 Post Medieval Period

The centuries following AD 1550 are referred to as the post-medieval period, which is generally considered to continue into the mid-19th century and the period thereafter is described as early modern. The early part of the post-medieval period was a turbulent time in Irish history and in the later decades of the 16th century the Tudors sought to re-assert English control over the country. The resultant wars between the 1560s and 1603 brought this unsettled period to a temporary end although further widespread strife ensued during the Cromwellian Wars (1649–53) which ended with extensive dispossession of forfeited Gaelic lands. An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for agricultural produce which resulted in landlords investing in extensive land improvement works within their holdings to increase land productivity. This included the extensive enclosure of open lands into field systems that survive to the present-day. The post-medieval period also saw the development of high and low status stone houses throughout the Irish countryside and rural settlements at this time typically consisted of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common in the 19th century. The settlement pattern throughout much of the rural landscape was greatly affected by the famine period in the middle of the 19th century and subsequent decades saw an intensification of agricultural practices which was further increased by the advent of mechanised farming practices in the 20th century.

The period from the 17th to early 19th centuries was generally a time of prosperity for the newly established Protestant gentry and landowners in Ireland who began to invest in extensive land improvement works on their estates and the period also saw extensive construction of new country residences. This trend is evident within the landscape surrounding the Glanmire which contains the following residences that were constructed during this period: Dunkettle House, Lotamore House, Ballinglanna House, Maryborough House; Glenview House, Glenburne House, Richmond House, Woodlands Cottage, Woodville House, Glanmire House, Glyntown House, Riverstown House and Dunsland House. The 19th century also saw the development of an industrial village at Glanmire centred on the Glashaboy River which provided a source of water-power vital for the mills of the period. The village industries included distilleries, paper, corn and woollen mills and associated bleaching, dyeing and starch works. While many similar Irish industrial villages went into decline at the start of the 20th century, Glanmire continued to thrive partly due to its location on an important transport route into the city (O'Flanagan 1993, 456). The physical remains of this industrial activity include the following recorded archaeological monuments within the study area: a cloth mill (CO075-001----) in Poulacurry South townland and a distillery (CO075-003---), corn mill (CO075-00201-) and lime kiln (CO075-00202-) in Ballinglanna townland. The study area also contains two country houses, Dunkettle and Lotamore Houses, which are listed as archaeological sites (CO075-075---- and CO074-026----) as well as a church (CO074-104----), road bridge (CO075-048----) and icehouse (CO075-080----). The proposed development site is located within lands in the Dunkettle House property and further details on the historical context of the house and its associated property are provided in Section 15.6.1.1.8.

15.6.1.1.5 Database of Irish Excavation Reports

This database contains summary accounts of licensed archaeological excavations carried out in Ireland from 1970 to present and collates entries typically submitted at the end of each year or early in the following year. This Database, therefore, currently does not contain any entries for the archaeological test trenching carried out within the proposed development site in order to inform this assessment. The results of these archaeological test trenching excavations will be submitted for inclusion in the Database per licensing requirements. A report on these site investigations has also been submitted to the National Monuments Service and the results are detailed in Section 15.6.3 of this chapter. In addition, a copy of the archaeological test trenching report is also provided in Appendix 15.3. A number of other archaeological site investigations have been conducted within the surrounding study area as part of housing and infrastructure projects and the results are summarised in Table 15-6.

Table 15-6 Summary of Archaeological Investigations Within Study Area

Location	Licence	Archaeologist	Summary of Results
Poulacurry South, Glyntown Bridge, Glanmire, Cork	17E0484	Julianna O'Donoghue	Archaeological monitoring of vegetation and sedimentation clearance works within the environs of the bridge revealed a stone wall which was left in situ.
Ballinglanna, Riverstown, Glanmire, Cork	16E0029 17E0060 23E0207	Avril Purcell	A number of phases of investigation within the site of a distillery on the Butlerstown River, which was destroyed by fire in 2016, revealed subsurface remains of various levelled distillery structures.
Glyntown, Cork	07E0107	Liam Hackett	Archaeological testing of a proposed housing development site revealed nothing of archaeological significance.
Ballinglanna, Cork	18E0466	Tony Cummins	Archaeological testing and a geophysical survey of a proposed housing development site revealed nothing of archaeological significance.
Dunkettle 1, Cork	E5029	Bruce Sutton	Archaeological site investigations of the N25 Dunkettle Interchange Motorway Improvement Scheme Archaeological Consultancy Services Contract, revealed a disturbed burnt mound, two archaeological pits and four linear features.
River Lee, Cork	01E0076	Sheila Lane	Monitoring of dredging as part of the Cork Main Drainage Scheme in a section of the River Lee close to Tivoli revealed nothing of archaeological significance.
Blackrock Castle, Mahon, Cork	99E0297	Sheila Lane	Archaeological test trenching at this location revealed nothing of archaeological significance
Castlejayne, Poulacurry South, Cork	04E1036	Deborah Sutton	Archaeological monitoring of the construction of a housing development revealed nothing of archaeological significance.

15.6.1.1.6 National Museum of Ireland (NMI) Topographical Files

An inspection of the NMI Topographical Files revealed that they do not contain any entries recording the discovery of any archaeological objects within the proposed development site.

15.6.1.1.7 Architectural Heritage Context

The proposed development site is not located within an Architectural Conservation Area. There are 24 Protected Structures located within the study area (Table 15-7 & Figures 15-2). These include Dunkettle House, two of its associated outbuildings and its gateway in the east side of the property. The NIAH has assigned a 'National' rating to Dunkettle House. The remainder of the Protected Structures within the surrounding study area comprise country houses and associated structures, as well as a number of mills, a bridge and smaller residential houses and, as detailed in Table 15-7, a number of these buildings are also listed as archaeological sites. The majority of the Protected Structures within the surrounding study area are also listed in the NIAH which assigns a 'Regional' rating to all examples, including those listed as Protected Structures and recorded archaeological sites. The NIAH also includes an additional 17 buildings and features within the study area which are not listed as Protected Structures or archaeological sites (Table 15-7 & Figure 15-3). In addition, the NIAH

Designed Landscapes and Historic Gardens Survey includes an entry for the lands within the Dunkettle property (NIAH Survey ID: 3035[5]).

Table 15-7 Designated Architectural Heritage Structures Within Study Area

Name	RPS	NIAH	RMP	Approx. distance from Phase 1	Approx. distance from Phase 1 & 2
Blackrock Castle	PS528	20864028 20868108 20868109	CO074-052----	920m southwest	920m southwest
Gateway	PS1170	n/a	n/a	25m east	25m east
St Mary & All Saints Church	PS1177	20860010	CO074-104----	115m northwest	115m northwest
Glen Mervyn House	PS1178	20860009	n/a	165m northwest	165m northwest
Glanmire House (Colaiste na Piarsaigh)	PS1179	n/a	n/a	125m north	125m north
Poul na Corr - Hydraulic Barn	PS1180	n/a	n/a	960m north	960m north
Glanmire Bridge	PS1181	20907505	CO075-048----	145m northwest	145m northwest
Cloth Mill & Mill Race	PS1182	20907504	CO075-001----	625m north	625m north
Corn Mill	PS1183	20907510	CO075-002001-	30m west	30m west
"Woodlea" (6 Cottages)	PS1184	20907506	n/a	145m north	145m north
"Eastcliffe House" - Northern Half	PS1185	20907507	n/a	90m north	90m north
"Eastcliffe House" - Southern Half	PS1186	20907508	n/a	80m north	80m north
Lota Park	PS1187	20864021	n/a	635m west	635m west
Lota Lodge (now Vienna Woods Hotel)	PS1188	20864026	n/a	190m west	190m west
Lota House	PS1189	20864023 20864024 20864025	CO075-026----	260m west	260m west
Dunkettle House	PS1190	20907514	CO075-075----	290m east	120m southeast
Almshouse	PS1234	20860012	n/a	120m west	120m west
Almshouse	PS1235	20860013	n/a	120m west	120m west
Almshouse	PS1236	20860014	n/a	120m west	120m west
Gothic Structure	PS1237	n/a	CO075-094002-	290m northeast	290m northeast
Dunkettle Outbuilding	PS1238	20907516	n/a	380m east	80m south
Dunkettle Gate Lodge	PS1239	20907517	n/a	550m east	75m south
Dunkettle Outbuilding	PS1240	20907515	n/a	370m east	120m south
Lotamore House	PS1241	20864018	n/a	860m west	860m west
Flemmings Restaurant	n/a	20864020	n/a	1,000m west	1,000m west
Lotaville	n/a	20864017	n/a	1.000m west	1.000m west

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[5] https://www.buildingsofireland.ie/buildings-search/site/3035/dunkettle-house-caherlag-co-cork

Name	**RPS**	**NIAH**	**RMP**	**Approx. distance from Phase 1**	**Approx. distance from Phase 1 & 2**
Post Office	n/a	20860015	n/a	40m north	40m north
Dunsland House gate lodge	n/a	20907518	n/a	850m east	450m southeast
Dunsland House	n/a	20907519	n/a	Over 1km east	595m east
Dunsland Lodge	n/a	20907524	n/a	Over 1km east	850m east
Father Matthew Tower	n/a	20907523	n/a	Over 1km east	860m east
Glenburne House	n/a	20907521	n/a	Over 1km east	975m east
Post box	n/a	20907512	n/a	110m east	110m east
Ballinglanna House	n/a	20907509	n/a	350m northeast	350m northeast
Coach House	n/a	20907502	CO075-069----	920m north	920m north
Poulacurry House	n/a	20860005	n/a	990m north	990m north
Barnavara House	n/a	20860004	n/a	920m north	920m north
Glenkeen House	n/a	20860006	n/a	370m north	370m north
Glenkeen Lodge	n/a	20860007	n/a	370m northwest	370m northwest
The Cottage	n/a	20860008	n/a	315m northwest	315m northwest
Rectory	n/a	20907513	n/a	50m north	50m north

Figure 15-2 Location of Protected Structures Within Study Area

Figure 15-3 Location of NIAH structures not listed as Protected Structures

15.6.1.1.8 Dunkettle House Context

Introduction

Dunkettle House is a classical Palladian villa situated in an area on north side of the River Lee located c. 5km to the east of the historic centre of Cork city and the existing house was built in the late-18th century as the residence of Abraham Morris, a wealthy Cork merchant and MP. The property is bound by the Glashaboy River to the west, the Dunkettle road interchange to the south, modern housing developments to the north and a local road to the east. The house is one of number of similar sized eighteenth-century houses along the northern side of the River Lee. As noted by Malins and the Knight of Glin (1976, 114):

> *The shores of landlocked Cork Harbour were ideal for siting eighteenth-century houses and grounds – sunny, sheltered, on high ground and frostless…Dunkettle and Lota were also set above the harbour, their fine woods united by rising lawns in which lay the houses.*

The house and its associated lands, in summary, broadly consist of the following elements: Dunkettle House, walled garden, gate lodge, entrance gate and piers, coach house, stable yards and its associated buildings, woodlands, parkland and pleasure grounds. Save for a proposed cycle and pedestrian route, the lands within the proposed LRD Phase 1 development site comprise agricultural fields that were separate to the eighteenth-century extent of the Dunkettle demesne. As a result, the LRD Phase 1 development has a very limited interaction with Dunkettle House and its historic landscape character. A second access point from Dunkettle Road (L2998) will be included in the LRD Phase 2 development. This access will utilise and upgrade an existing access serving the applicant’s lands and a number of private dwellings. It is envisaged that the existing access will be upgraded to facilitate vehicular, pedestrian and cyclist movements and, it is possible that localised negative impacts will arise on the walled garden and the immediate setting of Dunkettle. The design and specification of this second access are currently being developed in consultation with Cork City Council officials

The following subsections presents information gathered during the desktop study combined with field-walking inspections of the proposed development site carried out as part of this assessment.

Dunkettle House History

Dunkettle House is first mentioned in 1750 when it was owned by Richard Tonson who may or may not have been its creator (Bence-Jones 1963). This house was probably built in the 1740s and according to Bence-Jones (1988), it stood "on a different site" than the existing house. The gardens, which at that time sloped down to the river, have since been reordered and their connection to the river has been severed by the construction of the N25 road. This house was succeeded by at least three further phases of development on the site. The second phase of building was the older part of the existing house which was probably built by Dominic Trant (MP for Kilkenny) who bought Dunkettle from Tonson some years before the latter's death in 1773. Trant then sold the house to Robert Reeves around 1776, who sold it on almost immediately to Zachariah Morris. Zachariah Morris died in 1780 and left Dunkettle to his nephew Abraham Morris (High Sherriff for County Cork and MP for Cork) who built the present house shortly thereafter, constituting the third phase of building. The house is most likely to have been designed by William Hargreave, a pupil of the renowned Cork-based architect Davis Ducart (or Douart), who also designed Lota and Kilshannig. It is thought that some elements of the second phase house may have been incorporated in Hargreave's design. Bence-Jones (1963; 1988) suggests that a room in a linking range, containing a frieze of 18th-century plasterwork is possibly part of the earlier house incorporated into the present one. The interior of the main block of the house also displays two periods, the front of the hallway towards the entrance has Georgian doors and probably dates from when the house was built, but the Regency double staircase to the rear of the arch must have been added in the early decades of the 19th century (Bence-Jones 1963).

Abraham Morris' grandson sold Dunkettle to Thomas Wise Gubbins in about 1883. Thomas Wise Gubbins had moved to Cork from Limerick in that year to take up the running of the Wise’s distillery at North Gate, which he had inherited. Thomas and his wife had two sons and five daughters and two of the daughters, Maria Maud and Kathleen oversaw running the house and farm (Spendiff 2002). The most well-known of the daughters was the youngest, Beatrice Edith Gubbins (1878-1944), who became an artist of some note, and a number of her watercolours depict views and farming scenes around Dunkettle. The house was inherited by Geoffrey Russell from the Gubbins family in 1954 and in 1956 its ownership was transferred to the Dunkathel Investment and Agency Company attached to the four shareholders: Mary Elizabeth Russell, John Russell, Francis Russell and Philip Russell. Elizabeth (Betty) Russell is a pianist of some note and under the Russell's ownership, the house became renowned as a place of music. During the 1960s, the drawing room was regularly the scene of concerts and recitals, and the Radio Eireann String Quartet often rehearsed in the house during this time (Bence-Jones, 1963).

Description of House and associated lands and structures

The existing Dunkettle House comprises a two storey country house residence dating to the late 18th century, with a construction date of c. 1780. The house and lands are surrounded by a wooded enclosure with a high wall along the adjacent local road to the east and is situated on a prominent position on a south facing hillside towards the estuary of the River Lee. The entrance front (south elevation) of the house contains 9 bays, including a 3 bay central breakfront. The central fan lighted entrance doorcase has an entablature and engaged Tuscan columns (Bence-Jones 1988). The house is rendered and has stone quoins exposed on the corners of both the house and breakfront. The roof is double-pitched and parapeted to front and sides and eaves to the rear. It is covered with Welsh slates with lead ridges and hips and it has two main rendered stacks with tall octagonal yellow clay chimney pots. The façades are all rendered ruled and lined with stepped limestone quoins to the front façade and stucco cornice to front and sides terminating in a plain stucco coping. The building is 4 bays deep and has screen walls with rusticated niches joining the house to office wings extending backwards. The front ends of the wings are treated as 2 storey, 2 bay pavilions with oculi in their upper storey (Bence-Jones 1988). The office wings return towards the centre to enclose a cobbled courtyard to the rear. The house contains a well preserved early 19th interior and an impressive bifurcating staircase.

The current entrance to Dunkettle House is located to the east on a local road between Glanmire and Glounthaune/Little Island. The entrance comprises shallow curving walls with a main gate and a pair of side gates, and a lodge set back from the entrance. The main entrance opening is 3.4m wide and is defined by cut stone piers 2.9m high on each side with double wrought iron gates. A shallow pilaster on the inner face of the piers accommodates the wrought iron gates; while the pier bases are simply carved with moulded cornice caps. Roughly coursed sandstone walls of random rubble construction extend from the gates in a shallow curve for a length of 15m to another matching pair of cut stone piers. These walls rest on a wider sandstone base and the coping comprises cut limestone slabs (0.06m thick) with roughly cut sandstone blocks on top. The walls curve (devoid of coping) beyond the outermost pillars to the roadside and there is some evidence of rendering.

The derelict gate lodge stands inside the entrance gate to the south of the east-west aligned driveway and comprises a square single-storey structure with a slated hipped roof. This was one of four gate lodges indicated on the first edition 6-inch Ordnance Survey map. The walls are of random rubble construction and are thickly rendered. The front and rear elevations are three bay (including central door) and the west side is single bay. The back door has been blocked up with brick, while a large flat limestone slab forms a doorstep at the entrance to the front door. The windowsills are of cut limestone. A single storey extension has been added to the east side. Inside the front door there is a small lobby which gives access to two rooms, one at either side. Access to the extension is through the east wall of the eastern room. The interior of the lodge is in poor condition – the windows have no glass and water has permeated through the roof and windows. The main drive to the house swept in a gentle curve from the east gateway before ending in a carriage turn on the south front of the house. Two side-roads off this driveway lead to the stable block and to the walled garden.

The pleasure grounds extend around the close environs of the house and its outbuildings and are defined by the presence of a ha-ha ditch which is still traceable on the edge of the pleasure grounds although it has been infilled. The purpose of this ditch was to define and separate the area of pleasure grounds from the surrounding meadows and grazing fields. More importantly it prevented incursion by livestock without the necessity of using a conventional fence or parkland rail to exclude them and it ensured an invisible barrier so views across the landscape were not interrupted, or perspective foreshortened.

The walled garden is located directly north-east of Dunkettle house. This garden probably predates the existing Dunkettle house and may be contemporary with the earlier building indicated at the location on the 17th-century Down Survey map. Its close proximity to the existing house is also suggestive of an early date as walled gardens during the late 18th and 19th-century were usually constructed further away from the main house. The garden is presently in a derelict, overgrown condition and no record of the original garden designs nor any original planting records are currently known to exist, but its depiction on historic Ordnance Survey (OS) maps indicate its layout during the 19th and early 20th centuries. These historic OS maps comprise the first edition 1:10,560 (or '6-inch') map (published 1845), the 1:2500 (or '25-inch') map (published 1900-01) and the second edition 1:10,560 ('6-inch') map (published 1935 & 1956). The walled garden appears to have had an ornamental appearance on the 1845 OS map while it is depicted as a typical kitchen garden layout on the later map editions, with paths and borders and central plots to facilitate rotation of crops. No fruit trees are present within the walled garden. The garden is shown delimited by four stone walls and was originally set out in sections divided by straight paths. This arrangement lasted for many years; the successive families probably undertook improvements during the middle of the 19th century as indicated by the outbuildings and offices surrounding the walled garden and yards. A Georgian period slated roof building containing one half a privy with a shared window is located on the exterior of the southwestern corner of the garden and potentially dates to the mid-18th century.

The stable yards are located to the west of the walled garden and north-west of Dunkettle house. The yards also contain the functional outbuildings associated with the original daily operations of the house. The principal stable yard is a rectangular space with walls on two sides and a multi-bayed, two-storey 'L' shaped (in plan form) coach house and stables dating to the 19th century on the other sides. The roofs within the stable are single pitched, hipped with eaves and are covered with Welsh slates while the walls are rendered ruled and lined. The openings of the stables on the first floor originally had louvres and boarded doors. The windows on the ground floor are rectangular with four-over-four paned sashes; the bottom one is fixed, and the upper one is centre hung. The interior is reasonably intact with timber stalls with cast iron posts and timber horseboxes. The coach house, which occupied the short length of the 'L' plan of the yard has two elliptically arched openings on the ground floor and steel framed windows on the first floor. The yard retains its boundary walls and ashlar limestone gate piers. There are two smaller yards surrounded by masonry walls, one of which has two elliptically arched openings and the walls of a lean-to out building the walls of which alone survive. The other yard and has a multi bayed two-storey lean-to building that backs on to the wall of the walled garden. The roof is covered with Welsh slates, and it has a masonry wall at first floor level supported on a timber and in part later concrete beam on cast iron columns

The parkland associated with Dunkettle house is located to the south and west of the house. This is an extensive area currently utilised as pastureland and is sub-divided by a south-east to north-west orientated laneway. The parkland is small in scale relative to the size and architectural importance of the house, however, the concept of 'borrowed landscape' was well understood and availed of because of its prominent position on the south facing slopes to the south of Glanmire village. There are panoramic vistas southwards from the house and the southern area of parkland across the River Lee estuary. The planting of extensive trees to the south of the house would have obliterated views in that direction and would have also reduced exposure to sunlight so this area of the parkland appears to have had a sparse tree population. The parkland is now a much-depleted landscape when compared to its representation on the 1845 OS map since most of its original stocks of parkland specimen trees have been removed. The surviving parkland trees and exotic evergreens vary in date from between the mid-18th to mid-20th centuries. The demesne grounds of the house are located north/north-east of the stable yards. The modest demesne of Dunkettle house was laid out in a practical manner, probably in tandem with the new house constructed *c.*1780. Shelter belts were planted to protect the grounds and gardens from wind exposure. Narrow belts of deciduous trees surrounded and protected the grazing fields, meadows and house.

The extent of the original estate has been truncated and altered through property disposal due to incremental one-off housing (such as along its eastern side (the present day L2998)) and transportation infrastructure upgrades during the nineteenth-, twentieth- and twenty-first centuries (along its southern margin and south-eastern corner). The original extent of the Dunkettle estate has been identified by O'Kane Crimmins (2004) and its extent is outlined on a modern aerial photograph in Figure 15-4 below.

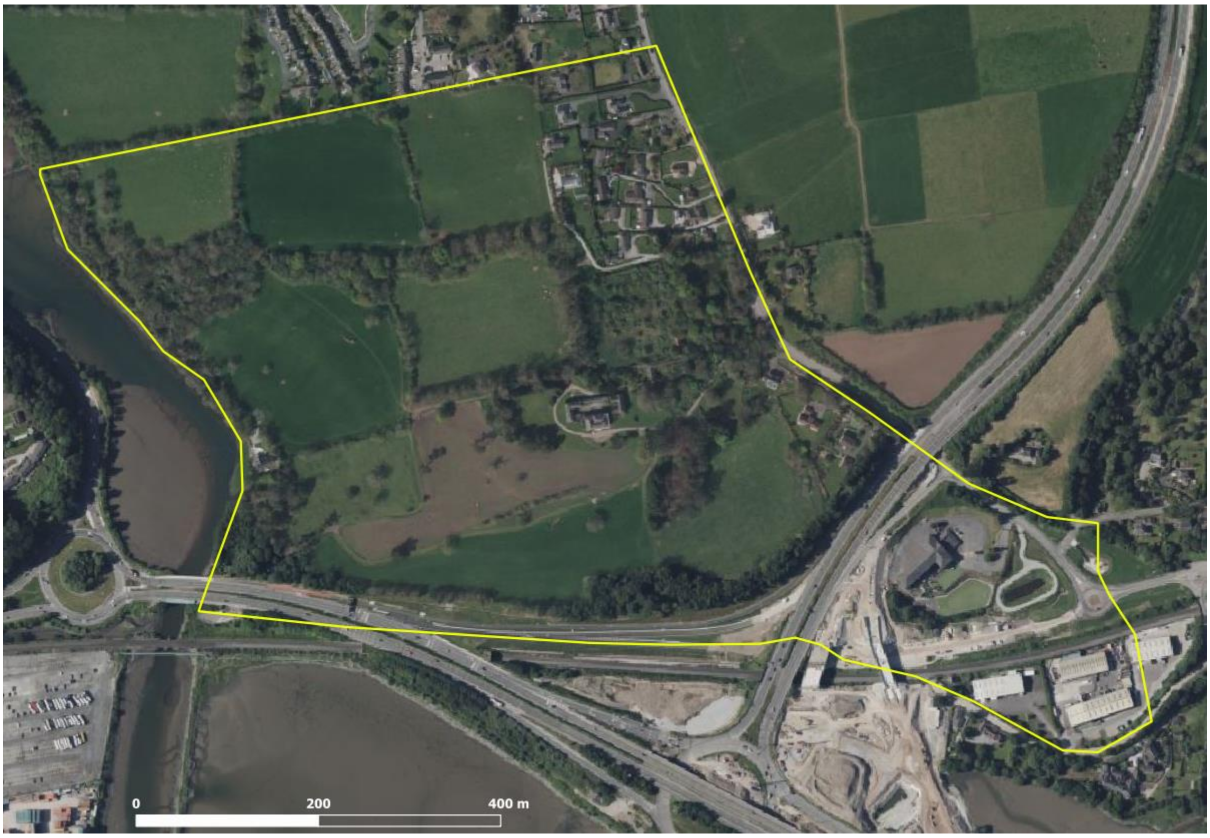

Figure 15-4 Extent (outlined in yellow) of the eighteenth-century demesne at Dunkettle (after O'Kane Crimmins (2004)). The extensive portions of the southern, south-eastern and north-eastern portions of the original demesne have been severed from the original historic landholding.

The pattern of the rectangular fields to the north of Dunkettle house probably pre-dated the landscaping encompassed in the parkland and pleasure grounds and is more likely to have been utilised in an agricultural economy of earlier 18th century date. The fortune of the original owner, Abraham Morris, was not based on agriculture but on trade in the boom economy of 18th century Cork, nevertheless, this house and estate were devised emulate traditional estates whose economy was dependent on agriculture and revenue from land ownership. On estates like Dunkettle, agriculture was largely geared towards the domestic economy. Walled gardens and orchards (including glasshouses) were intended to cater for all the culinary needs of a 'country house' and its staff. Sufficient agricultural land was required for dairy cows, beef cattle, sheep and horses to service the needs of the house and its dependents, but a surplus was not critical for its economy.

The green field areas within the boundary of the proposed LRD Phase 1 development site do not contain any built or artificial demesne features, such as structures, follies, tree-rings, earthworks or ponds. The field boundaries within the proposed development site typically comprise tree-lined, earth-stone banks with no notable large ditches. No surface traces of any potential unrecorded archaeological sites were noted during field walking inspections of the lands within the boundary of the proposed LRD Phase 1 development.

Cartographic Sources and Historical References

The 1st edition 1:10,560 OS map of 1845 (Figure 15-5) shows the lands within the Dunkettle house property as a typical estate landscape characterised by woodland fields and open parkland with specimen trees and deciduous trees. The location of the estate centre is depicted around the house with various structures associated with the garden and stable areas depicted within its environs. Native deciduous trees were the preferred and most common component of the 19th-century parklands, while conifers, especially the newly introduced species from the Americas, were added during the 19th century (Lamb and Bowe, 1995). Conifers are shown on the map to the east of Dunkettle House and in stands to the northwest and west. Despite the presence of conifers, the landscape is dominated by deciduous trees to the present day. The 'natural style' of 18th century landscape designers dominates the landscape to the south of Dunkettle House. Serpentine, rather than straight lines, were used in the layout of the woodlands and walks while straight lines were confined to the walled gardens. This view of landscape was inspired by the observer in Italy on 'The Grand Tour' and the prevailing aesthetic was reinforced by 'pastoral' literature and the paintings of artists such as Claude Lorraine (Lamb and Bowe, 1995). The arrangement of the lands within the Dunkettle property is typical of this style. The contrast between the ‘wooded oasis’ of the estates and the more widespread treeless agricultural landscape of Ireland was the subject of comments by 18th-century travel writers visiting Ireland. In particular, the renowned travel writer Arthur Young described Dunkettle as follows (Young 1780):

> *“Accompanied Mr. Jefferys to Dunkettle, the seat of Dominick Trant Esq. who with a liberality of sentiment which renders him deservedly esteemed, took every measure I could wish for my information. The road leads very beautifully on the side of the harbour under a shorf bold hills, on which are many villas and some plantations. For the following particulars concerning the neighbourhood I am indeed indebted to Mr. Trant. September 16th to Cove by water from Mr. Trant's quay. The view of Lota is charming, a fine rising lawn from the water, with noble spreading woods reaching on each side, the house a very pleasing front, with lawn shooting into the woods. The river forms a creek between two hills, one Lota, the other opening to another hill of inclosures well wooded. As the boat leaves the shore nothing can be finer than the view behind us; the back woods of Lota, the house and lawn, and the high bold inclosures towards Cork, from the finest shore imaginable leading to Cork the city appearing in full view. Dunkettle wooded inclosures, a fine sweep of hill joining Mr. Hoare's at Factory Hill whose woods have a beautiful effect. Dunkettle House almost lost in a wood. As we advance, the woods of Lota and Dunkettle unite in one fine mass. The sheet of water, the rising lawns, the house in the most beautiful situation imaginable, with more woods above it than lawns below it, the west shore of Loch Mahon, a very fine rising hill cut into inclosures, but without wood, landlocked on every side with high lands, scattered with inclosures, woods, seats etc. with every cheerful circumstances of lively commerce, has altogether a great effect.”*

The detail on the 1845 OS map shows the location of the housing element of the proposed LRD Phase 1 development as five sub-rectangular fields, delimited by tree-lined boundaries, and no built structures or artificial demesne features are shown within the area (Figure 15-5). When compared to the fields to the south, there is a notable paucity of trees planted within the interior of these fields other than a small triangular stand of trees depicted in the eastern half of the LRD Phase 1 lands, which may indicate that they were in agricultural use. This area of the proposed LRD Phase 1 development is located c. 600m to the north of Dunkettle house, and its associated buildings, and is c. 80m north of another house named Woodville House, which Lewis (1837) records as the residence of Nicholas Marshall Cummins during in the 1830s. There are no property boundaries included on the 1845 OS map and the extent of lands within the area which were in the ownership of Woodville House is unclear from the map detail. Woodville House is not a Protected Structure, or a NIAH-listed building and the property is now occupied by modern housing. A house named Woodlands House is also shown outside the northeast side of LRD Phase 1 boundary and this is also not a Protected Structure or a NIAH-listed building. The LRD Phase 1 boundary also encompasses access points extending to the public roads to the north and east and these public roads are shown on the 1845 OS map. The north access route is located c. 30m to the east of a flour mill building shown on this map which is listed as a Protected Structure (PS 1183) and is also a recorded archaeological site (CO075-002001-). The 1845 OS map does not depict any buildings associated with the flour mill within the LRD Phase 1 boundary in this area but does show three small, detached structures positioned along the laneway that led south from the flour mill. The eastern access route extends through smaller fields within the east end of the LRD Phase 1 boundary and no structures or other features of cultural heritage interest were noted within this area. The 1845 OS map shows the extent of the LRD Phase 1 boundary extending to the south of the west end of the proposed housing area occupied by a strip of woodland along the Glashaboy River to the west. The proposed amenity greenway route in this area will extend along the outer (east) side of the woodland strip and the 1845 OS map does not depict any structures located within or adjacent to this route. A ‘boat harbour’ is indicated along the riverside in the south end of the woodland strip and a gate lodge is shown adjacent to the public road to the south. Both of these features are located outside the LRD Phase 1 boundary and the nearest area of this section of the proposed development is located c. 290m to the west of Dunkettle House.

The detail on the 1:2500 OS map (1900-01) indicates that by the start of the 20th century the overall Dunkettle property retained the general layout depicted on the 1845 OS map but had been somewhat modified with the area of parkland with planted trees more clearly confined to the area to the south of Dunkettle House (Figure 15-6). A notable change in the depiction of the overall lands within the property when compared to the 1845 OS map appears to have been the removal of many of the trees within the internal areas of the fields to the north and west of the house, perhaps related to agricultural land improvement works. A number of the field boundaries shown on the 1845 OS map within the LRD Phase 1 boundary have been removed and the area is shown dominated by two large vacant fields with two smaller plots in the east end. The triangular area of trees shown in the southeast corner of the eastern large field on the 1845 OS map is still depicted but an area of trees appears to have been removed at the north end. The extent of the woodland strip within the section of the LRD Phase 1 boundary extending to the south appears to be slightly narrower than depicted on the 1845 OS map but this may be the result of a more accurate survey. A footpath is shown extending through the woodland strip on the 1:2500 map and this partially extended outside the east end of the woodland in the southern area. The 1:2500 map also shows number of riverside features not present or clearly depicted on the 1845 OS map are also shown within the environs of the boat harbour area. These include a quay feature, boat slip and boat house and of these, the quay and slip are located outside the LRD Phase 1 boundary in a private third-party property. The indicated location of the boat house is within the LRD Phase 1 boundary and is now contained in a heavily overgrown woodland area. While structural remains of the boat house were noted within the woodland during the site inspection, its location was inaccessible due to dense overgrowth. The route of the proposed amenity greenway is located to the east of the indicated location of this structure within an adjacent field outside the woodland. The SMR also records an icehouse (CO075-080----) located adjacent to the quay area and this is not indicated on any editions of the OS maps. The recorded location of this structure is outside the LRD Phase 1 boundary and is within a private third party property. The roadside location of a gate lodge building at the south end of the property remains extant within a private third party property which is located outside the boundary of the proposed development. The proposed route of the amenity greenway outside the east end of the woodland is depicted on the historic OS maps as the western end of a number of vacant fields which contains one area of woodland which extends eastwards in the southern area.

A review of later edition 1:10,560 mapping (sheets published in 1935 and 1956) revealed that the layout of the lands within the property, including those within the LRD Phase 1 boundary, had remained broadly unchanged since the publication of the 1:2500 map at the start of the 20th century (Figure 15-7).

The lands within the Dunkettle property were recorded to have been in agricultural use throughout most of the 20th century (Spendiff 2002). A review of aerial/satellite images (Tailte Éireann, Google Earth and Bing Maps) indicates that existing layout of the LRD Phase 1 lands, as well as the proposed Phase 2 lands and Dunkettle House, visible on the reviewed imagery appears to be broadly unchanged since the publication of the 2nd edition 1:10,560 OS map in the mid-20th century. The detail on the reviewed images demonstrates that the two large fields within the LRD Phase 1 boundary continued in agricultural use during recent decades with tillage activity evident. There are construction works evident within the locations of the northern and eastern access routes into the proposed LRD Phase 1 development on recent images. Many of the planted trees shown within the fields in the proposed Phase 2 lands to the west and south of Dunkettle House are no longer present and the lands in these areas are shown as a combination of tillage and pasture fields. The access driveway to Dunkettle House from the gate lodge to the west follows the same route as depicted on the historic OS maps and the layout of the house and associated buildings also remain unchanged. The walled garden to the north of the house is also clearly visible on the reviewed images and the internal area is shown as an overgrown area. The main changes in the character of the lands within the environs of the overall property since the publication of the 2nd edition 1:10,560 OS map are the construction of the modern road network to the south and east and construction of modern housing developments to the north and east.

No traces of potential unrecorded archaeological sites were noted within the boundaries of the proposed LRD Phase 1 and Phase 2 developments, during the review of historic mapping and modern aerial/satellite images.

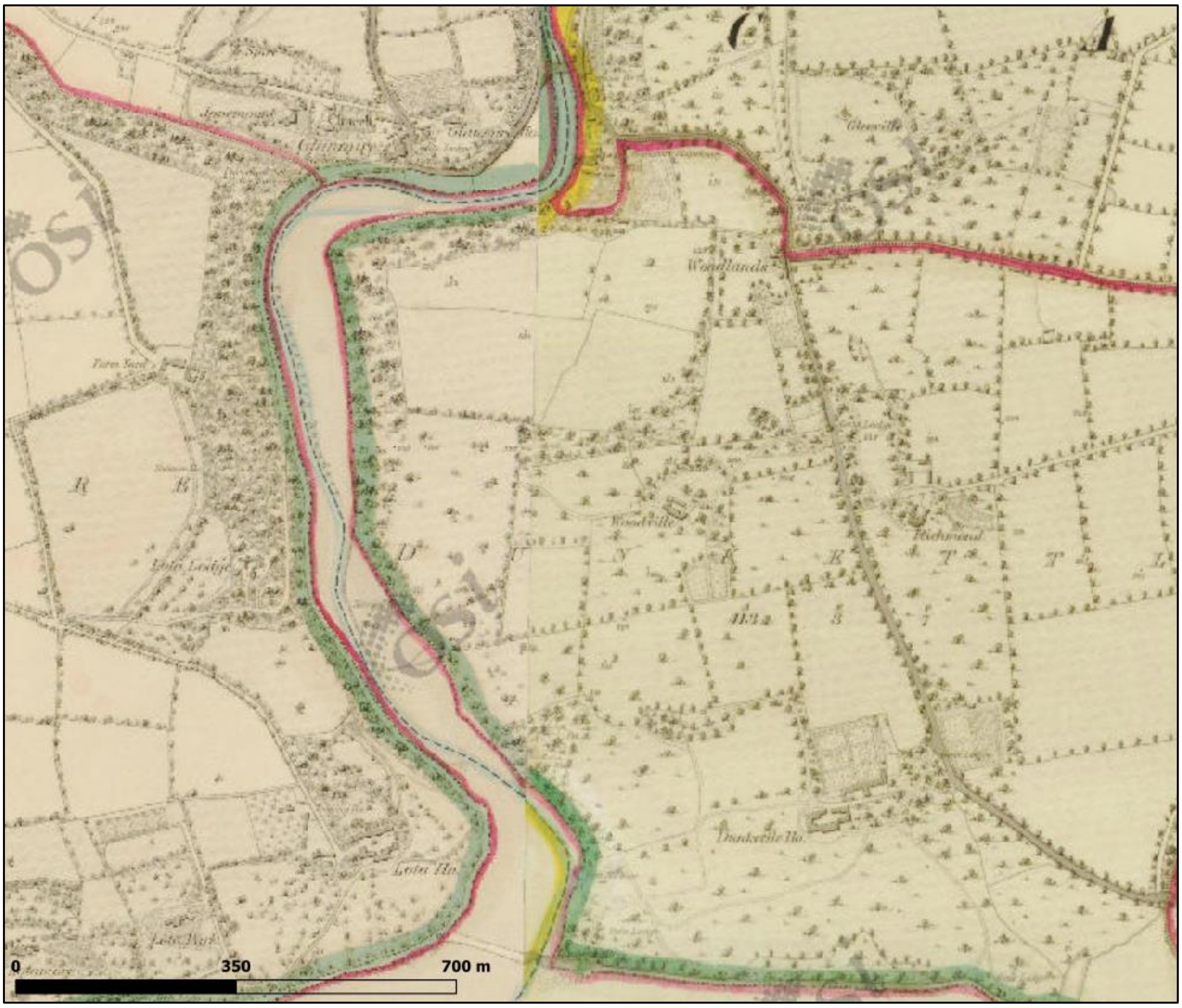

Figure 15-5 Extract from 1st edition 1:10,560 (or ‘6-inch-to-one-mile’) OS (1845) map

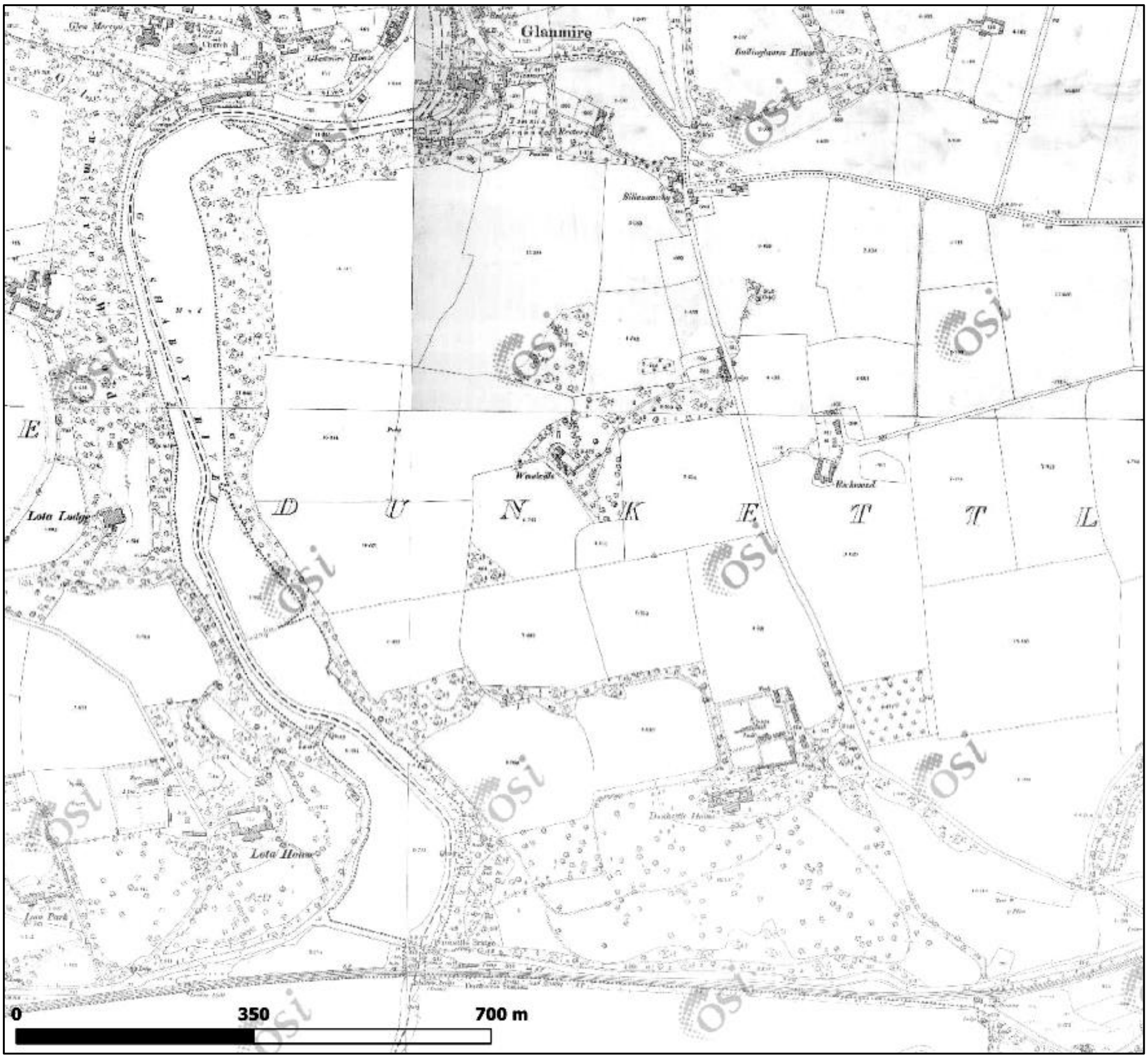

Figure 15-6 Extract from 1:2500 (or 25-inch-to-one-mile) OS map (1900-01)

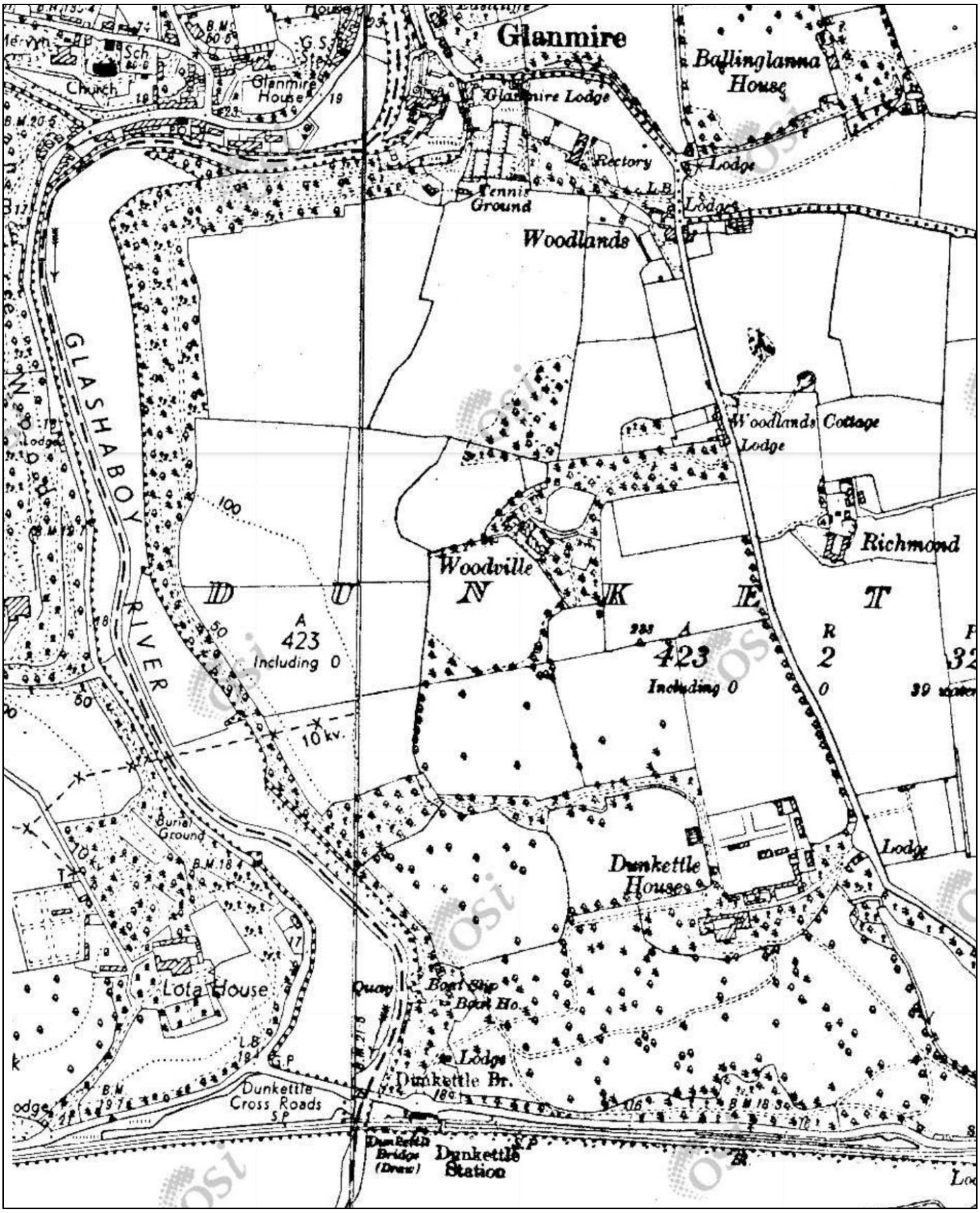

Figure 15-7 Extract from second edition 1:10,560 OS map (1935 & 1956)

Historic Landscape

Historically the bulk of the LRD Phase 1 were not associated with the eighteenth-century demesne of Dunkettle House. The first edition of the Ordnance Survey (OS) map of 1844-45 shows Dunkettle as a typical estate landscape characterised by woodland fields and open parkland with specimen trees and deciduous trees. First edition OS map shows a narrow ribbon of wooded parkland surrounding the mansions and villas of the wealthy, which lines the banks of the River Lee and its tributary the Glashaboy (or Glanmire) River. This wooded parkland presents a sharp contrast to the treeless agricultural landscape lying on the higher ground of Lotamore and Banduff Townlands to the northwest. This vivid contrast was noted and commented upon by a number eighteen-century travel writers visiting Ireland, including Arthur Young who visited the area in 1780 (O'Kane-Crimmins 2004; John Cronin & Associates 2004, 14-15). The section of the wooded parkland which lies to the east of the Glashaboy River and the west of the north-south road immediately to the east of Dunkettle House appears to be shared by both Dunkettle House and Woodville House.

O'Kane-Crimmins (2004, 13) in her historic landscape assessment of the demesne states that the landscape of Dunkettle is considered to be most significant in the 1775—1835 period. She categorised the landscape of Dunkettle to be of national importance and that Dunkettle formed 'a key element in the composite designed landscape of the Lee Estuary' (ibid, 5). O'Kane Crimmins considered the principal eighteenth-century elements of Dunkettle's designed landscape to be:

- The Borrowed Landscape of the Lee Estuary and the valley of Glanmire
- The demesne's structure, perimeter wall and tree belt
- The Southern Parklands
- The Historic Circulation Routes, Vistas and Eyecatchers
- The Orchard and Deerpark
- The Kitchen Garden (or walled garden)
- Dominick Trant's Circuit Walk

In particular, O'Kane Crimmins highlighted the survival of historic designed routeways through the landholding. She notes (*ibid.* 6) that the experience of:

> *the eighteenth-century landscape garden was one of the continuous movement. Landscape was understood as a changing sequence of views or tableau, marked and emphasised by exceptional points along these routes, which are highlighted vista point.*

O'Kane-Crimmins identified six such designed routes through the landscape (see Figure 15-8 below). Four of the six were designed to be appreciated by carriage or horse (*ibid*.) The fifth was a tripartite route which extends from the eastern gate. The sixth route was a walking route, intended for exercise. In her study she categorized the routes as follows:

- Route 1: The Approach Route (which is substantially intact)
- Route 2: The South Boundary Drive (largely removed by the development and upgrades of the N8 and N25 roads)
- Route 3: The Approach Route from the Southeastern Gate Lodge (this portion of the demesne no longer survives)
- Route 4: The Exit Route (which is substantially intact)
- Route 5: The Eastern Approach/Service Route (which is substantially intact)
- Route 6: Dominick Trant's Circuit and Riverside Walk/Nineteenth-century Ladies' Walk (which is substantially intact but overgrown and inaccessible).

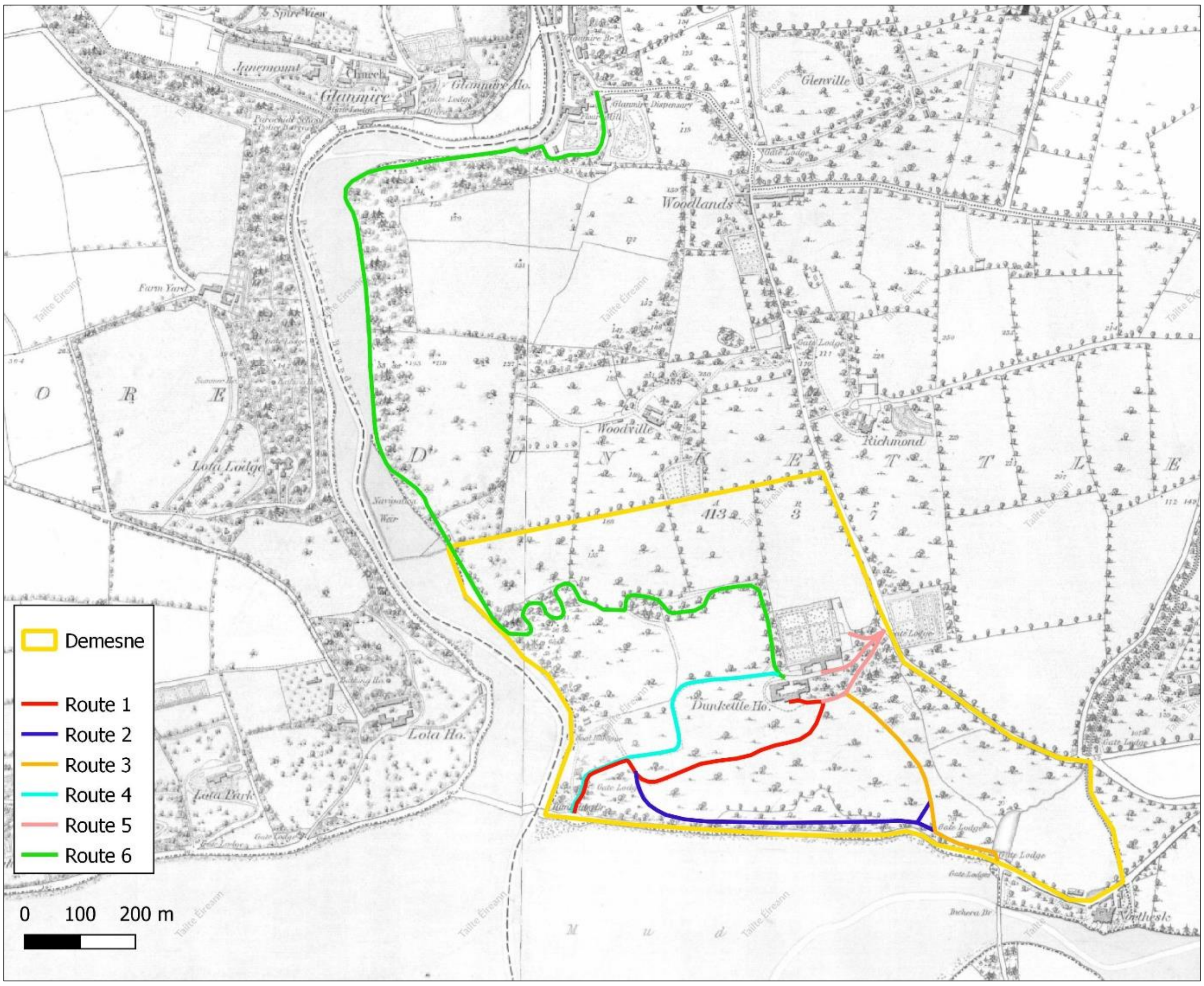

Figure 15-8 Diagram of landscape circulation routes and key features of the first edition OS map (after O'Kane Crimmins). The historic extent of the demesne is outlined in yellow.

Undesignated Cultural Heritage Constraints

The place name evidence indicates the potential existence of an unrecorded ringfort (a 'dun') within the townland of Dunkettle (*Dún Citil* – the fort of Citil). The review of the historic OS maps revealed that they do not depict any features within the house property that are indicative of extant traces of an archaeological enclosure site. Dunkathel is the current spelling of the house whereas on the first edition OS map it is named as to as "Dunkettle House" and it appears from the title deeds that Thomas Wise Gubbins, a previous owner of the house, changed the name of the from "Dunkettle" to "Dunkathel". A review of the online National Folklore Collection UCD Digitization Project revealed that it does not contain any entries relating to local traditions or folklore associated with the Dunkettle house property. There are no townland boundaries extending through the LRD Phase 1 boundary and no extant structures of potential vernacular or industrial heritage interest were identified within its boundary during site inspections. The fragmentary and overgrown ruinous remains of three stone built structures are located in the northernmost portion of the LRD Phase 1 boundary; these structures will be demolished. They are not of cultural heritage significance.

15.6.2 Geophysical Survey

A programme of geophysical survey of green field lands within the EIAR boundary was carried out by Target Archaeological Geophysics in January 2024 under a Detection Licence (24R0003) issued by the National Monuments Service of the Department of Housing, Local Government and Heritage. The results from the geophysical survey demonstrated a generally quiet magnetic background across the site and no responses of definite archaeological character were present in the results from the geophysical survey at the site. No concentrations of anomalies indicative of levelled enclosures, settlement activity or groups of potentially significant response were noted. Discrete positive anomalies, poorly defined linear responses and trends were present in the survey data. However, none of these exhibited notable characteristics or sufficient patterning to warrant an archaeological interpretation. These anomalies were mostly expected to derive from a combination of recent land use, natural soil/geological variation and/or modern ferrous. A full copy of the geophysical survey report, including the survey mapping, is provided in Appendix 15.2.

15.6.3 Archaeological Test Trenching

A program of archaeological test trenching of green field lands within the EIAR boundary was carried out by John Cronin and Associated in April 2024 under Excavation Licence Number 24E0395, as issued by the National Monuments Service of the Department of Housing, Local Government and Heritage. The archaeological testing entailed the excavation of 29 no. linear test trenches with a combined length of 4735m. The topsoil varied in depth across the site, ranging between 0.17m and 0.50m in depth. The topsoil was largely comprised of a mid-brown clayey silt and contained very infrequent small to medium angular stones, modern pottery sherds, glass shards and occasional fragments of plastic and modern refuse. While evidence of agricultural activity was revealed in the majority of the excavated trenches, nothing of archaeological significance was encountered. A full copy of the archaeological test trenching report, including figures and photographic record, is provided in Appendix 15.3.

15.6.4 Summary of Baseline Environment

There are no recorded archaeological sites located within the boundary of the proposed LRD Phase 1 development and no potential unrecorded sites were identified during the programmes of geophysical survey, archaeological test trenching and site inspections carried out to inform this assessment.

The 18th-century Dunkettle House is a recorded archaeological site (CO075-075----) and is also listed as a Protected Structure (PS1190). The NIAH have assigned a National rating to Dunkettle House which is indicative of it being a high value cultural heritage constraint (see Table 15-2). The property also contains an additional four Protected Structures which comprise two outbuildings close to the north end of the house (PS1240 and PS1238) and a gate lodge (PS1239) and gateway (PS1170) which fronts onto a local road to the east. These structures are assigned a 'Regional' rating by the NIAH which is indicative of a medium value but when considered in combination with the house they are deemed to have a high value as a group.

According to the Archaeological Survey of Ireland, the west end of the Dunkettle lands also contain an icehouse structure (CO075-080----) which has been added to the SMR in recent years (following information provided by members of the public). This structure is now contained within a private third-party property located outside the boundary of the proposed development; the area in question is heavily overgrown. The housing element of the proposed development is contained within agricultural fields in the north end of the landholding of Dunkettle House which are located at c. 600m to the north of the house and its associated structures for LRD Phase 1 and c. 200m for LRD Phase 2. The amenity greenway element of the development is located c. 290m to the west of the house (withing the western margins of the historic parkland of Dunkettle).

Save for a proposed cycle and pedestrian route, the lands within the proposed LRD Phase 1 development site comprise agricultural fields that were separate to the eighteenth-century extent of the Dunkettle demesne. As a result, the LRD Phase 1 development has a very limited interaction with Dunkettle House and its historic landscape character.

A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. This access will utilise and upgrade an existing access serving the applicant's lands and a number of private dwellings. It is envisaged that the existing access will be upgraded to facilitate vehicular, pedestrian and cyclist movements and, it is possible that localised negative impacts will arise on the walled garden which adjoins the existing lane, and the immediate setting of Dunkettle. The design and specification of this second access are currently being developed in consultation with Cork City Council officials - it does not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

The surrounding study area contains a range of cultural heritage constraints which are variously listed as archaeological sites and/or Protected Structures, the majority of which comprise buildings associated with the development of Glanmire as an industrial village during the post-medieval period. Most of these constraints are also listed in the NIAH which assigns each a 'Regional' rating although as a group they may be considered within a Medium-High value range. However, it is noted that the Glanmire area is not within an Architectural Conservation Area and the historic landscape within the surrounding study area has been extensively amended by housing and road transport projects in recent decades.

15.7 The 'Do Nothing' Scenario

A 'Do Nothing Scenario' will see to the continued preservation of the known and potential cultural heritage resource, including any potential unrecorded, sub-surface archaeological remains, located within the study area.

15.8 Potential Significant Effects

15.8.1 Demolition Phase

The LRD Phase 1 development will require the demolition of ruined remains of three small structures within the northernmost portion of the LRD Phase 1 development. The structures are of negligible heritage interest. Therefore, the demolition phase effects on the cultural heritage resource will not be significant.

A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. At the time of writing this EIAR, the design and specification of this second access are currently being developed in consultation with Cork City Council officials – it does not form part of the LRD Phase 1 application. The proposals for the second access point may result in a direct moderate/significant adverse impact on the former walled garden however the effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

15.8.2 Construction Phase

There are no archaeological sites listed in the SMR/RMP located within the boundary of the proposed LRD Phase 1 and 2 developments and the construction phase will, therefore, have no predicted direct adverse effects on the known archaeological resource listed in those records. The programmes of geophysical survey and archaeological test trenching carried out to inform this assessment did not reveal any previously unrecorded, sub-surface archaeological remains within boundary of the proposed development. The route of the amenity greenway is located outside the area of the lands that were subject to site investigations. The potential exists for the presence of unrecorded, sub-surface archaeological sites or features within the footprint of this element of the proposed development and this will require mitigation (see Section 15.9.3).

The proposed development will include two drainage outlets to the Glashaboy River: Catchment 2 drains northwards to the river and Catchment 3 drains westwards. Further details of these works are provided in the Infrastructure Design Report and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application. A review of the report on an Underwater Archaeological Impact Assessment carried out as part of the Glashaboy Flood Relief Scheme was carried out (Licence Numbers 16E316, 16D0057, 16R0102).[6] This revealed that the survey area of the underwater archaeological assessment extended along relevant sections of the riverbanks in these catchment areas. The survey identified sections of revetment walling (0.4m-1.3m high) extending along the riverbank which is constructed of roughly coursed stone with the larger stones (0.5m x 0.30m) at the base and smaller stones forming the upper courses. All sections of the survey areas were subjected to metal detection and frequent pieces of modern debris were recorded. Nothing of archaeological interest was found during the metal-detecting survey. The proposed outlet ground works will be located behind the revetment walls but will require in localised interventions and reconstruction of narrow sections of the walling.

Dunkettle House and a number of its associated outbuildings, which are listed as Protected Structures, are located within the wider environs of the proposed development at distances of c. 600m and c. 200m to the south of the housing element for Phase 1 and 2 respectively and c. 290m to the east of the proposed amenity greenway. In addition, no site access, traffic movement, compounds, storage

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[6] https://www.floodinfo.ie/frs/media/filer_public/44/eb/44eb1178-9882-4b5d-ab34-2fd5aa867b60/volume_2_eiar_appendices_8_of_9.pdf

or any other ancillary activity will occur within areas of the property located outside the boundary of the LRD Phase 1 development during the construction phase, including within or in the environs of the existing entrance and driveways to Dunkettle House and its associated buildings. The construction of the amenity greenway within the western portion of the demesne of Dunkettle House will cross a former section of Dominick Trant's Circuit and Riverside Walk/Nineteenth-century Ladies' Walk (Route 6 as identified by O'Kane-Crimmins). The historic route will not be negatively impacted. As the amenity greenway approaches the south-western corner of the landholding, it will utilise a much-modernised (but unused) section of the principal historic approach route to Dunkettle House (Route 1 as identified by O'Kane-Crimmins). The construction phase of the LRD Phase 1 development will result in a neutral effect on the wider setting of Dunkettle House and its historic landscape character.

The construction phase of the proposed LRD Phase 1 and LRD phase 2 developments will result in no predicted effects on any of the other recorded archaeological sites or architectural heritage constraints within the surrounding study area as these are also located in areas outside the development boundary where no construction works will occur.

A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. At the time of writing this EIAR, the design and specification of this second access are currently being developed in consultation with Cork City Council officials. The proposals for the second access point may result in a direct moderate/significant adverse impact on the former walled garden.

However as noted, the design and specification of this second access are being developed in consultation with Cork City Council officials – they do not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed.

15.8.3 Operational Phase

There are no recorded archaeological sites located within the boundaries of the LRD Phase 1 and 2 developments, and no potential unrecorded archaeological sites or features were identified during the geophysical survey and test trenching investigations carried out to inform this assessment. No direct adverse effects on the archaeological resource are, therefore, predicted during the operational phase of the LRD Phase 1 and 2 developments.

There are no designated architectural heritage structures located within the boundary of the proposed Phase 1 development, and it is not located within, or adjacent to, an Architectural Conservation Area. The operational phase of the LRD Phase 1 development will, therefore, not result in any direct, adverse effects on the architectural heritage resource. In addition, the residential element of the LRD Phase 2 development will also not result in any direct, adverse on architectural heritage resources.

A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. The design and specification of this second access are currently being developed in consultation with Cork City Council officials. The proposals for the second access point may has the potential to result in moderate, adverse, direct effect on architectural heritage and historic landscape character on the walled garden to the rear of Dunkettle House.

However as noted, the design and specification of this second access are currently being developed in consultation with Cork City Council officials – they do not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed

There is no notable intervisibility between the proposed development and other designated cultural heritage constraints located within the surrounding 1km study area. A review of the locations, settings and functions of the cultural heritage constraints within the surrounding study area did not reveal any examples that rely on formal sightlines or intervisibility with the locations of other constraints within the wider landscape that formed aspects of their original functions. The proposed LRD Phase 1 and 2 developments will, therefore, result in no predicted adverse indirect effects on the setting of other cultural heritage constraints within the surrounding study area during the operational phase.

15.8.4 Cumulative Effects

In consideration of cumulative effects of other planned or permitted developments that may interact with the proposed development in respect of cultural heritage, the below developments in the vicinity of the development were reviewed:

Ballinglanna residential development (Planning Ref ABP-300543-19, 2039179, 2342154)

This is a large residential development that is currently under construction on a site to the north-east of the site of the proposed development. An architectural fragment inset in a later well feature within this development site is listed as an archaeological site (CO075-094001-) and is being retained in situ as part of the development. A programme of pre-construction archaeological investigations, which comprised a geophysical survey and test trenching, was carried out as part of this development and revealed nothing of archaeological significance.[7]

Nursing home and childcare facility at the former Glanmire Rectory (Planning Ref 1938900, 2140423): This is facility is located within a site adjacent to the north end of the proposed development. Construction of the facility is partially completed but at the date of writing of this document is paused. The subject property contains a rectory building listed in the NIAH (ref. 20907513) and this is being retained as part of the development.

Residential development at Glanmire Lodge, Glanmire (Planning Ref. 2039719)

This is a residential development of 30 dwellings that is currently under construction on a site adjacent to the north end of the site of the proposed development. This development site does not contain any recorded cultural heritage constraints.

Dunkettle Road Upgrade Scheme

This Part VIII scheme will include upgrades and extensions of existing footpaths and the development of new pedestrian/cycle facilities within the environs of the Dunkettle interchange. The scheme boundary extends just inside the southern end of the Dunkettle House lands but does not encompass

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[7] https://excavations.ie/report/2018/Cork/0027318/

the locations of any associated cultural heritage constraints within the property. Scheme proposals within this area include the extension of an existing footpath located within the road carriageway.

The proposed development will not result in any predicted significant adverse effects on the cultural heritage resource in combination with the above developments and, therefore, is not predicted to contribute to any potential significant cumulative effects on the resource.

15.8.5 Summary

The proposed development will not result in any predicted significant construction, operational or cumulative effects on the cultural heritage resource.

15.9 Mitigation Measures

15.9.1 Incorporated Design Mitigation

The design of the proposed development was informed by the desktop studies and site investigations carried out as part of this assessment and this included design inputs by the architectural heritage specialist in relation to the formulation of development proposals within the environs of Dunkettle House and its associated outbuildings.

15.9.2 Demolition Phase Mitigation

Demolition phase works proposed in the LRD Phase 1 development include the removal of three small ruinous structures in the northernmost portion of the development area. The structures are not of architectural or cultural heritage significance. However, it is proposed to prepare a written and photograph record of each structures prior to demolition.

There is potential for localised demolition in the LRD Phase 2 development associated with a possible second access. When the detailed design of the LRD Phase 2 development has been completed, detailed mitigation measures will be proposed (including, but not restricted to, a programme of pre-construction architectural recording).

15.9.3 Construction Phase Mitigation

For the proposed development, the location of Dunkettle House and its associated structures will be excluded from construction activities including, but not limited to, traffic movement, equipment storage, compounds and spoil retention areas. The location of these cultural heritage constraints will be identified during contractor site inductions and will be clearly signed as no entry areas for the duration of the construction phase.

A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. This access will utilise and upgrade an existing access serving the applicant’s lands and a number of private dwellings, running adjacent to the walled garden. It is envisaged that the existing access from the L2998 will be upgraded to facilitate vehicular, pedestrian and cyclist movements and, it is possible that localised negative impacts will arise on the walled garden and the immediate setting of Dunkettle House.

However as noted, the design and specification of this second access are currently being developed in consultation with Cork City Council officials – it does not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

A programme of geophysical survey followed by archaeological test trenching was carried out in greenfield areas of the LRD Phase 1 and 2 development lands inform this assessment and these revealed nothing of archaeological significance within the investigated lands (see Appendices 15.2 and 15.3). Given the limited footprint of the proposed amenity greenway and two drainage outlets to the Glashaboy River, these areas have not been subject to a programme of pre-development archaeological investigation.

A programme of licensed archaeological monitoring of ground works along the route of the amenity greenway and the two outlets to the Glashaboy River will be carried out by a suitably qualified archaeologist during the construction phase. This will include the compilation of a pre-works written, drawn and photographic record of the locations of revetment walling at the locations of the two drainage outlets. In the event that any archaeological sites or features are identified during monitoring, ground works will halt at that location, and they will be recorded and will be left to remain securely in situ within a cordoned off area. The National Monuments Service and Cork City Council's Archaeologist will be notified of the discovery and consulted to determine further appropriate mitigation measures, which may entail preservation *in situ* by avoidance or preservation by record through a licensed archaeological excavation.

The construction phase of the proposed development will not result in any predicted effects on other aspects of the cultural heritage resource that will require mitigation.

15.9.4 Operational Phase Mitigation

Following the successful implementation of the mitigation measures presented in Sections 15.9.2 and 15.9.3, the operational phase of both LRD Phase 1 and 2 developments will not result in any predicted effects on the archaeological and cultural heritage resource that will require mitigation. The operational phase of the proposed LRD Phase 1 development will also not result in any predicted direct effects on other elements of the cultural heritage resource (including built heritage resources and historic landscape character) that will require mitigation.

The operational phase of the LRD Phase 2 development will have the potential to result in a permanent, direct, adverse, moderate effect on the former walled garden of Dunkettle House through the creation of a second access point from Dunkettle Road (L2998). However, the design and specification of this second access are currently being developed in consultation with Cork City Council officials and it does not form part of the LRD Phase 1 planning. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

15.10 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

15.10.1 Demolition Phase

The proposed LRD Phase 1 development requires the demolition of three ruinous structures that are not of cultural heritage significance; these will be recorded prior to demolition. No residual demolition phase effects on the cultural heritage resource will arise. The future LRD Phase 2 development may require localised interventions to the former walled garden. However, the design and specification of this second access are currently being developed in consultation with Cork City Council officials and it does not form part of the LRD Phase 1 planning. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

15.10.2 Construction Phase

The protective mitigation measures for Dunkettle House and its associated structures, as detailed in Section 15.9**,** will result in no predicted residual construction phase effects on these constraints during the LRD Phase 1 development. The other cultural heritage constraints within the surrounding study area, as identified in Section 15.6, are located within third-party properties where no construction works will occur and, therefore, no residual construction phase effects on those constraints will occur.

The future LRD Phase 2 development may require localised interventions to the former walled garden that would result in residual construction phase effects in this area. However, the design and specification of this second access are currently being developed in consultation with Cork City Council officials and it does not form part of the LRD Phase 1 planning. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

A programme of licensed archaeological monitoring of topsoil stripping works along the route of the amenity greenway and drainage outlets to the Glashaboy River will be carried out by a suitably qualified archaeologist during the construction phase. Preservation *in situ* of any identified features within these areas shall allow for a negligible magnitude of impact resulting in a potential not significant to imperceptible significance of effect in the context of residual impact on the archaeological resource. Preservation by record through archaeological excavation shall allow for a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This shall result in a potential slight to moderate range of significance of effect in the context of residual impacts on the unrecorded archaeological resource.

15.10.3 Operational Phase

While the operational phase of the proposed development will have the potential to result in permanent, indirect, residual adverse effects of a visual nature on Dunkettle House and its associated outbuildings, these effects are predicted to be low in magnitude and slight in significance. No residual operational phase effects on other cultural heritage constraints within the study area are predicted from the LRD Phase 1 development.

There is potential for permanent, direct, residual adverse on the former walled garden arising from the LRD Phase 2 development arising from the proposed second access. However, the design and specifications are currently being developed in consultation with Cork City Council officials and does not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

15.10.4 Summary of Post-mitigation Effects

The operation phase of the proposed Phase 1 and Phase 2 residential developments will have the potential to result in permanent, indirect, residual adverse effects of a visual nature on the setting of Dunkettle House and this indirect residual effect is predicted to be **negligible** in significance. The proposed second access envisaged for the LRD Phase 2 development has the potential to result in a permanent, indirect, adverse, low effect on the wider setting of Dunkettle House and its associated outbuildings. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

15.10.5 Cumulative Residual Effects

No potential cumulative residual effects on the cultural heritage resource are predicted.

15.11 Risk of Major Accidents or Disasters

No predicted risks of major accidents of disasters are predicted to arise from any potential adverse effects on the cultural heritage resource.

15.12 Worst Case Scenario

If the proposed development were to proceed without the implementation of the mitigation measures detailed in Section 15.9, then construction phase ground works will have the potential to result in direct adverse effects on any unrecorded, sub-surface archaeological remains that may exist along the route of the amenity greenway.

15.13 Interactions

The Landscape and Visual aspect of the environment assessed in this EIAR will have the potential to interact with the assessment of effects on the cultural heritage resource. The Landscape and Visual assessment detailed in Chapter 5 of the EIAR has been reviewed during the compilation of this assessment.

15.14 Monitoring

There are a number of obligatory processes to be undertaken as part of applications to the National Monuments Service for licences to carry out archaeological monitoring of ground works, and these will allow for monitoring of the successful implementation of mitigation measures. A revised method statement for any further archaeological excavations that may be required, dependant on the results of archaeological monitoring of ground works, will be submitted to the National Monuments Service and National Museum of Ireland. Reports on all completed archaeological site works will be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all works in written, mapped and photographic formats.

15.15 Summary of Mitigation and Monitoring

As noted in Section 15.4 and detailed in reports provided in Appendices 15.2 and 15.3, programmes of geophysical survey and archaeological test trench investigations within the greenfield areas of the proposed development site were completed as part of this assessment. Based on the results of these investigation, no additional archaeological mitigation measures are considered necessary within the principal development area.

While the location of Dunkettle House and its associated structures are located outside the boundary of the proposed LRD Phase 1 development, protective mitigation measures in relation to the exclusion of any activity at the locations of these constraints are detailed in Section 15.10.

A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. It is envisaged that the existing access from the L2998, which serves the applicants lands and private dwellings, and runs alongside the walled garden, will be upgraded to facilitate vehicular, pedestrian and cyclist movements. It is possible that localised negative impacts will arise on the walled garden and the immediate setting of Dunkettle House. However, the design and specifications are currently being developed in consultation with Cork City Council officials and does not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

15.16 Conclusion

There are no recorded archaeological sites located within the boundary of the proposed development site and the programmes of geophysical survey and archaeological test trenching carried out to inform this assessment revealed nothing of archaeological significance.

There are no designated architectural heritage structures located within the boundary of the proposed LRD Phase 1 development, and it is not located within, or adjacent to, an Architectural Conservation Area. In addition, no undesignated structures of architectural heritage significance are located within the proposed development site during the compilation of this assessment. Therefore, the operational phase of the proposed LRD Phase 1 development will result in a negligible effect on the wider setting of Dunkettle House and its associated outbuildings.

It is concluded that the proposed LRD Phase 1 development will not result in any predicted significant construction, operation or cumulative direct or indirect effects on the cultural heritage resource.

The proposed second access envisaged for the LRD Phase 2 development has the potential to result in a permanent, indirect, adverse, low effect on the wider setting of Dunkettle House and its associated outbuildings. The residential element of the LRD Phase 2 development will result in a negligible effect on the wider setting of Dunkettle House and its associated outbuildings.

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Dunkettle EIAR

Volume II

Main Statement

CHAPTER 16

Interactions of the Foregoing

November 2024

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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16 Interactions of the Foregoing

16.1 Introduction

The construction, operational and cumulative impacts of the proposed development have been assessed within each chapter of the EIAR. This chapter considers the significant interactions of impacts between each of the separate disciplines.

In practice many impacts have slight or subtle interactions with other disciplines. This chapter highlights in Table 16-1 (located at the end of this section) those interactions which are considered to potentially be of a significant nature. Discussions of the nature and effect of the impact is primarily undertaken within each of the relevant chapters, while this chapter identifies the most important potential interactions.

This chapter was prepared by Louise O'Leary of McCutcheon Halley Chartered Planning Consultants with input from the lead author of each assessment.

16.2 Population & Human Health

During the construction phase, the following interactions with Population and Human Health are noted:-

- **Landscape and Visual (Chapter 5):** Construction processes and plant such as cranes used during the construction phase may give rise to visual impacts.
- **Material Assets – Traffic and Transport (Chapter 6):** Increased construction traffic movements on the local road network during the construction phase may give rise to noise, dust, and road safety impacts.
- **Material Assets – Built Services (Chapter 7):** Excavation during the construction phase may give rise to risks to human health from contact with live electricity lines or damage to live gas pipelines.
- **Noise and Vibration (Chapter 12):** There is potential for effects on human health associated with noise during the construction phase which may impact upon amenity.

During the operational phase, the following interactions with Population and Human Health are noted:-

- **Landscape and Visual (Chapter 5):** The landscape plan will impact the quality of the private, communal and public open spaces, which could impact people's health and well-being.
- **Material Assets – Traffic and Transport (Chapter 6):** The proposed development's proximity to services, amenities, and high-quality public transport would interact with patterns of traffic and transport locally during the operational phase. Traffic flows within the site have the potential to create safety risks for pedestrians and cyclists.
- **Air Quality (Chapter 13):** Energy efficient design within the proposed development may give rise to reduced electricity consumption by future residents, potentially decreasing dependence on fossil fuels for energy generation, resulting in improved air quality. There is

potential for impact on human health from a deterioration in air quality associated with emissions from vehicles.

- **Climate (Chapter 14):** Energy efficient design within the proposed development may give rise to reduced electricity consumption by future residents, potentially decreasing dependence on fossil fuels for energy generation, resulting in significant CO_2 savings.

16.3 Landscape & Visual

During the construction phase, the following aspects have potential to interact with landscape and visual:

- **Biodiversity (Chapter 11):** Existing trees are proposed to be removed to facilitate the construction of the proposed development at Dunkettle. This impacts on flora and fauna supported by this vegetation and the biodiversity value of the agricultural field areas of the site as existing.
- **Land & Soils (Chapter 9):** There are some significant recontouring works required to achieve the proposed development. This cut and fill is proposed to be absorbed into the site layout using retaining structures within duplex and apartment structures. Where road works require general regrading of slopes these are proposed to be planted with new woodland.

During the operational phase, the following aspects have potential to interact with landscape and visual:

- **Biodiversity (Chapter 11):** The proposed management of existing woodland solely for conservation will see an overall improvement in biodiversity value especially along the Glashaboy Estuary Shoreline. Conservation management of the historic parkland area and trees on the south side of the proposed residential development will see an enhancement of existing biodiversity in that area of the Dunkettle lands. Proposed new woodland, street and open space tree planting across the development site with native species will also contribute further enhancement to biodiversity as it matures.
- **Air Quality and Climate (Chapters 13+14):** Proposed new woodland, street, and open space tree planting across the development site with native species will also contribute to the improvement in air quality and provide further shelter and enhancement of existing microclimate areas within the existing envelope of existing woodland surrounding the site.
- **Cultural Heritage (Chapter 15):** The proposed new residential area is proposed within an envelope of existing woodland, and this separates it from the existing historic Dunkettle House, walled gardens and parkland landscape. There may be some interaction of the area to the northeast of the house where an access to the southern end of the residential development area is proposed.

16.4 Material Assets: Traffic & Transport

During the construction phase, the following aspects have potential to interact with traffic and transport:

- **Population & Human Health (Chapter 4):** The following construction phase activities may result in an impact on population and human health:
    - HGV's interacting with normal traffic, both vehicular and pedestrian;
    - Emergency access routes to the site restricted by construction traffic;
    - Spillage of hazardous material in the public realm.
- **Land & Soils (Chapter 9):** The following activities may result in an impact on Land & soils:
    - Construction based traffic contaminating the Local Roads Network resulting in slippery surfaces;
    - HGV traffic resulting in dust emissions;
    - Spillage of hazardous material in the public realm;
- **Water & Hydrology (Chapter 10):** The following activities may result in an impact:
    - Spillage of hazardous material in the public realm;
- **Biodiversity (Chapter 11):** The following activities may result in an impact:
    - Spillage of hazardous material in the public realm;

During the operational phase, the following aspects have potential to interact with traffic and transport:

- **Population & Human Health (Chapter 4):** The following activities may result in an impact on population and human health:
    - Increase in traffic volumes on the local roads network;
    - Queues and delay leading to driver frustration;
    - Potential for interaction between cyclists/pedestrians on the proposed greenway through the site.
- **Land & Soils (Chapter 9):** The following activities may result in an impact on Land & soils:
    - Spillage of carbon-based fuels from development-based traffic into the environment.
- **Water & Hydrology (Chapter 10):** The following activities may result in an impact:
    - Spillage of carbon-based fuels from development-based traffic into the environment.
- **Biodiversity (Chapter 11):** The following activities may result in an impact:
    - Spillage of carbon-based fuels from development-based traffic into the environment;
- **Air Quality (Chapter 13) and Climate (Chapter 14):** The following activities may result in an impact:
    - 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. Also, with increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase.

16.5 Material Assets: Built Services

During the construction phase, the following aspects have potential to interact with built services:

- **Population & Human Health (Chapter 4):** The following activities may result in an impact on population and human health:

    - Uncontrolled release of surface water resulting overland flows of surface water, flooding, disruption and risk to health and safety;
    - Blockage of existing surface water drainage systems resulting in overflowing of existing drainage systems, overland flows and flooding, disruption and risk to health and safety;
    - Uncontrolled release of wastewater resulting in overland flows, flooding, disruption and risk to health and safety;
    - Blockage or breakage of existing wastewater drainage systems resulting in blockage of existing drainage systems, overland flows and flooding, disruption and risk to health and safety.
    - Disruption to existing electrical supply services causing
- **Land & Soils (Chapter 9):** The following activities may result in an impact on Land & soils:
    - Trench excavations for service installation resulting in exposure of subsoils and bedrock to potential erosion and subsequent sediment generation and movement, including entrainment in surface water and dust emissions.
- **Water & Hydrology (Chapter 10):** The following activities may result in an impact:
    - Uncontrolled discharges of surface water to existing watercourses causing flooding;
    - Surface water discharge to existing watercourses containing sediments, concrete, construction detritus, hydrocarbons, construction chemicals.
- **Biodiversity (Chapter 11):** The following activities may result in an impact:
    - Discharge to watercourses of surface water containing sediments, concrete, construction detritus, hydrocarbons, construction chemicals.

During the operational phase, the following aspects have potential to interact with built services:

- **Population & Human Health (Chapter 4):** The following activities may result in an impact on population and human health:
    - Blockage of surface water drainage systems resulting in overflowing of existing drainage systems, overland flows and flooding, disruption and risk to health and safety;
    - Blockage or breakage of wastewater drainage systems resulting in blockage of existing drainage systems, overland flows and flooding, disruption and risk to health and safety;
    - Interruption of existing electrical supply services causing electrical supply outages to premises and consequent disruption and risk to health and safety.
- **Land & Soils (Chapter 9):** The following activities may result in an impact on Land & soils
    - Ground opening activities for maintenance of services resulting in exposure of sub subsoils and bedrock to potential erosion and subsequent sediment generation and movement, including entrainment in surface water and dust emissions.
- **Water & Hydrology (Chapter 10):** The following activities may result in an impact:
    - Incorrect disposal of liquids and chemicals resulting in discharges to the surface water drainage system and ultimately to existing watercourses.
- **Biodiversity (Chapter 11):** The following activities may result in an impact:
    - Incorrect disposal of liquids and chemicals resulting in discharges to the surface water drainage system and ultimately to existing watercourses.

16.6 Material Assets: Waste

During both the construction and operational phases, the following aspects have potential to interact with Waste:

- **Population & Human Health (Chapter 4):** The improper removal, handling and storage of hazardous waste could negatively impact on the health of construction workers.
- **Biodiversity (Chapter 11):** The improper handling and storage of waste during the Construction and Operational Phases could negatively impact on biodiversity.
- **Land & Soils (Chapter 9):** Improper handling and segregation of hazardous or contaminated wastes could lead to the contamination of soil and stones excavated from the Site.
- **Material Assets: Traffic & Transport (Chapter 6):** The proposed development will require the removal of excavated soil and transportation to appropriate waste facilities during the construction phase. This has the potential to negatively affect the surrounding road network.

16.7 Land & Soils

During the construction phase, the main interaction of the land/soil (geology) attribute is on Traffic & Transport (Chapter 6) and Waste (Chapter 8) as unsuitable subsoil and bedrock is removed from site and required aggregate material is brought to site. Potentially there could be interactions with Air Quality (Chapter 13) from dust generation and/or Water & Hydrology (Chapter 10) with sediment runoff.

16.8 Water & Hydrology

During the construction phase, the main interaction of the water attribute is with Chapter 9 Land & Soils (Geology) due to the cut & fill earth work activities that could produce sediment runoff. Interactions with the groundwater attribute is not anticipated.

16.9 Biodiversity

During the construction and operational phases, the main interactions for biodiversity are:-

- Landscape & visual (Chapter 5)
- Material Assets: Built Services (Chapter 7)
- Material Assets: Waste (Chapter 8)
- Land & Soils (Chapter 9)
- Water & Hydrology (Chapter 10)

There are no interactions foreseen which could pose a risk due to accumulation of multiple non-significant effects resulting from the Proposed Development of Phase 1 or subsequent phases of the lands within the EIAR study area.

16.10 Noise & Vibration

During the construction and operational phases, interactions between noise and vibration and other specialist chapters in the EIAR is primarily linked to Chapter 4 (Population & Human Health), Chapter 11 (Biodiversity) and Chapter 6 (Traffic & Transportation). 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. The traffic flow projections associated with the development provided by the traffic consultants in Chapter 6 (Traffic & Transportation) has been utilised in the construction and operational noise calculations in this Chapter of the EIAR report.

16.11 Air Quality

During the construction phase, the following aspects have potential to interact with air quality:

- **Population & Human Health (Chapter 4):** An adverse air quality impact during the construction phase can cause health and dust nuisance issues. 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 ***medium-term, negative*** and ***imperceptible*** with respect to Population and Human Health during the construction phase, which is overall ***not significant*** in EIA terms
- **Climate (Chapter 14):** Air quality and climate have interactions as the emissions from the burning of fossil fuels during the construction phase 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 and Hydrogeology (Chapter 9):** Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land, soils and hydrogeology 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 (Chapter 11):** 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 two designated ecological sites within 250m 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 13.9.1. With the implementation of these mitigation measures dust emissions will be minimised and impacts will be ***medium-term, negative and imperceptible*** with respect to biodiversity, which is overall ***not significant*** in EIA terms. Effects on Biodiversity are considered by the project ecologist in Chapter 11 of this EIAR.
- **Material Assets – Traffic & Transport (Chapter 6)**: 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 considered to be ***medium-term, direct, negative*** and ***imperceptible*** during the construction phase.

During the operational phase, the following aspects have potential to interact with air quality:

- **Population & Human Health (Chapter 4):** 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 ***imperceptible***, which is overall ***not significant*** in EIA terms.
- **Climate (Chapter 14):** Air Quality and climate have interactions as the emissions from the burning of fossil fuels during the operational phase 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.
- **Biodiversity (Chapter 11):** There are interactions between air quality and biodiversity during the operational phase. There are two designated ecological sites within 250m of the proposed development site area. Emissions generate by operational traffic have the potential to impact ecological receptors. An assessment of the air quality impacts on ecological receptors as a result of the change in annual average daily traffic on roads close to the site was conducted. The impact of the interactions between air quality and biodiversity are considered to be ***direct, long-term, negative*** and ***slight*** during the operational phase, which is overall ***not significant*** in EIA terms
- **Material Assets – Traffic & Transport (Chapter 6)**: The impact of the interactions between traffic and air quality are considered ***long-term, direct, negative, localised, slight to moderate*** but overall ***not significant*** during the operational phase.

16.12 Climate

During the construction and operational phases, the following aspects have potential to interact with climate:

- **Land & Soils (Chapter 9) and Water & Hydrology (Chapter 10):** 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 (Chapter 9) and Water & Hydrology (Chapter 10) 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.
- **Air Quality (Chapter 13):** 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.

- **Material Assets: Traffic and Transportation (Chapter 6):** 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 air quality 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.
- **Material Assets: Waste (Chapter 8)**: 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.

16.13 Cultural Heritage

During the operational phases, the following aspects have potential to interact with cultural heritage:

- Landscape & Visual (Chapter 5): The Landscape and Visual aspect of the environment assessed in this EIAR will have the potential to interact with the assessment of effects on the cultural heritage resource. The Landscape and Visual assessment detailed in Chapter 5 of the EIAR has been reviewed during the compilation of this assessment.

16.14 Conclusion

Table 16-1 Interactions with Potential for Significant Impacts Before the Implementation of Mitigation Measures

	Pop. & H. Health		L.scape & Visual		Traffic & Transport		Built Services		Waste		Land & Soils		Water & Hydrol.		Bio-Diversity		Noise & Vibration		Air Quality		Climate		Cultural Heritage	
Interaction	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Population & Human Health			✓	✓	✓	✓	✓										✓			✓		✓		
Landscape & Visual											✓				✓	✓				✓		✓		✓
MA: Traffic & Transport	✓	✓									✓	✓	✓	✓	✓	✓				✓		✓		
MA: Built Services	✓	✓									✓	✓	✓	✓	✓	✓								
MA: Waste	✓				✓						✓				✓	✓								
Land & Soils					✓				✓				✓						✓					
Water & Hydrology											✓													
Biodiversity			✓	✓			✓	✓	✓	✓	✓	✓	✓	✓										
Noise & Vibration	✓				✓	✓									✓	✓								
Air Quality	✓	✓			✓	✓					✓				✓	✓					✓	✓		
Climate						✓			✓	✓		✓		✓					✓	✓				
Cultural Heritage				✓																				

Con. - Construction Phase | Op. - Operational Phase | ✓ - Potential Significant Interaction |

Dunkettle EIAR

Volume II

Main Statement

CHAPTER 17

Summary of Mitigation Measures

November 2024

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CHARTERED PLANNING CONSULTANTS

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17 Summary of Proposed Mitigation and Monitoring Measures

17.1 Introduction

Article 5(1) of the EIA Directive sets out what the developer has to include as a minimum in the EIA Report including mitigation or compensation measures: measures to avoid, prevent or reduce, and offset any identified adverse effects on the environment shall be provided by the developer (Article 5(1)(c) and Annex IV.7).

This chapter summarises the mitigation measures proposed for the construction and operational stage of the proposed development as set out in the preceding assessments contained in Chapters 4 to 17.

All mitigation measures are deemed adopted for the purpose of the Construction Environmental Management Plan (CEMP), prepared by JODA Engineering Consultants that accompanies this application for permission.

17.2 Incorporated Design Mitigation Measures

The measures outlined in Table 17-1 have been incorporated into the design of the proposed development for the Demolition & Construction and Operational Stage, as appropriate.

Table 17-1 Incorporated Design Mitigation

Aspect	Mitigation
Population & Human Health	▪ The proposed development complies with the Building Regulations, to safeguard users of the buildings and the health of occupants. ▪ The proposed development complies with the requirements of Part M of the Building Regulations and incorporates the principles of universal design so that the development will be readily accessible to all, regardless of age, ability, or disability. ▪ The proposed design provides for a highly accessible layout across the scheme including segregated pedestrian and cyclist entrances strategically located proximate to Glanmire Village in the north and the Glanmire to City Centre Cycle Route and Carrigtwohill to Midleton Inter-urban Cycle Route to the south, via the new greenway through the site. This will encourage sustainable modes of outdoor access for a wide age group. ▪ The integration of energy efficient measures into the design will provide for healthier living standards for future occupants, less dependence on fossil fuels and associated improved air quality. ▪ The preservation and management of the woodland areas, and the availability of on-the-doorstep public open spaces and amenity areas will provide a high-quality environment for the residents and will encourage sustainable modes of outdoor access for a wide age group
Landscape & Visual	▪ From the outset of the design process, site assessment and analysis has been undertaken to identify significant effects. Responding to those with the integration of mitigation measures addressing those potential Negative Visual and landscape impacts.

Table 17-1 Incorporated Design Mitigation

Aspect	Mitigation
	▪ Cork City Council's zonings on the Dunkettle lands mitigate by avoidance restricting the proposed residential development to within the agricultural field areas of the site. In the Cork City Development Plan 2022-2028, the objective is to preserve the existing heritage, green and blue biodiversity assets. This gives protection to existing pNHA designated Woodland, the Historic Dunkettle House complex and the Parkland. ▪ The residential development will have interactions with the pNHA woodlands, the estuary with its SPA designation and an area of the parkland. Mitigation by avoidance is provided with the site layout stepped back from the woodland edge. ▪ In LRD Phase 1 a greenway for pedestrians and cyclists is proposed along the west side of the site (within the western portion of the historic demesne of Dunkettle House) will not give rise to negative impacts on historic landscape quality or the integrity of the setting of Dunkettle House, a protected structure. This pushes the development back from the estuary and the woodland and this reduces the potential Negative Impact on the estuary and woodland avoiding diminishing its conservation status post development. ▪ Dwellings in all cases front on to the woodland area and this creates a buffer space. ▪ Within the residential zoned area mitigation by avoidance is proposed with the retention of existing mature tree lines where possible. ▪ Prevention mitigation strategies include the proposed exclusion of future residents from the pNHA woodland areas and thus keeping the eastern shore of the estuary a quiet zone. This will prevent the degradation of the conservation status of the PNHA and SPA areas. ▪ The scale of the buildings proposed has been carefully considered in terms of design and location so that this large-scale residential development into the existing landscape with minimum exposure from external viewpoints. ▪ Strategies to reduce Negative Impact include the minimisation of tree and hedgerow removal from the site. These are retained in most areas apart from the northern Phase I area of the development. This is achieved by designing one main route through the development that connects from north to south through each field area. The road network within each of the field areas connects to this through route with the mass of housing reduced to a series of pockets of development within the mature tree lines and woodland. ▪ Negative Impact is reduced through the decision to retain the existing 'Woodville' oak woodland on site which is on an area zoned residential. ▪ Proposing bat friendly lighting along the greenway on the woodland edge is also an important mitigation measure as the woodlands are an important commuting and foraging corridor for bats. ▪ The reduction in lighting intensity along the woodland edge will in turn minimise light pollution in the estuarine area and make the presence of the residential development less intrusive at night from the western shore of the estuary. ▪ There are two intrusions in the pNHA woodlands to provide for stormwater outfalls to the estuary; In the north the outfall follows the route of the historic walk path. The wayleave is 4 metres wide, and the path is narrow on steep terrain. It does require some loss of trees and disruption. In the south the route is taken where overhead lines already cross over the woodland, the position of the outfall requires the removal of diseased and dead elm and ash trees. Some woodland trees are to be removed

Table 17-1 Incorporated Design Mitigation

Aspect	Mitigation
	in the northwest corner of the site to accommodate a stormwater attenuation pond. Mitigation measures to offset these identified Negative Impacts include the proposal to place the woodland areas into management with the sole objective of conservation. This will be done within the structure and guidance of the Native Woodland Conservation Scheme. The woodland areas are to be managed to ensure their conservation status is maintained and improved. The buffer zone along the woodland is to be planted with appropriate woodland edge vegetation to increase it biodiversity value. ▪ The open space areas across the development (phase I & II) will feature native Irish Oaks integrating the woodland ambience into the development. Where earth remodelling works are undertaken to provide vehicular access from the Dunkettle Road in the north of the site, the regraded hillside will be planted under the Native Woodland Conservation Scheme, and this will compensate for the loss of existing tree lines by extending the 'Woodville' woodland and connecting it with the trees retained near to the Dunkettle Road. Extensive street tree planting will also occur across all phases of the development.
Material Assets: **Traffic & Transport**	None
Material Assets: **Built Services**	▪ The surface water drainage services, wastewater drainage services and water supply services for the development includes measures to mitigate by design.
Material Assets: **Waste**	▪ Buildings have been designed with material efficiency in mind. This involves reducing the amount of materials used in the building fabric and minimising the waste during construction; ▪ Opportunities to achieve on-site and off-site reuse and recycling of waste have been identified;
Land & Soils	▪ The design seeks to mitigate potential negative effects with all new-build infrastructure to be designed in accordance with the Technical Guidance Documents of the Building Regulations and associated codes of practice, which require due cognisance of the receiving environment. ▪ Design depths of proposed infrastructure are to be optimised so that excessive excavations are avoided where possible, and by association a reduction in resultant waste and machinery operation time ▪ Any deep excavations will be designed in such a way as to be supported both during the construction and operational phases of the site development. ▪ The site layout design has kept the extent and depth of retaining walls and supporting structures to a minimum.
Water & Hydrology	▪ All new-build service infrastructure is to be designed in accordance with the relevant service provider and asset owner's code of practice, which require due cognisance of the receiving environment. In particular design, choice and standard of materials for buried pipe work and interceptors shall be adequate for operating successfully without effecting the local environment for the long term. ▪ The design seeks to mitigate potential negative effects with all new-build infrastructure to be designed in accordance with the Technical Guidance Documents of the Building Regulations and associated codes of practice, which require due cognisance of the receiving environment.

Table 17-1 Incorporated Design Mitigation

Aspect	Mitigation
	▪ Design depths of proposed infrastructure are to be optimised so that excessive excavations are avoided and by association a reduction in potential waste material, machinery operation time and associated risks. ▪ The proposed development will be provided with a surface water management system that is designed in accordance with the principles of Sustainable Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). ▪ The proposed surface water network for the development is arranged into individual systems that match the natural catchments of the site. Each system will operate independently of each other. ▪ The proposed surface water networks includes a train of SuDS features which collectively provide for interception, treatment and conveyance of surface water, including nature-based features, which will aid the reduction of runoff volumes by slowing surface water flows, both providing the opportunity for evapotranspiration and rainwater storage. Interception storage requirements of GDSDS will be sufficiently met through the provision of SuDS features. Discharges to existing drainage systems is controlled as necessary to ensure adequate flood protection. ▪ The SuDS features incorporated into the site scheme were chosen following an assessment using the guidance provided in the following documents: - SuDS Manual, CIRIA 753; - Nature-based Solutions to the Management of Rainwater and Surface Water Run-off In Urban Areas, Dept of Housing, Local Government and Heritage. ▪ SuDS features suitable for the site layout and site constraints have been identified and incorporated into the proposed surface water drainage scheme. Surface water drainage has been designed to, where necessary, mimic the site run-off characteristics with storm water run-off passing through the necessary treatment systems to prevent pollution. The design of the residential heating systems shall exclude the use of potentially polluting kerosene or fuel oils.
Biodiversity	The Proposed Development includes several embedded design features that may act to avoid or mitigate negative impacts that would likely occur in the absence of these features. However, as opposed to typical mitigation measures, the implementation of these features is integral to the design and completion of the Proposed Development, and as such the impact assessments are performed with consideration of these features as integrated parts of the Proposed Development. All considered embedded design features that may act to mitigate negative impacts on local ecology and environment are listed in Table 11-22 and include SUDS, Landscape Design and Lighting Design measures. Biodiversity Enhancement by Design The landscape plan incorporates native planting throughout the green spaces of the Proposed Development including the addition of native species on the periphery of the existing woodlands and the creation of a new woodland area to the east, connecting the eastern section of the Site to the riparian woodland and hedgerows already present (DMNA 2024). Additionally, as part of SuDS measures, an attenuation pond will be located to the north, close to the edge of the Glanmire Wood pNHA, eventually outfalling into the Glashaboy Estuary post settlement and treatment.

Table 17-1 Incorporated Design Mitigation

Aspect	Mitigation
	The planting of native shrubs in the ground layer will provide cover and nesting opportunities for birds and small mammals. While the mixed planting of wildflowers, hedgerow, scrub, fruit trees and wildflower meadow will attract insects which act as food sources for the above species groups and pollinator species. The above measures are considered good for promoting pollinators and are considered to provide an overall enhancement of the biodiversity at the Site from the baseline due to the low value and extent of habitats that are to be lost to facilitate the Proposed Development. The following enhancement measures are also recommended: ▪ Enhancement 1: Amphibian and Reptile Hibernacula ▪ Enhancement 2: Bird Box/ Swift Brick Scheme ▪ Enhancement 3: Bat Box Scheme ▪ Enhancement 4: Wildflower Meadows ▪ Enhancement 5: Native Planting ▪ Enhancement 6: Insect Hotels ▪ Enhancement 7: Log Piles for Invertebrates and Fauna ▪ Enhancement 8: Low Intervention Hedgerow/ Treeline Management
Noise & Vibration	None
Air Quality	None
Climate	None
Cultural Heritage	▪ The design of the proposed development was informed by the desktop studies and site investigations carried out as part of this assessment and this included design inputs by the architectural heritage specialist in relation to the formulation of development proposals within the environs of Dunkettle House and its associated outbuildings.

17.3 Mitigation Measures

The recommended mitigation measures for the Demolition & Construction and Operational Stages are summarised in Tables 17-2 and 17-3 below.

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
Population & Human Health	▪ The appointed contractor(s) will update the CEMP submitted with the application after development consent is received, incorporating the environmental mitigation and monitoring measures included in this EIAR and relevant measures attached to a grant of permission. - The CEMP will comply with all appropriate legal and best practice guidance for construction sites. - The purpose of a CEMP is to provide a mechanism for the implementation of the various mitigation measures which are described in this EIAR and to incorporate relevant conditions attached to a grant of permission. The CEMP requires that these measures will be checked, maintained to ensure adequate environmental protection. The CEMP also requires that records will be kept and reviewed as required to by the project team and that the records will be available on site for review by the planning authority. - All mitigation and monitoring measures included in the Summary of Mitigation and Monitoring Measures in Chapter 17 of this EIAR will be included in the CEMP and adhered to. - The CEMP will be submitted to the Planning Authority prior to the commencement of development. ▪ The Resource Waste Management Plan (RWMP) will be updated by the Main contractor(s) and implemented after development consent is received, incorporating the environmental mitigation and monitoring measures included in this EIAR and relevant measures attached to a grant of permission. ▪ All construction personnel will be required to understand and implement the requirements of the CEMP and RWMP and shall be required to comply with all legal requirements and best practice guidance for construction sites. ▪ Project supervisors for the construction phase will be appointed in accordance with the Health, Safety and Welfare at Work (Construction) Regulations 2021 (as amended), and a Preliminary Health and Safety Plan will be formulated during the detailed design stage which will address health and safety issues from the design stages, through to the completion of the construction phases. ▪ The *Construction Environmental Management Plan (CEMP)* and a *Resource and Waste Management Plan (RWMP)* will be live documents and will be updated in future for the LRD Phase 2 development, and Dunkettle House if relevant, and will accompany a future application for those lands. The same principles will apply. ▪ The contractor will appoint a community liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the contractor's CEMP.

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	▪ Construction Working Hours will generally be limited to the hours 7am – 6pm Monday to Friday and 8am to 2pm on Saturday. Works proposed outside of these periods will be agreed with the Local Authority in advance. In order to mitigate any impact of construction activities, the following measures are proposed: - Coordination of deliveries to site within working hours, - Scheduling of noisier activities early in the working day, - Noise and vibration mitigation measures will be implemented in line with Chapter 12. - The delivery of materials to the site during the construction phase shall be organised so that deliveries are minimised and do not cause traffic hazards. - Deliveries are not permitted at peak traffic times (8:00am to 9:00am and 5:00pm to 6:00pm) and - all construction vehicles are parked within the site. Note: Mitigation measures relating to those factors under human health which are relevant under other environmental factors, are included in the relevant chapters of this EIAR.
Landscape & Visual	▪ During the construction phase mitigation will be in place with the provision of tree protection fencing to all woodland areas and to treelines proposed for retention. The Parkland and Heritage assets in the southern area of the site are similarly to be excluded from any construction activity using secure protection fencing. ▪ The commencement of woodland management under the Native Woodland Conservation Scheme should begin in tandem or before the construction of the development. ▪ Where possible proposed tree planting should be undertaken as early as possible in the construction phase to allow for the vegetation to develop in advance of the construction and occupation of dwellings. ▪ When the proposed southern access road is under construction, extra care will need to be taken in the vicinity of the Walled Garden and the landscape areas closer to the parkland. The Construction Management Plan will include a specific section on works to / in the vicinity of the walled garden and other protected structures on site. This will be written in consultation with the project conservation architect. ▪ Works to road frontage areas on the Dunkettle Road should be undertaken at an early stage in the appropriate phase to minimise Negative Impact. ▪ Site hoarding, where natural screening is not available, will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. ▪ All required tree protection fencing is to be erected as planned for each phase of the development and is to be kept in place and regularly inspected throughout the construction phase of the development. ▪ Where construction work to provide for outfalls to the Glashaboy Estuary shoreline are proposed within woodland areas these works are to be supervised by the ecologist and forester appointed under the Native Woodland Conservation Scheme. Once in place the woodland areas concerned are to be secured from any further

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	construction activity with secured gate access provided for maintenance access only. ▪ A freshwater ecologist is to periodically monitor the operation of the SUDs features on site; swales and attenuation pond to maximise their habitat value.
Material Assets: **Traffic & Transport**	▪ A Construction Environmental Management Plan coupled with a Construction Stage Traffic Management Plan has been developed by the appointed engineers for the scheme. These plans seek to minimise the number of materials imported and exported from site as well as minimising construction stage traffic. These plans are to be updated by the appointed Main contractor(s). ▪ The Contractor's Construction Traffic Management Plan will identify suitable routes to accommodate HGV traffic and will include specific times of operation. These times will ideally avoid peak hour traffic times as identified in this assessment. ▪ An on-site wheel wash facility will ensure no site material is brought on to the public roads network
Material Assets: **Built Services**	General ▪ Works shall be performed in accordance with Statutory requirements, including Health, Safety and Welfare at Work (Construction) Regulations 2013 (S.I. no. 291 of 2013). ▪ The works shall be supervised by suitable competent personnel responsible for delivery of the built services as per the permitted development. ▪ Works in existing roads shall be performed in accordance with *Guidelines for Managing Openings in Public Road*, Dept of Transport Tourism and Sport, Second Edition (Rev 1), April 2017. ▪ Works in existing public roads and pedestrian paths shall be performed in accordance with Cork City Council requirements for the management and control of roadworks in Cork city. ▪ The Construction Environmental Management Plan (CEMP) prepared to accompany the planning application shall be updated with any and all additional requirements included in a Grant of Permission from the Planning Authority and shall be adopted and executed with updating as necessary to reflect changes in the construction phase. ▪ The Resource and Waste Management Plan (RWMP) prepared to accompany the planning application shall be updated with all additional requirements included in a Grant of Permission from the Planning Authority and shall be adopted and executed with updating as necessary to reflect changes in the construction phase. ▪ The locations of all existing on-site services (underground and overhead) shall be confirmed prior to the commencement of works and suitable protection measures put in place to minimise the risk of damage to existing services. ▪ The precise routing of electricity and telecommunications infrastructure on the site are to be agreed with the relevant service providers prior to the commencement of on-site works. ▪ Consultation with the relevant services providers shall be undertaken in advance of works. This will ensure all works are carried out to the relevant standards and ensure safe working practices are implemented. ▪ All reasonable precautions shall be taken to avoid unplanned disruptions to any services / utilities during the proposed works.

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	▪ There will be an interface established between the contractor(s) and the relevant utilities service providers / authorities during the construction phase of the proposed development. This interface will be managed in order to ensure a smooth construction schedule with no / minimal disruption to the local community. In addition to the General Mitigation Measures listed above, the following measures shall be implemented: - Surface Water Drainage Services ▪ A quality management plan shall be created and implemented to ensure that the works are executed to deliver the permitted surface water drainage system free of significant defects. Waste Water Drainage Services ▪ Uisce Éireann shall be consulted prior to commencement of works. ▪ Existing wastewater drainage infrastructure shall be protected in accordance with Uisce Éireann requirements. ▪ Wastewater drainage services to be adopted by Uisce Éireann shall be constructed in accordance as per the permitted development and in accordance with the following: - *Code of Practice for Wastewater Infrastructure, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 2); - *Wastewater Infrastructure Standard Details, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 2) - *Quality Assurance (QA) Field Inspection Requirements Manual, Connections and Developer Services (A Guide for Self-Lay Developers)*, Uisce Éireann, August 2020 (Revision 3) ▪ In respect of wastewater drainage services not to be adopted by Uisce Éireann, including temporary wastewater drainage, a quality management plan shall be created and implemented to ensure that the works are executed to provide a suitable wastewater drainage system free of significant defects and in accordance with the recommendations of Building Regulations Technical Guidance Document H – *Drainage and Waste Water disposal* (published 2010, re-printed 2016) Water Supply Services ▪ Uisce Éireann shall be consulted prior to commencement of works ▪ Existing water supply infrastructure shall be protected in accordance with Uisce Éireann requirements. ▪ Water supply services to be adopted by Uisce Éireann shall be constructed in accordance as per the permitted development and in accordance with the following: - *Code of Practice for Water Infrastructure, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 2); - *Water Infrastructure Standard Details, Connections and Developer Services, Design and Construction Requirements for Self-Lay Developments*, Uisce Éireann, July 2020 (Revision 4)

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	- *Quality Assurance (QA) Field Inspection Requirements Manual, Connections and Developer Services (A Guide for Self-Lay Developers)*, Uisce Éireann, August 2020 (Revision 3) ▪ In respect of water supply services not to be adopted by Uisce Éireann, including temporary water supply, a quality management plan shall be created and implemented to ensure that the works are executed to provide a suitable water supply system free of significant defects and in accordance with the recommendations of Building Regulations Technical Guidance Document G – *Hygiene* (published 2008, Reprinted July 2011) Electrical Supply Services ▪ ESB Networks will be consulted prior to commencement of the works ▪ A quality management plan shall be created and implemented to ensure that the works are executed to deliver the permitted Electrical Supply System free of significant defects. Telecommunications services ▪ Openeir will be consulted prior to commencement of the works ▪ A quality management plan shall be created and implemented to ensure that the works are executed to deliver the permitted Telecommunications Supply System free of significant defects.
Material Assets: Waste	▪ Dedicated, secure waste segregation areas have been selected for the duration of the enabling works. The dedicated waste storage areas within the waste segregation points will house all bins and skips for the storage of segregated construction waste generated. All containers will be marked with clear signage which will identify which waste types are to be placed into each container. ▪ Waste materials will be separated at source and will follow the Resource and Waste Management Plan (RWMP) and Construction Environmental Management Plan (CEMP); ▪ Prior to the commencement of the Construction Phase detailed calculations of the quantities of topsoil, subsoil and green waste will be prepared, and soils will be tested to confirm they are clean, inert or non-hazardous; ▪ A policy of 'as needed' ordering and strict purchasing procedures will be implemented to prevent waste arisings as far as possible; ▪ The Contractor will vet the source of aggregate, fill material and topsoil imported to the site in order to ensure that it is of a reputable origin and that it is "clean" (i.e., it will not contaminate the environment). ▪ The Contractor and/or Council will implement procurement procedures to ensure that aggregate, fill material and topsoil are acquired from reputable sources with suitable environmental management systems as well as regulatory and legal compliance; ▪ The waste materials generated during the Construction Phase will be stored in suitably size receptables and transferred offsite for appropriate processing, recycling and recovery; ▪ Waste materials generated from the Construction Phase that are unsuitable for reuse or recovery will be separately collected; ▪ Disposal of construction generated wastes will be considered a last resort and only after recycling or recovery options have been ruled out; ▪ A suitably competent and fully permitted waste management company will be employed to manage waste arising for the Construction Phase. The appointed waste

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	contractor must have the relevant authorisations for the collection and transport of waste materials, issued by the National Waste Collection Permit Office (NWCPO); ▪ All waste materials will be transported to an appropriately authorised facility, which must have the relevant authorisations for the acceptance and treatment of the specific waste streams, i.e., a Certificate of Registration (COR) or a Waste Facility Permit (WFP) as granted by a Local Authority, or a Waste/Industrial Emission Licence as granted by the Environmental Protection Agency; ▪ It is not envisaged that there will be any hazardous waste generated throughout the construction works however, in the event that hazardous soil, or historically deposited waste is encountered during the site bulk excavation phase, the contractor will notify Cork City Council and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s). Only authorised facilities will be used and as a result of this, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures; ▪ Waste generated by construction workers will be stored in wheelie bins on site and it will be collected by an appropriately authorised waste collector. ▪ All wastes generated on site will be sent for recycling, recovery, or disposal to a suitably licensed or permitted waste facility; ▪ All waste quantities and types will be recorded and quantified, and records will be retained onsite for the duration of the Construction Phase. ▪ The Contractor will have the responsibility to record resource and waste management at the site in line with the Resource and Waste Management Plan (RWMP). Some of the principal duties and responsibilities of this role include: - Report to Project Manager on the management of resources and waste at the site; - Identify all destinations for resources taken off-site; - Address end-of-waste and by-product notifications with the EPA, where applicable; - Maintain full records of all resources (both wastes and other resources) for the duration of the project; - Delegate responsibility to sub-contractors, where necessary; - Coordinate with suppliers, service providers and sub-contractors; and - Prioritise waste prevention and resource salvage. ▪ In terms of invasive species, an IAS Specialist will be contracted to treat and eradicate the Travellers Joy and Sycamore on site per TII Technical Guidance on ‘Management of Invasive Plant Species on National Roads’ published in December 2020. The following measures will be adhered to, to avoid the introduction or dissemination of invasive species to and from the site. - For the construction phase, the contractor will prepare a project specific Invasive Alien Plant Species (IAPS) standard operating procedure document, in advance of work commencement. The document should be prepared by an IAPS specialist and should cover the bio-security measures to be taken, including the maintenance of records, to screen for the introduction of IAPS

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	on-site, and to enable their tracing if such an introduction occurs; and to ensure no transmission of IAPS offsite. The measures include: o Validation that all machinery / vehicles are free of IAPS, prior to their first introduction to site; o Certification from the suppliers that all imported soils and other fill/landscaping materials are free of IAPS; o A regular schedule of site inspections across the IAPS growing seasons, for the duration of the construction works programme; o Validation that all machinery / vehicles are free of IAPS, prior to leaving the site; and o Appropriate and effective site biosecurity hygiene to ensure that no IAPS are transmitted off-site for the duration of the proposed works.
Land & Soils	▪ The planning, timing and scheduling of the earth works across the site is important in limiting, as far as possible, the extent of ground being worked, as reducing the surface area of exposed soil will reduce the potential for the generation of dust and or sediment runoff. ▪ Control of Soil Excavation and Export from Site using the reduce, reuse and recycle approach with any excavation arisings to be reused on site where possible with the implementation of an appropriate earthworks handling protocol to be used, as per the sites CEMP. ▪ The areas where the excavation of unconsolidated soil and subsoils is required within each building phase will be kept to a minimum and only extended as already stripped ground has been built over. Keeping the surface area of exposed soils in the construction areas to a minimum is the most effective way of preventing the release of dust in dry weather and suspended sediments in wet conditions. Potential effects are therefore avoided. ▪ Limiting activities to designated work areas, thereby not allowing machinery or construction activity in proposed future green, open space and/or undeveloped areas will ensure that there is no dust or sediment runoff generated and no soil compaction will occur in those areas. ▪ Designated roadways and internal access/construction routes will be clearly designated and fenced off in order to prevent uncontrolled tracking of construction vehicles across the site. This will help reduce the surface area of disturbed ground which will limit the potential for soil compaction, sediment runoff or dust generation. ▪ Dust can be reduced by damping down of the works areas and especially along roads and access tracks where vehicle activity increases the generation of dust and fine particulates. Vehicle wheel washes, road sweeping and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads. ▪ A number of designated contractor compounds, located in areas of level ground, will be established for the site. These compounds will enable the safe storage of building materials, car parking, waste skips and will include a designated refueling station and wash down areas.

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	▪ Designated stockpile areas for the temporary storage of topsoil, subsoils and rock material required for site use will be established in areas where the ground level is flat and well away (>20m) from surface water features and steep slopes. ▪ Sand and gravel stockpiles will be kept to a minimum, stored on leave ground, away (>20m) from water courses and covered if necessary. ▪ Shallow berms, silt fences and/or cut-off trenches can be established around compound, work and stockpile areas which will prevent clean surface water runoff from flowing across these areas and will also help contain any impacted runoff flowing away from these parts of the site. ▪ Any sediment laden runoff will be channeled through silt traps and ponds to allow, as far as possible, the settlement of suspended solids. The discharge of silty water over grass field areas will be considered if necessary. ▪ Runoff from machine service and/or concrete mixing areas will not be allowed to discharge to ground or enter watercourses. Dedicated service and concrete wash down bunded areas will be established. ▪ Any finished construction, landscaped and green areas will be finished and re-grassed as soon as possible to limit the potential for dust and surface water generation from those areas. ▪ Activity of plant equipment and machinery operating in the construction area could result in small scale fuel spills to ground - mitigating against accidental leaks and spillages during the development will involve implementing good practices including regular plant maintenance, use of drip trays, adequate bunding for storage containers, refuelling in designated areas etc. ▪ All fuel storage areas on the site are sufficiently bunded and any mobile bowsers used on site will be double skinned. Bunds sufficiently large to fully contain accidental spills will be provided around all tanks/storage areas containing harmful substances. ▪ Spill kit materials will be maintained on site and site staff trained in the response to accidental spills and the use of clean up materials. ▪ Good housekeeping (site clean-ups, use of disposal bins, etc.) around the site and proper use of storage and disposal facilities for lubricants fuels and oils will be used. ▪ The construction contractor and design team will work to the Construction Environmental Management Plan (CEMP) prepared for the development works and this will be reviewed during the construction phase and be augmented with additional controls as required.
Water & Hydrology	▪ The phased nature of the sites development will reduce the foot print of open ground and active earth work areas as the site is being prepared for construction works. The areas where the excavation of unconsolidated soil and subsoils is required within each building phase will be kept to a minimum and, as far as practicable, only extended as already stripped ground has been built over. Keeping the surface area of exposed soils in the construction areas to a minimum is the most effective way of preventing the release of dust in dry weather and suspended sediments during or after wet conditions. Potential dust and suspended solids runoff impacts are therefore reduced or avoided.

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Aspect	Mitigation
	▪ Limiting excavation works and machinery activity during and immediately after periods of heavy rainfall (>20mm/day) will also be incorporated into the earth works management to help limit sediment generation. ▪ Control of Soil Excavation and Export from Site using the Reduce, Reuse and Recycle approach with all excavation arisings to be reused on site where possible. The implementation of an appropriate earthworks handling protocol with adequate runoff control and dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping and general housekeeping will ensure that the surrounding environment are free of nuisance dirt on roads which will reduce sediment runoff and dust generation. ▪ There will be a requirement for a Construction Management Plan to oversee the development. The Main Contractor(s) will update the CEMP; ▪ Earthwork operations will be carried out such that surfaces, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and suspended sediments from going off site. ▪ Construction methods used by the contractor are to be tailored to reduce, where possible, sediment runoff and leaks or spills to ground and to minimise effects on the local environment. ▪ Designated roadways and internal access/construction routes will be clearly designated and fenced off in-order to prevent uncontrolled tracking of construction vehicles across the site. This will help reduce the surface area of disturbed ground which will limit the potential for soil compaction, sediment runoff or dust generation. Similarly existing hedge rows and site features which are to be maintained will be fenced off. ▪ Any spoil or waste material generated from the construction process is to be temporarily stored on level ground at an approved location on site, and segregated from surface water runoff, before being either re-used on site or removed off-site to a suitably licenced waste management facility. ▪ All fill and aggregate for the project will be sourced from reputable suppliers. ▪ Designation of bunded refuelling areas on the site (as required) as well as the provision of spill kits across the site will reduce the potential for fuel or oil spills occurring or their extent. ▪ Fuel, oil and chemical storage should be sited within a bunded area. The bund must be able to take the volume of the largest container plus 10% and be located at least 10m away from drains, ditches, excavations and other locations where it may cause pollution. Bunds should be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. ▪ All bowsers to carry a spill kit and operatives must have spill response training; and portable generators or similar fuel containing equipment will be placed on suitable drip trays and/or absorbent fuel 'nappies'. In the case of drummed fuel or other potentially polluting substances (i.e. cement) which may be used during construction the following measures will be adopted: ▪ The use of a dedicated concrete truck washout areas and secure storage areas for the storage of concrete materials. All containers that contain potential polluting substances to be stored in dedicated internally bunded chemical storage cabinet units or inside concrete bunded areas. Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

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Aspect	Mitigation
	▪ All works in the riparian corridor (<10m from the river) will be carried out in consultation with Inland Fisheries Ireland and the project ecologist following the best practice guidelines for construction in the vicinity of watercourses. Extra care needs to be taken when working in sloped areas which could have direct runoff to the local Glashaboy River Estuary System. ▪ All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines. Potable water supply networks and waste water infrastructure are to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with the requirements of Uisce Eireann. ▪ Connections to the service providers are to be carried out to the approval and / or under the supervision of the Local Authority or relevant utility service provider, prior to commissioning. All new sewers are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase. ▪ All construction works will be completed in line with the recommendations of - The Construction Industry Research and Information Association (CIRIA) *Environmental Good Practice on Site 4th Ed (C741 - 2015) & Control of Water Pollution from Construction Site* (C532 - 2001). - The SuDs Manual (C752) Construction Industry Research and Information Association (CIRIA), 2015. - UK Environmental Agency Guidance Series for Pollution Prevention (GPP), including GPP5: Works and maintenance in or near water (NRW, NIEA, SEPA), January 2017 and GPP22: Dealing with Spills, (NRW, NIEA, SEPA), October 2018 ▪ Best practice environmental guidance will be incorporated into the Construction Environmental Management Plan (CEMP) for the development, an outline of which is part of the planning submission, prepared by JODA Engineering Consultants.
Biodiversity	▪ Best practice development standards and mitigation measures to be implemented during the Construction Phase of the Proposed Development, outlined in Table 11-23 of Chapter 11 and outlined in more detail in the CEMP (JODA, 2024). ▪ The CEMP should be reviewed and updated by the Main Contractor(s) / Project Manager in consultation with the Ecological Clerk of Works (ECoW) during the life of the project to ensure that it remains suitable to facilitate efficient and effective delivery of the project's environmental commitments. The Contractor shall also designate a Site Engineer/Manager/Assistant Manager as the Construction Waste Manager and who will have overall responsibility for the implementation of the Project Waste Management Plan (WMP). This Plan will be prepared upon appointment of the Main Contractor. Additional mitigation measures required are outlined below:- <u>Mitigation 1: Establish Storage, Cut and Fill Requirements</u> Prior to construction commencing the Contractor will be required to establish quantities of waste which will be generated by the excavation works for the substructure, roads and underground civil infrastructure, and how these will be stored, reused or exported from the

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	Site. The contractor will be required to determine the number and size of settlement tanks and temporary surface water percolation areas required (more detail provided below). The Contractor will prepare Construction Method Statements for key construction activities, including but not limited to: ▪ Site set-up; ▪ Sequence of works – in particular, soil disturbance and reinstatement; ▪ Earthworks; ▪ Pouring of concrete; ▪ Construction of residential units; ▪ Construction of on-site waste water treatment plant; ▪ Construction of settlement ponds; ▪ Landscaping works, and; ▪ Emergency protocols for surface water management. The Employers Representative and ECoW will be required to review and sign off on all Construction Method Statements, including consultation with the Local Authority where relevant, prior to works commencing. Mitigation 2: Siting of Mitigation Measures, Site Compound, and Storage In advance of construction commencing, the ECoW, Employers Representative and Contractor will undertake a walkover of the Site. The locations of silt fencing, settlement tanks, lagoons, monitoring locations, site compounds and storage areas will be determined. It will be the responsibility of the Contractor to draw up a Construction Phase drainage and mitigation drawing which must be signed off by the ECoW and Employers Representative, this detail is outlined in the CEMP accompanying this chapter under separate cover. This drawing must include the following information: ▪ The location of all surface water features (springs, drains, watercourses on/adjacent to the Site; ▪ The location of silt fences; ▪ The location(s) of settlement ponds/tanks and standby silt buster equipment; ▪ The location(s) of surface water percolation areas; ▪ The location of site compounds; ▪ The location of site welfare facilities; ▪ The location(s) of storage areas (e.g., stockpile locations)(detailed further in the next section); ▪ The location of the wheel wash; ▪ The location of the haul route, and; ▪ The location of spill kits and refuelling areas. Mitigation 3: Ecological Clerk of Works (ECoW) Prior to the commencement of the Construction Phase, the Site Ecologist will be on Site to ensure that the silt fences and bunding are correctly positioned in the correct locations and are effectively managed to ensure any run-off from these areas is intercepted. Mitigation 4: Preparation of a Water Management System All water protection measures will be incorporated into a detailed Water Management System (WMS) which will be prepared by the contractor.

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Aspect	Mitigation
	The WMS will be drawn up in consultation with the ECoW and Employers Representative and will take into account any changes in the physical conditions of the Site e.g. river flows or ground conditions, which may have occurred subsequent to the submission of the application. Mitigation 5: Public Signage on all entrances to Glanmire Wood pNHA: In order to protect the rich ground flora and fauna within Glanmire Wood pNHA, a number of signs will be erected on all entrances to the area informing the public of access restrictions. Access to the woods will be strictly for maintenance purposes and this will be made clear to future residents to maintain the ecological integrity of the ancient woodland. Recreation and amenity opportunities for future residents will be confined to the external perimeter through the use of proposed greenways, without the need to enter into the woods directly. The woods will be protected from incursion by a Paladian style fence, as outlined in the landscape report accompanying this application under separate cover (DMNA, 2024). Lighting will be minimised on the perimeter of the woodland in order to reduce/negate impacts on nocturnal wildlife, including bat species. Mitigation 6: Bat sensitive lighting To comply with Figure 11-35 - Lighting Plan showing proposed lux levels on the edge of Glanmire Wood pNHA. Mitigation 7: Tree Protection Protective tree fencing in compliance with BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' will be erected prior to any Construction works being undertaken to prevent damage to the canopy and root protection areas of existing trees at the Site. The fencing will be signed off by a qualified arborist prior to Construction to ensure it has been properly erected. No ground clearance, earthworks, stock-piling or machinery movement will be undertaken within these areas. Mitigation 8: Invasive Species Management Cherry laurel which is classed as a High-impact invasive species is present within the Glanmire Wood pNHA to the north of the Site, and also within the wider area within the applicant's landholding. A suitably qualified ISM specialist will be required to make provision for the control and adequate removal and monitoring of this species in order to protect the integrity of the protected area on Site, and the wider environs. All of the medium impact invasives and their respective distributions at the Site are not significant and their removal will not be an issue, however this will be placed at the discretion of the invasive species specialist with responsibility for invasive species management throughput the duration of the project. Transport Infrastructure Ireland (2020) guidance 'The Management of Invasive Alien Plant Species on National Roads – Technical Guidance' will be consulted with regards the treatment, removal and disposal of invasive flora at the Site. Biosecurity Measures The following measures will be adhered to, to avoid the introduction or dissemination of invasive species to and from the Site of the Proposed Development site.

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Aspect	Mitigation
	▪ For the Construction Phase the contractor will prepare a project specific IAPS standard operating procedure document, in advance of work commencement. The document should be prepared by an IAPS specialist and should cover the bio-security measures to be taken, including the maintenance of records, to screen for the introduction of IAPS onsite, and to enable their tracing if such an introduction occurs; and to ensure no transmission of IAPS offsite. These measures to include: - Removal of Cherry Laurel from the Site to be advised by an Invasive Species specialist. - Validation that all machinery / vehicles are free of IAPS, prior to their first introduction to site. - Certification from the suppliers that all imported soils and other fill/landscaping materials are free of IAPS. - A regular schedule of site inspections across the IAPS growing seasons, for the duration of the construction works programme. - Validation that all machinery / vehicles are free of IAPS, prior to leaving the site. - Appropriate and effective site biosecurity hygiene to ensure that no IAPS are transmitted off-site for the duration of the Proposed Works. Mitigation 9: Aquatic and Surface Water Protection To ensure that no contaminated waters containing silt, fuel, cementitious materials etc., have the potential to enter the receiving surface water network during the Construction Phase of the Proposed Development, a suite of mitigation measures will be put in place, all of which have been outlined in the CEMP which accompanies the application, along with all other relevant measures recommended to protect environmental sensitivities during the Proposed Works (including those listed in the NIS report). Mitigation 10: Reduction of Noise Related Impacts Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction/Infill Phase can have a range of impacts depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing. To mitigate this disturbance, the following measures will be implemented: ▪ Selection of plant with low inherent potential for generating noise. ▪ Siting of plant as far away from sensitive receptors as permitted by Site constraints. ▪ Avoidance of unnecessary revving of engines and switch off plant items when not required. ▪ Keep plant machinery and vehicles adequately maintained and serviced. ▪ Proper balancing of plant items with rotating parts. ▪ Keep internal routes well-maintained and avoid steep gradients. ▪ Minimize drop heights for materials or ensure resilient material underlies. ▪ Where noise originates from resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate. ▪ Limiting the hours during which Site activities likely to create high levels of noise are permitted.

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Aspect	Mitigation
	▪ Appointing a Site representative responsible for matters relating to noise. ▪ Monitoring typical levels of noise during critical periods and at sensitive locations. Mitigation 11: Timing of Vegetation Clearance To ensure compliance with the Wildlife Act 2000 as amended, the removal of areas of vegetation will not take place within the nesting bird season (March 1st to August 31st inclusive) to ensure that no significant impacts (i.e., nest/egg destruction, harm to juvenile birds) occur as a result of the Proposed Development. Where any removal of vegetation within this period is deemed unavoidable, a qualified Ecologist will be instructed to survey the vegetation prior to any removal taking place. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the Ecologist confirms the young have fledged. Table 11-24 provides guidance for when vegetation clearance is permissible. The preferred period for vegetation clearance is within the months of September and October. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., Hedgehog). Where this seasonal restriction cannot be observed, a check for active roosts and nests, as well as signs of amphibians, will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist and repeated as required to ensure compliance with legislative requirements. Mitigation 12: Small Mammal and Fauna Protection The following general avoidance measures will be incorporated to minimise impacts to mammals during the Construction Phase: ▪ Hours of work - The hours of working will be limited to daylight hours where possible, so as to limit disturbance to nocturnal and crepuscular animals. ▪ Waste Management - As best practice, all construction-related rubbish on Site e.g., plastic sheeting, waste, wires, bags, netting in which animals can become entangled etc. will be kept in a designated area and kept off ground level so as to prevent small mammals such as hedgehogs from entrapment and death. ▪ Excavations & Pipes - Trenches/pits must be either covered when not in use/at the end of each working day with caps (especially at night) or include a means of escape for any animal falling in and getting stuck. If this is not possible, then a strategically placed plank or object should be placed in the corner of an excavation to enable animals to safely escape (Badgers will continue to use established paths across a Site even when construction work has started). Any temporarily exposed open pipe system will be capped in such a way as to prevent badgers from gaining access as may happen when contractors are off-site. Mitigation 13: Construction Phase Lighting Regime Where possible, Construction Phase lighting will be switched off during non-working hours. However, during use, directional lighting will be the lighting of choice as this will minimise light spill from the site, into any surrounding areas which may be in use by bats or other nocturnal animals that may be commuting/foraging in the area.

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Aspect	Mitigation
	It is recommended that LED luminaires possessing a warm white spectrum (2700k) be used so as to reduce the blue light component. LED lights are also ideal due to their sharp cut-off, lower intensity, and dimming capabilities. See Bat Activity results maps (Figures 11-24-35, Section 11.6.4.3.2.4) for detailed illustrations of core bat foraging and commuting areas within the overall EIAR study area. Mitigation 14: Ecological Clerk of Works (ECoW) A suitably qualified Ecological Clerk of Works (ECoW) will be present on-site for the duration of the works until monitoring for each construction element listed in the SOWOR is no longer required and has been signed off by the ECoW and the Employers Representative. The ECoW will ensure that all targeted ecological mitigation measures identified in this Chapter, the NIS and CEMP are adhered to in full. The ECoW will also ensure that the silt fences and bunding are correctly positioned in the correct locations as per the CEMP and are effectively managed to ensure any run-off from these areas is intercepted.
Noise & Vibration	▪ 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. - 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.

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Aspect	Mitigation
	The following best practice migration measures will be considered: ▪ Site compounds will be located away from noise sensitive locations 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 percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker tool and ensuring any leaks in the air lines are sealed. ▪ Erecting localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries. ▪ 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. <u>Screening</u> ▪ 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. ▪ Construction noise calculations have assumed 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.

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Aspect	Mitigation
	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 ▪ 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. If piling / rock breaking/rock excavation works are in progress on another site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities. This will be reviewed in relation to cumulative works within the site and at any other potential external sites with potential to generate significant noise effects in close proximity to noise sensitive locations.
Air Quality	Site Management ▪ The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies. ▪ The siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions to minimise the potential for significant dust nuisance (see Figure 13-1). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors. ▪ Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological

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Aspect	Mitigation
	conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken to avoid dust nuisance occurring under unfavourable meteorological conditions: ▪ The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised. ▪ The appointed contractor will provide a site hoarding along boundaries where works are taking place adjacent to ecological sensitive receptors and at the main construction compound which will assist in minimising the potential for dust impacts off- site. ▪ During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. ▪ 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. ▪ Community engagement will be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses. ▪ 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. ▪ It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein. ▪ At all times, the procedures put in place will be strictly monitored and assessed. ▪ The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below. Preparing and Maintaining the Site ▪ Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. ▪ Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. ▪ Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period. ▪ Avoid site runoff of water or mud. ▪ Keep site fencing, barriers and scaffolding clean using wet methods. ▪ Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below. ▪ Cover, seed or fence stockpiles to prevent wind whipping. Operating Vehicles / Machinery and Sustainable Travel

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Aspect	Mitigation
	▪ Ensure all vehicles switch off engines when stationary to avoid idling of vehicles. ▪ Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. ▪ Impose and signpost a maximum-speed-limit of 20 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 ▪ No bonfires and burning of waste materials. 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 ▪ 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.

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Aspect	Mitigation
	- 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 Trackout Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25% to 80% (UK ODPM, 2002). - A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles. - Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. If sweeping using a road sweeper is not possible due to the nature of the surrounding area, then a suitable smaller scale street cleaning vacuum will be used. - Avoid dry sweeping of large areas. - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. - Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. - Record all inspections of haul routes and any subsequent action in a site log book. - Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. - Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). - Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. - Access gates to be located at least 10m from receptors where possible. Summary of Dust Mitigation Measures The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be: - The specification of a site policy on dust and the identification of the site management responsibilities for dust issues; - The development of a documented system for managing site practices with regard to dust control; - The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and - The specification of effective measures to deal with any complaints received.
Climate	- The following best practice measures shall be implemented on:

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled; - Materials will be reused on site where possible – the applicant has identified a goal of 50% of materials will be re-used on site; - 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; and - Sourcing materials locally where possible to reduce transport related CO_2 emissions. ▪ There is also the potential to reduce carbon emissions through the use of alternative materials with lower embodied carbon emissions. For example, the developer has considered the use of concrete with a GGBS replacement and a recycled rebar type. The houses will all be constructed using timber frame. ▪ 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.
Cultural Heritage	▪ Demolition phase works proposed in the LRD Phase 1 development include the removal of three small ruinous structures in the northernmost portion of the development area. The structures are not of architectural or cultural heritage significance. However, it is proposed to prepare a written and photograph record of each structures prior to demolition. ▪ There is potential for localised demolition in the LRD Phase 2 development associated with a possible second access. When the detailed design of the LRD Phase 2 development has been completed, detailed mitigation measures will be proposed (including, but not restricted to, a programme of pre-construction architectural recording). ▪ For the proposed development, the location of Dunkettle House and its associated structures will be excluded from construction activities including, but not limited to, traffic movement, equipment storage, compounds and spoil retention areas. The location of these cultural heritage constraints will be identified during contractor site inductions and will be clearly signed as no entry areas for the duration of the construction phase. ▪ A second access point from Dunkettle Road (L2998) is envisaged in the LRD Phase 2 development. This access will utilise and upgrade an existing access serving the applicant's lands and a number of private dwellings, running adjacent to the walled

Table 17-2 Demolition & Construction Mitigation

Aspect	Mitigation
	garden. It is envisaged that the existing access from the L2998 will be upgraded to facilitate vehicular, pedestrian and cyclist movements and, it is possible that localised negative impacts will arise on the walled garden and the immediate setting of Dunkettle House. However as noted, the design and specification of this second access are currently being developed in consultation with Cork City Council officials – it does not form part of the LRD Phase 1 planning application. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed. ▪ A programme of licensed archaeological monitoring of ground works along the route of the amenity greenway and the two outlets to the Glashaboy River will be carried out by a suitably qualified archaeologist during the construction phase. This will include the compilation of a pre-works written, drawn and photographic record of the locations of revetment walling at the locations of the two drainage outlets. In the event that any archaeological sites or features are identified during monitoring, ground works will halt at that location, and they will be recorded and will be left to remain securely in situ within a cordoned off area. The National Monuments Service and Cork City Council's Archaeologist will be notified of the discovery and consulted to determine further appropriate mitigation measures, which may entail preservation *in situ* by avoidance or preservation by record through a licensed archaeological excavation.

Table 17-3 Operational Mitigation

Aspect	Mitigation
Population & Human Health	None Note: Mitigation measures relating to those factors under human health which are relevant under other environmental factors, are included in the relevant chapters of this EIAR.
Landscape & Visual	Visual None Landscape ▪ The woodland management should be ongoing under the Native Woodland Conservation Scheme and maintenance of the newly landscaped areas should be ongoing with an emphasis on broadening the biodiversity value across the Dunkettle lands. ▪ All woodland areas are to be managed solely for conservation under the Native Woodland Conservation Scheme, access to the estuary pNHA woodlands is to be restricted to maintenance personnel only, using the existing historic walk paths.
Material Assets: **Traffic & Transport**	▪ Implement Proposed junction upgrade works as follows:- - Junction 1: R639 Glanmire Road/Glanmire Bridge -a traffic signal controlled which will also facilitate the proposed new 2A Bus route - Junction 2: East Cliff Road and the L2998 - a 'Yellow box' junction be provided on the L2998 to facilitate some level of right turners from East Cliff Road. The option of including this junction as part of the signalisation of Junction 1 could be investigated. The operation of Junction 2 to be reconsidered when the link road through Ballinglanna Residential Development to Fernwood and the L3010 Glanmire Village is in operation. - Junction 3: Ballinglanna Signalised Junction - existing junction to be upgraded to facilitate the revised phasing which will significantly improve the capacity of Junction 3. ▪ To minimise disruption to the local roads network during the operational phase, the following mitigation measures are proposed. - It is proposed to make the site permeable to the surrounding roads network ensuring it will be connected to existing and proposed cycle/pedestrian linkages to public transport offerings, schools, retail and amenity destinations. - The proposed new access arrangement onto the L2998 is safe and suitable and is in accordance with the Design Manual for Roads & Bridges (DMRB) and the Design Manual for Urban Roads & Streets (DMURS). - The traffic impact assessment carried out has included the re-distribution of traffic via Junction 3 when the Fernwood link road is open. This will facilitate traffic heading towards Glanmire Centre to use this route as an alternative to Junction 2 East Cliff Road. - Junction 3 upgrade works will significantly improve the capacity of this junction which has the capacity to cater for all phases of development. - The signalisation of Junction 1 R639/Glanmire Bridge is seen to improve traffic flows, specifically for the minor arm serving the development.

Table 17-3 Operational Mitigation

Aspect	Mitigation
	- The site benefits from being near regular public transport provision, within walking distance of the site, which enables journeys throughout Cork City to the west and Little Island, Carrigtwohill and Midelton to the East. - The site is adjacent to the Dunkettle Interchange, accessed from the site via Junction 6, which has been recently upgraded to a free-flow interchange. This interchange provides direct access to the N40, M8 and the N25 reducing development traffic impacting on the local roads network (Glanmire Direction). - The introduction of a new bus route to serve the area (Route 2A) which is an NTA funded scheme due to open Q4 2024. ■ It is the intention of the applicant to develop all sustainable routes associated with the site as part of the first phase of the scheme implying that access to the East Cork Greenway, Little Island train station and the re-routed Bus 2A will be available for new residents. This infrastructure may also result in an improvement in the modal shift percentage in the wider area implying background traffic flows could reduce as opposed to grow. Mitigation measures as outlined should only be implemented when necessary.
Material Assets: **Built Services**	Surface water drainage services ■ The surface water services include various components to control and ensure the quantity and quality of surface water runoff in accordance with design requirements. Inspection and maintenance of components of the system shall be performed on a regular and scheduled basis to ensure the effective functioning of the system and the mitigation of risk to the receiving environment, for both adoptable and non-adoptable parts of the system. ■ A maintenance plan for the surface water drainage system is included in the *Site Civil Infrastructure and Design Report* and accompanying drawings prepared by JODA Engineering Consultants and submitted under separate cover as part of the planning application. The maintenance schedule is also enclosed in Appendix 7-1 to this document for reference – *Surface Water drainage Scheme with SuDS Elements – Maintenance Plan*. Wastewater drainage services ■ Wastewater drainage services not to be vested to Uisce Éireann consist of drainage systems within individual premises upstream of each Customer Connection Chamber to each premises. Wastewater drainage systems within individual premises are designed to operate without the need for maintenance. However, this depends on individual good practices. To this end, the following information and educational material will be distributed to purchasers at handover: - *A guide to Managing Your Household Waste & Domestic Water Usage*, produced by the Environmental Awareness & Research Unit of Cork County Council. - *Think Before You Flush* information leaflet produced by thingbeforeyouflush.org, supported by Uisce Éireann and An Taisce. - *Think Before You Pour* information leaflet produced by thingbeforeyouflush.org, supported by Uisce Éireann and An Taisce. - *The Dirty Dozen* information leaflet produced by thingbeforeyouflush.org, supported by Uisce Éireann and An Taisce.

Table 17-3 Operational Mitigation

Aspect	Mitigation
	▪ The sale or lease of commercial premises that generates grease and oil and food residue as part of its commercial output will include a requirement to install grease traps in accordance with EN 1825-1:2004 *Grease separators Principles of design, performance and testing, marking and quality control* and to enter an agreement with a suitably licenced operator to maintain and clean the grease traps on an appropriate maintenance schedule. Water supply services ▪ Water supply services not to be vested to Uisce Éireann consist of water supply pipework within individual premises downstream of the Customer Connection and Boundary Box to each premises. Water supply systems within individual premises are designed to operate without the need for maintenance. Each purchaser or lease holder will be informed of the location of the shutoff valve at the connection to each premises so that the user may shut off the water supply should the need arise.
Material Assets: **Waste**	▪ Implementation of the OWMP will ensure a high level of recycling, reuse and recovery at the development. ▪ A separate Outline Operational Waste Management Plan will be developed for the subsequent phases of development at Dunkettle, as described in Chapter 2. These Plans will also include mitigation measures to ensure a high level of recycling, reuse and recovery at the proposed development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in The National Waste Management Plan for a Circular Economy 2024-2030.
Land & Soils	None
Water & Hydrology	Mitigation measures proposed include ▪ routine maintenance of the site services; ▪ regular maintenance of the development's green roofs and interceptors ▪ regular maintenance of landscaped areas, bio-retention, percolation and attenuation areas
Biodiversity	Mitigation 15: Operational Phase Invasive Species Management Any newly landscaped areas, particularly where infill materials and soils have been imported for soft landscaping, are assessed during the Operational Phase within the next botanical season for the presence of any inadvertently introduced invasive species, with particular focus on those listed on Schedule III of SI 477 of 2011. If invasive species are detected, an Invasive Species Management Plan will be prepared, agreed with the Local Authority and implemented at the earliest possibility to limit the potential for further spread by ongoing operations at the Proposed Mixed-use Development. Mitigation 16: Operational Phase Lighting In order to minimise disturbance to bats utilising the site in general, the lighting and layout of the Proposed Development will be designed to minimise light-spill onto habitats used by the local bat population foraging or commuting. See Bat Activity results maps (Figures 11-24-35, Section 11.6.4.3.2.4) for detailed illustrations of core bat foraging and commuting areas within the overall EIAR study area. This can be achieved by ensuring that the design of lighting accords with guidelines presented in the Bat Conservation Trust

Table 17-3 Operational Mitigation

Aspect	Mitigation
	& Institute of Lighting Engineers *'Bats and Lighting in the UK - Bats and Built Environment Series'*, the Bat Conservation Trust '*Artificial Lighting and Wildlife Interim Guidance*' and the Bat Conservation Trust *'Statement on the impact and design of artificial light on bats'*. Therefore, where possible, the lighting scheme will include the following: ▪ Lighting will only be installed where necessary for public safety in known Bat Foraging and Roosting locations (Riparian corridor/pedestrian greenway). These lights have been designed and selected with specific shutters and filters to minimise any potential for back spills into the sensitive locations while still providing the primary function of safely lighting the pedestrian routes. ▪ Lighting along the riparian woodland corridor and existing treelines, and woodland margins (notably to the west and east) will be avoided where possible and bat friendly; using low level bollards, motion sensors where applicable, once health and safety standards are met. ▪ Reflectance – Downward lighting can be reflected from bright surfaces. To minimize bat disturbance, the design avoids the use of bright surfaces and incorporates darker colour lamp heads and poles to reduce reflectance. Only luminaires with an upward light ratio of 0% and with good optical control to be used. ▪ Lighting controls and dimming shall be utilised for post-curfew times. ▪ Shielding of Luminaires & Light - To minimize bat disturbance, the design avoids the use of upward lighting by shielding or by downward directional focus. i.e., no upward tilt. ▪ Type of Light – To minimize bat disturbance, the design avoids the use of strong UV lighting. The lighting design is based on the use of LED lighting which has minimal or no UV output of significance. Warmer 2700°K LED lighting will be utilized for amenity areas, as the warmer colour temperatures with peak wavelengths greater than 550nm (~3000°K) cause less impacts on bats. Mitigation 17: Hedgehog Highways By creating a number of separate private dwellings and gardens at a Site, the land becomes fragmented and largely inaccessible to species such as Hedgehog, which like to roam each night in search of food (garden pests e.g., slugs). This can easily be fixed by ensuring that the boundaries and barriers within and surrounding the Site i.e., garden fencing, railings and gates, are permeable for Hedgehogs. This can be achieved by: ▪ The use of fence panels with 13 x 13 cm holes at ground level (Hedgehog holes); ▪ Leaving a sufficient gap beneath gates, and; ▪ Leaving brick spaces at the base of brick walls. The inclusion of hedgehog highways will be considered as part of the landscape design of the Site, specifically the private garden boundary fencing. A variety of fence suppliers stock specific hedgehog-friendly fencing options, which can be easily incorporated at little or no additional cost. These simple measures will provide habitat connectivity at the Site for Hedgehogs and reduce the impact of the land-use change on this species. Including details of hedgehog-friendly features in the new home owner's welcome pack will raise awareness and prevent home owners from reversing these features, for instance blocking fence holes.

Table 17-3 Operational Mitigation

<table>
<tr><th>Aspect</th><th>Mitigation</th></tr>
<tr><td></td><td>Mitigation 18: Public Signage
In order to mitigate against an increase in human traffic with pets (specifically pet dogs) to the Glanmire Wood pNHA, signage should be erected on the proposed Paladian style fencing surrounding the woodland, that clearly states all pet owners should be kept on leads at all times and not allowed to enter the woodland area encompassing Glanmire Wood.
Mitigation 19: Woodland Monitoring
In order to ensure the Proposed Development is not having an adverse effect on the adjoining Glanmire Wood, and to provide added mitigation measures (should they be required) monitoring of the integrity and structure of the woodland will take place every two years for the first ten years post construction.</td></tr>
<tr><td>**Noise & Vibration**</td><td>▪ 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 12-7 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.
▪ Consideration will therefore be given to the provision of upgraded glazing to the northern, eastern and southern facades of the H1/H2 Duplexes and House Types Fb and G located within 60m of the Dunkettle Road, achieving the sound insulation performance outlined in the Table below (and further detailed in Appendix 12.1).
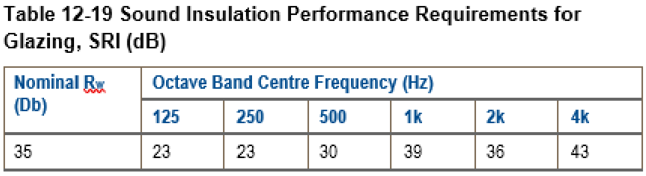
Table 12-19 Sound Insulation Performance Requirements for Glazing, SRI (dB)
<table>
<tr><th>Nominal R_w (Db)</th><th colspan="6">Octave Band Centre Frequency (Hz)</th></tr>
<tr><th></th><th>125</th><th>250</th><th>500</th><th>1k</th><th>2k</th><th>4k</th></tr>
<tr><td>35</td><td>23</td><td>23</td><td>30</td><td>39</td><td>36</td><td>43</td></tr>
</table>
▪ Test data should be sought from the supplier of the glazing at detailed design stage to ensure that the acoustic specification is met.
▪ It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. The over-riding requirement is that the internal noise criteria is achieved, other combinations of upgraded glazing may provide the same or better performance than those outlined in the Table above.</td></tr>
<tr><td>**Air Quality**</td><td>None</td></tr>
<tr><td>**Climate**</td><td>▪ The proposed development has been designed to minimise the impact to climate where possible during operation.
▪ The buildings are aspiring to meet a Net Zero Carbon strategy to align with the aspirations set out by Cork City Council within Chapter 6 (Visions, Goals and Objectives) of the CCC Development Plan 2022-2028.
▪ The design intent at present for hot water, heating and cooling system designs are based on a combination of highly efficient air source and water to water heat pumps with no fossil fuels being consumed throughout the proposed development, avoiding the production of large amounts of local pollution within an urban environment.</td></tr>
</table>

Table 17-3 Operational Mitigation

Aspect	Mitigation
	▪ The buildings will meet and exceed the new NZEB (Nearly Zero Energy Buildings) requirements set out in the revised Part L document. ▪ The proposed development will achieve an A rated energy certificate for all buildings. ▪ The proposed development has benchmarked itself against Sustainability Assessments including; BREEAM, LEED, WELL Building Standard, WIRED Score and Passive House. As a minimum, the scheme will adopt the principles of all and pursuing the formal rating and certification will be subject to cost / benefit feasibility post planning. The project will also seek a HPI Certificate. ▪ Due to the location of the proposed development within Cork City Centre the site has a number of sustainable travel options such as bus and cycling. Sustainable travel modes will be encouraged through support facilities for cycling, minimal onsite parking and infrastructure for electrical vehicle charging points. ▪ It is also proposed to retain high quality buildings and facades to reduce the environmental impact and embodied carbon of the development. With the inclusion of these sustainability measures the impact to climate during the operational phase will be reduced. ▪ Some measures have been incorporated into the design of the proposed development to mitigate the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated to avoid potential flooding impacts due to increased rainfall events in future years.
Cultural Heritage	LRD Phase 1 – None LRD Phase 2 - the design and specification of the second access are currently being developed in consultation with Cork City Council officials and it does not form part of the LRD Phase 1 planning. The effects will be reviewed in the making of the future LRD Phase 2 application when the detailed design has been completed and detailed mitigation measures appropriately developed.

17.4 Monitoring Measures

Tables 17-4 and 17-5 below summarise the recommended monitoring measures for the demolition, construction, and operational stages.

Table 17-4 Demolition & Construction Monitoring

Aspect	Monitoring
Population & Human Health	None
Landscape & Visual	▪ Monitoring of the development is to be undertaken from commencement of construction of the development on site. This is to be undertaken by on site construction personnel responsible for the provision and maintenance of hoardings, tree protective fencing and the control of and management of water runoff. ▪ Woodland areas are to be monitored by an ecologist and forester appointed under the Native Woodland Conservation Scheme. The sole aim of monitoring is to ensure there is no degradation in biodiversity value or loss in existing tree cover occurs. Where conservation value is detected then remedial action is to be taken to restore and enhance habitat areas affected. ▪ The Woodville Woodland is also to be managed under the Native Woodland Conservation Scheme without formal exclusion of public access. Proposed new woodland, street, and open space tree planting across the development site will also require periodic monitoring to ensure the establishment of the landscaping proposed. Where there are failures in planting these are to be assessed with appropriate action taken to replace the failed stock with similar or replace the stock with species more likely to thrive in the same location. ▪ A freshwater ecologist is to periodically monitor the operation of the SUDs features on site; swales and attenuation pond to maximise their habitat value.
Material Assets: **Traffic & Transport**	The following specific monitoring measures over and above expected normal practices for such a development are proposed: ▪ HGV movements to from the site (dedicated routes); ▪ Operating times for deliveries to and from the site;
Material Assets: **Built Services**	No specific measures proposed over and above expected normal construction practices including normal monitoring in accordance with the Construction Environmental Management Plan (CEMP) and Resources and Waste Management Plan (RWMP).
Material Assets: **Waste**	▪ The site control measures to manage and minimise waste include: - Signage on the site office/welfare bins to separate them as environmental/domestic waste bins; and - Briefing for all sub-contractors via induction handouts. ▪ The Resource Manager (RM) will be responsible for conducting ongoing resource audits at the site during the Construction Phase. The audit protocol will be risk based and focus on key issues of concern but will include as minimum: - Adequacy of site signage and need for any repairs or upgrades; - Adequacy of storage infrastructure and need for any repairs or upgrades; - Compliance with resource segregation protocols and observed contamination in any resource streams;

Aspect	Monitoring
	- Assessment of observed Contractor and Sub-Contractor work practices for compliance with the RWMP; ▪ The RM will undertake a review of all records of wastes and resources generated on-site and transported off-site periodically through the Construction Phase. If waste movements are not accounted for, the reasons for this are to be established to understand why the record keeping system has not been maintained and implement corrective actions if needed; ▪ The resource records will be compared with established targets for the site (e.g., reuse of resource target or recycling waste target); ▪ Examining material management on-site to determine where the largest percentage of residual waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how project contract targets can be achieved; and ▪ Issue corrective actions (training, penalties, etc.) as required to site operatives where deviations of the RWMP are observed.
Land & Soils	▪ All topsoil, soil and rock excavation work will be observed by a banks man. While there is no evidence of foreign fill or waste material on the site this operative will be instructed to lookout for any physical evidence, (discolouration, odour, sheen etc,), of potential contamination in the excavations. ▪ Runoff from works, stockpile and compound areas will be observed to ensure that it is not impacting on the local watercourse. Both hydrocarbons and silt cause discolouration so are easy to visually monitor for their presence. If necessary water sampling and monitoring of the Glashaboy River can be completed to test for Total Suspended Solids (TSS) and Hydrocarbon concentrations. ▪ In areas where temporary retaining structures are required then observations of the exposed face will help monitor for potential collapse. Ideally any retaining wall structures will be constructed promptly after the excavations are completed to ensure good ground stability.
Water & Hydrology	▪ Runoff from works, stockpile and compound areas will be observed during the construction phase to ensure that it is not impacting on the local watercourse. Both hydrocarbons and silt cause discolouration so are easy to visually monitor for their presence. If necessary water sampling and monitoring of the Glashaboy River can be completed to test for Total Suspended Solids (TSS) and Hydrocarbon concentrations for the construction phase.
Biodiversity	▪ Monitoring by ECoW of relevant biodiversity Mitigation Measures in this EIAR, the NIS and relevant CEMP measures.
Noise & Vibration	Noise ▪ During the 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 NSL1 and NSL2 to the eastern site boundary. Any Noise Monitoring Terminal (NMT) (number and locations to be agreed post-

Aspect	Monitoring
	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 ▪ Where the excavation works take place within 50m of vibration-sensitive locations (VSLs) e.g. NSL1 and NSL2 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. ▪ 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.
Air Quality	▪ Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/m^2/day during the monitoring period of 30 days (+/- 2 days). Monitoring shall ensure that the dust mitigation measures are working satisfactorily as construction works progress
Climate	None
Cultural Heritage	▪ There are a number of obligatory processes to be undertaken as part of applications to the National Monuments Service for licences to carry out archaeological monitoring of ground works, and these will allow for monitoring of the successful implementation of mitigation measures.

Aspect	Monitoring
	▪ A revised method statement for any further archaeological excavations that may be required, dependant on the results of archaeological monitoring of ground works, will be submitted to the National Monuments Service and National Museum of Ireland. ▪ Reports on all completed archaeological site works will be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all works in written, mapped and photographic formats.

Table 17-5 Operational Monitoring

Aspect	Monitoring
Population & Human Health	None
Landscape & Visual	▪ All woodland areas are to be managed solely for conservation under the Native Woodland Conservation Scheme, access to the estuary pNHA woodlands is to be restricted to maintenance personnel only, using the existing historic walk paths.
Material Assets: Traffic & Transport	The following specific monitoring measures over and above expected normal practices for such a development are proposed: ▪ On-going monitoring of modal shift patterns in the area (National Census timeline); ▪ On-going collection of traffic generation data from the site (once a year); ▪ Monitoring of the operational characteristics of junctions within the study area (annual review); ▪ It is recommended that on-going monitoring of the critical junctions is carried out to determine the impact of the construction stage of the scheme as phases of the development become occupied.
Material Assets: Built Services	In addition to normal operational practices, implement the Maintenance plan outlined in outlined Appendix 7-1: *Surface Water drainage Scheme with SuDS Elements – Maintenance Plan.*
Material Assets: Waste	▪ The building management company and future residents will be required to maintain the bins and storage areas in good condition as required by the Cork City Council Waste Bye-Laws. ▪ The waste strategy presented in the OWMP will provide sufficient storage capacity for the estimated quantity of segregated waste. ▪ The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.
Land & Soils	None
Water & Hydrology	▪ A Maintenance schedule for monitoring drainage infrastructure during the operational phase is recommended.
Biodiversity	▪ Monitoring by ECoW of relevant biodiversity Mitigation Measures in this EIAR, the NIS and relevant CEMP measures.
Noise & Vibration	None
Air Quality	None
Climate	None
Cultural Heritage	None