



Engineering and Environmental Consultants

**Castlelake Strategic Housing Development
Environmental Impact Assessment Report (EIAR)**

Project No. 22461

June 2022



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Appendix 13.2 – Cork County Council Predicted 2025 Do Minimum Junction Traffic Turning Volumes

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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
22461	6002	A	06/2022	MWP	AR	OH	ISSUE

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Volume 2: Environmental Impact Assessment Report (EIAR)

Castlelake Strategic Housing Development Environmental Impact Assessment Report (EIAR)

Project No. 22461

June 2022



1. Introduction & Methodology

BAM Property is applying to An Bord Pleanála for a Strategic Housing Development (SHD) at Castlelake, Terrysland, Carrigtwohill, Co. Cork. Permission is being sought for the construction of 716 No. residential units with a childcare facility, landscaped open spaces and associated works and services (hereafter referred to as the ‘proposed development’).

MWP have been engaged by the Applicant to prepare an Environmental Impact Assessment Report (EIAR) to accompany the planning application. This Chapter sets out the purpose and scope of the EIAR, the report structure, assessment topics, assessment authors and contributors, and assumptions which underlie the EIAR. It introduces the project and outlines the site location and key elements of the project. It sets out the legislative background to the project and details the consultation undertaken with relevant stakeholders.

1.1 The Applicant

BAM Property (formerly Ascon Property Developments) was established in Ireland in 2004, in order to provide a clear focus for BAM Ireland’s property development projects. Its primary focus is to manage the property development activities of the group while providing a crucial link between the main contracting arm, BAM Building and the general development market. Castlelake SHD is a current project that BAM want to progress in a phased manner as has been achieved on earlier project phases in Castlelake.

1.2 Project Summary

The proposed development is for the construction of a strategic housing development of 716 no. units and a 2 storey creche. The proposed development comprises:

- 224 no. houses,
- 284 no. duplex units and
- 208 no. apartments.

The proposed development also provides for: hard and soft landscaping; boundary treatments; public realm works; car parking; bicycle stores and shelters; bin stores; lighting; plant rooms; and all ancillary site development works above and below ground.

The project is outlined in further detail in **Chapter 2 Project Description**.

1.3 Application Area

The proposed development site is located on lands which have been zoned for residential development in Carrigtwohill 16km east of Cork city. The site is 9km east of the Jack Lynch tunnel, on the northern side of the N25 Cork to Waterford Road. The proposed development is located circa 500m west of Carrigtwohill village. The site is bounded by agricultural lands to the north, the existing Castlelake housing estate to the west and the Cork Road L3680 to the south. The proposed development lands bound the Cork-Midleton Railway line to the north. Carrigtwohill train station is located circa 160m to the north east of the site boundary. The train station serves Midleton and Cobh to the east and south and Cork to the west, with onward links to Dublin and the rest of the country.

The development sites comprise greenfield lands comprise a total area of 18.17 ha of which 16.6 ha is developable. There are existing powerlines along the western edge of the site, that do not form part of the developable area. There are 2 no. existing underpasses beneath the train tracks to the north. The application site relates to 8 No. parcels of lands, as illustrated on Error! Reference source not found. below.

The lands are currently unused and there are no existing buildings.

The site boundary is shown below in **Figure 1.1**.

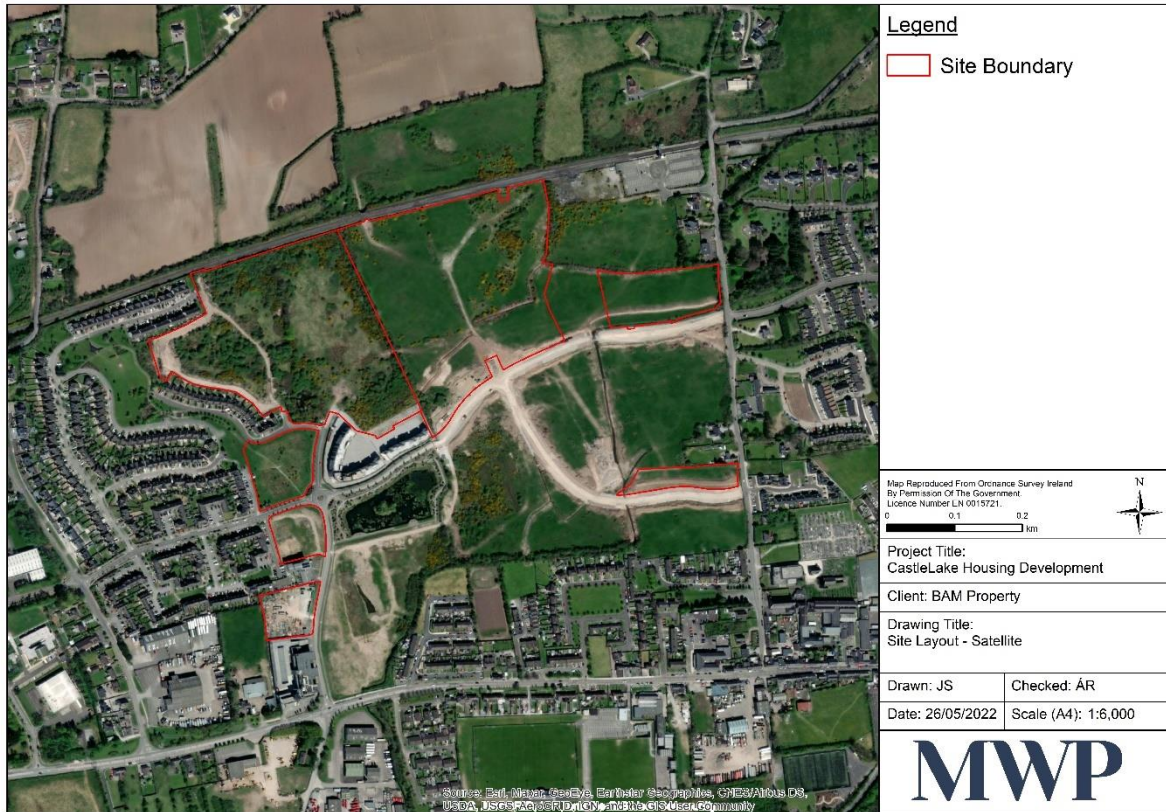


Figure 1.1 Site Boundary

1.4 Structure of the EIAR

The EIAR is presented as three volumes as outlined in **Table 1.1** below.

Table 1.1 Structure of EIAR

Volume	Content	Description
Volume I	Non-Technical Summary	The Non-Technical Summary provides an overview of the project and the EIAR in non-technical terms. It is presented in a similar way to Volume 2 – Main EIAR, in the use of a ‘Grouped Format Structure’, which discusses each environmental topic separately.
Volume II	Main EIAR	<p>The Main EIAR provides a detailed description of the proposed project and contains specialist reports on each of the selected assessment topics. This document is prepared in the ‘Grouped Format Structure’ which examines each environmental topic area within an individual Chapter. This structure was selected for the Main EIAR as it facilitates straightforward investigation of individual topics:</p> <ul style="list-style-type: none"> • Chapter 1 Introduction • Chapter 2 Proposed Description • Chapter 3 Alternatives • Chapter 4 Population and Human Health • Chapter 5 Biodiversity • Chapter 6 Land and Soils • Chapter 7 Water • Chapter 8 Air and Climate • Chapter 9 Material Assets • Chapter 10 Cultural Heritage • Chapter 11 Landscape and Visuals • Chapter 12 Noise and Vibration • Chapter 13 Traffic and Transportation • Chapter 14 Interaction of the Foregoing • Chapter 15 Schedule of Mitigation Measures
Volume III	Appendices	The Appendices volume contains supporting information and reference documents to Chapters of the Main EIAR Volume 2.
Volume IV	Photomontages	This volume contains the Photomontages and Zones of Theoretical Visibility maps in support of Chapter 11, the Landscape and Visual Impact Assessment. Chapter 11 should therefore be read in conjunction with Volume 4 Photomontages.

1.5 Methodology

1.5.1 Legislative Context

The Environmental Impact Assessment (EIA) Directive (European Union Directive 2011/92/EU and the amending Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment, requires Member States to ensure that a competent authority carries out an assessment of the likely significant effects of certain types of projects, as listed in the Directive, prior to development consent being given for the project.

EIA provisions in Irish Law in relation to planning consents are currently contained in the Planning and Development Act, 2000, (Part X) as amended, and in Part 10 of the Planning and Development Regulations, 2001, as amended. Both the Act and Regulations have recently been amended by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) (EIA Regulations).

The EIA Directive and the Planning and Development Regulations 2001, as amended, provide that in respect of an application for development consent where EIA is required, the developer (applicant) is required to prepare and submit an EIAR to the competent authority.

The main objective of EIA is to identify, describe and assess the direct and indirect significant impacts of a project on the environment including population and human health, biodiversity, land, soils, water, air & climate, material assets, cultural heritage and the landscape and the interaction between the aforementioned topics.

EIA is a process for anticipating the effects on the environment caused by a development; the document produced as a result is termed the EIAR. Article 1(2)(g) of the 2014 EIA Directive (2014/52/EU) states that:

“environmental impact assessment” means a process consisting of:

- i. the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
- ii. the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*
- iii. the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*
- iv. the reasoned conclusion by the competent authority on the significant effects of the project on the environment, 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 has been prepared in accordance with the requirements set out in the Planning and Development Act 2001 (as amended) and in Council Directive 2011/92/EU as amended by Directive 2014/52/EU (the EIA Directive). The Planning and Development Acts and Regulations 2000 to 2018 have been amended by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018) to take account of the requirements of the EIA Directive (Directive 2014/52/EU).

Annex IX of the EIA Directive and Schedule 6 of the European Union (Planning and Development) (Environmental Impact Assessment) (Regulations) 2018 specify the *information to be contained in EIAR*.

These requirements identify a range of prescribed environmental factors, the significant effects of which have been addressed in this EIAR. These include population and human health, biodiversity, land and soil, water, air and climate, noise, landscape, cultural heritage and material assets as well as the inter-relationship between the above topics.

This EIAR is compliant with the requirements set out in the Planning and Development Regulations 2001, as amended, and as set out in the EIA Directive in terms of the structure and content of the information required to be provided by the Applicant.

This EIAR has been prepared having regard to this legislation and national guidance, including European Commission’s *Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU) (2017)*, *‘Guidelines on information to be contained in an Environmental Impact Statement, 2002’* and most recent *‘Guidelines for Planning Authorities and An Bord Pleanála on carrying out EIA (August 2018)’*. Regard was also had to the published EPA *Guidelines on the information to be contained in Environmental Impact Assessment Report, 2022’*.

1.5.2 EIA Screening

The first step in the EIA process is ‘Screening’ which determines whether an EIA is required (EPA, 2017), and usually commences at the project design stage. The EIA Directive lists those projects that require a mandatory EIA (Annex I) and those projects for which an assessment must be undertaken to determine if they are probable to result in likely significant effects (Annex II). For Annex II projects, individual Member States can choose to institute specific thresholds or project-specific considerations, or a combination of both of these approaches to arrive at a decision regarding the requirement to undertake an EIA.

In Ireland, EIA is mandatory for development of a class set out in Schedule 5 of the Planning and Development Regulations 2001 (as amended), which exceeds a limit, quantity or threshold set for that class of development. Schedule 5 transposes Annex I and Annex II of the 2011 EIA Directive into Irish law under Parts 1 and 2 of the Schedule, respectively. There have been no changes to Annex I introduced by the 2014 EIA Directive or the 2018 Regulations.

Developments which require an EIA for the purposes of Part 10 of the Planning and Development Regulations 2001 (as amended) are outlined under two separate sections, Part 1 and Part 2. The schedule of projects listed in Part 1 and Part 2 of Schedule 5 was consulted to determine whether the new development required an EIA.

The proposed development does not fall under any class of development listed in Part 1 of Schedule 5.

Consideration was given to the following projects listed in Part 2:

Table 1.2 Summary of the Mandatory Legislative Requirements for Environmental Impact Assessment Impact

Mandatory	Mandatory Criteria Met?
Part 2 of Schedule 5 (10)(b)(i) Construction of more than 500 dwelling units.	Yes
Part 2 (10) (b) (iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere.	Yes

As outlined in **Table 1.2** based on the size and design, the proposed development falls within two thresholds specified under Schedule 5 Part 2; therefore, the proposed development is a mandatory project for EIA under Schedule 5 and consequently a full Environmental Impact Assessment Report (EIAR) is required to support the planning application.

1.5.3 Scoping

If it is determined that an EIA is required, the next step is to ‘scope’ the content of the EIAR. Scoping considers the potential for likely significant effects throughout different phases of a proposed project to determine “the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR” (EPA, 2022).

As described in the draft EPA guidelines, “the potential for likely significant effects throughout different phases of the proposed project, are considered as far as possible at scoping stage – whether they would individually require consent or not. These include, as relevant, site investigations, construction, commissioning and operation to eventual decommissioning. Scoping also considers the range of alternatives to be considered in an EIAR” (EPA, 2022).

Scoping was conducted in the form of written consultation and consultation meetings:

1.5.3.1 Pre-Planning Consultation

In determining the content of the EIAR and the planning application the authors have considered relevant EU and Irish legislation.

A formal pre-planning meeting took place with Cork County Council (Council Ref: SHD33) on 15th July 2021 in line with Section 247 of the Planning and Development Act 2000 to discuss the proposed development and including addressing changes to the previously refused application on a portion of the application site (CCC Reg. Ref. 175399, ABP Ref. PL04.301610). Subsequent to this meeting, Cork County Council issued an Opinion and Minutes, outlining the Council's formal response. Refer to **Appendix 1.1**.

A second tripartite pre-planning meeting took place via Microsoft Teams on 3rd February 2022 between An Bord Pleanála, Cork County Council and the design team, during which the scheme was outlined. Subsequent to the meeting, the Board issued minutes of the meeting and an Opinion report detailing the specific information which should be submitted with the application. Minutes of this meeting, the Opinion and the An Bord Pleanála Inspector's Report are available in **Appendix 1.2**.

It should be noted that in addition to the above, discussions between Design Team members and the relevant Cork County Council departments have been ongoing. The Applicant and the Design Team held a meeting on 31st March 2022 with members of the Planning, Transport and HIIT Departments to principally discuss traffic and transport related items.

Observations made by both Cork County Council and An Bord Pleanála have been taken into consideration and addressed in the EIAR.

In addition, the following prescribed bodies were notified of the extent of the proposed development and were asked to comment on the proposal:

- An Taisce
- Inland Fisheries Ireland (IFI)
- Department of Environment, Energy and Communications (DoEEC)
- Department of Culture, Heritage and the Gaeltacht
- Department of Housing, Local Government and Heritage
- Geological Survey of Ireland
- The Health and Safety Executive
- The Irish Aviation Authority
- Irish Rail
- National Parks and Wildlife Services
- Office of Public Works
- Traffic Infrastructure Ireland

The correspondence sent to the above bodies and the responses received are contained in **Appendix 1.3**.

1.5.4 Environmental Impact Assessment Report (EIAR)

An EIAR is prepared as part of the EIA process. Typically the EIAR includes a baseline assessment to determine the status of the existing environment; impact prediction and evaluation to determine the significance of effects identified (this can include cumulative effects); determination of mitigation and monitoring measures to reduce the impacts identified; and a residual impact assessment once any mitigation and monitoring measures have been implemented.

An EIAR is defined by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (Statutory Instrument (S.I.) No. 296 of 2018) (EU, 2018):

“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”.

The EIAR consists of a systematic analysis and assessment of the potential effects of the entire proposed project on the receiving environment. The intended purpose of the EIAR is to:

- identify the baseline environmental context of the proposed development;
- inform the consenting authority, other regulatory bodies and the public of the possible environmental effects and impacts associated with implementation of the proposed development;
- determine whether the identified impacts could be significant;
- propose preventative or mitigation measures for potential impacts, as required, where feasible.

1.5.4.1 General Approach to Assessment

In preparing the EIAR, the following regulations and guidelines were considered:

- The requirements of EC Directives and Irish Regulations regarding Environmental Impact Assessment;
- 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);
- Advice Notes for Preparing Environmental Impact Statements Draft (EPA, September 2015);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of the Environment, Community and Local Government (DoECLG), 2013); and
- In addition, specialist disciplines have had regard to other relevant guidelines, as noted in the specific chapters of the EIAR.

For each technical EIAR chapter, the classification and significance of effects is generally evaluated in accordance with the EIA Directive and the methodology outlined in the EPA’s guidelines.

Where more relevant and specific standards and methodologies exist, they are adopted and outlined in the respective methodology sections within each technical chapter. The EIAR is based on the data gathered during the assessment process. It applies accepted methodologies in determining if effects will be significant and recommends mitigation measures to avoid or reduce impacts where possible.

Each of the chapters contains a description of the existing environment, an assessment of the likelihood and extent of any potential environmental impacts and proposes mitigation measures, where necessary.

1.5.4.2 Assessment of Impacts

The potential impacts of the Proposed Development and associated effects on a sensitive receptor/existing environment are determined. This is undertaken by assessing the character of effect (including magnitude, duration probability and quality) in comparison to baseline conditions using the relevant terminology outlined in the EPA’s guidelines (EPA, 2022) (Table 1.3). The assessment of impacts takes into account any embedded mitigation measures that forms an inherent part of the Proposed Development (and as included in the EIAR Chapter 2 Project Description). For this assessment, ‘embedded mitigation measures’ are those that have been incorporated into the design of the development and any ‘additional mitigation’ are those preventing, reducing and offsetting any remaining significant adverse effects. Where it has not been possible to quantify effects, qualitative assessments are carried out, based on expert opinion and professional judgement. Where uncertainty exists, this is noted in the relevant EIAR chapter. Overall, a character of effect of High, Medium, Low or Negligible is then assigned to the impact being assessed.

The matrix (Figure 1.2) adapted from the EPA’s guidelines is then used to classify the significance of effect being assessed. This considers the overall character of effect with the sensitivity of the receptor/existing environment.

Table 1.3 Impact Assessment Criteria

	Term	Description
Quality of Effects	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative /adverse	A change which reduces the quality of the environment
Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequence
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant	An effect which, by its character, magnitude duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude duration or intensity alters most of a sensitive aspect of the environment
	Profound	An impact which obliterates sensitive characteristics
Duration of Effect	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 than can be undone e.g. through remediation or restoration
	Frequency	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

	Term	Description
Types of Effects	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create a larger, more significant effect.
	'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).

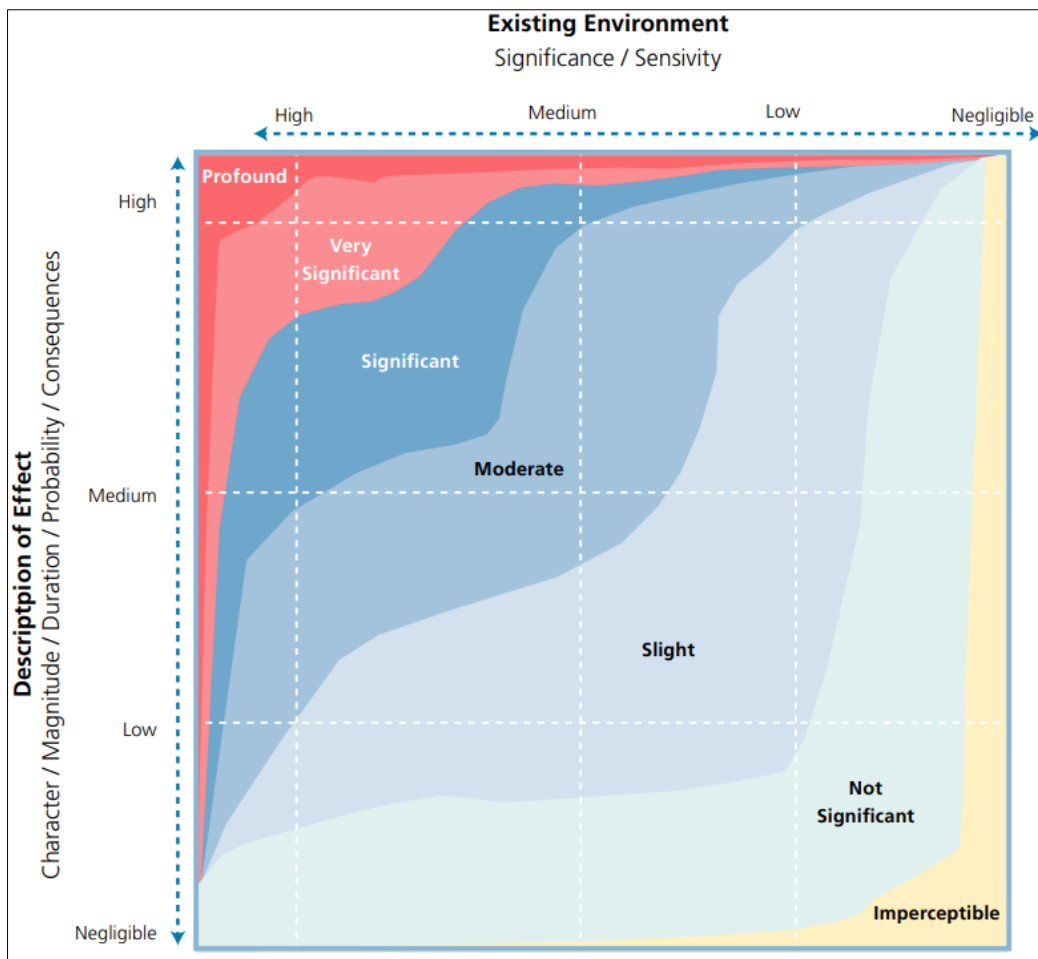


Figure 1.2 Determination of Significance Source: Figure 3.5, EPA Draft Guidelines (EPA, 2017)

1.5.4.3 Mitigation and Monitoring Measures

Mitigation and monitoring measures are identified through the assessment process to prevent, reduce, offset/remedy the likelihood of the environmental impact identified arising.

1.5.4.4 Residual Impacts and Effects

'Residual impacts' are defined as those impacts that remain following the implementation of mitigation measures. As per the EPA guidelines, the effects that remain after all assessment and mitigation are referred to as 'Residual Effects' (EPA, 2022). Determination of residual effects follows the same methodology outlined above.

It is important to note that the methodology outlined above is a general approach only. Characterising the character/significance of a potential effect can have specific criteria which is documented in the assessment chapters.

1.5.4.5 Cumulative Impacts

The proposed development has been assessed in the context and in combination with other relevant proposed or permitted developments in the vicinity.

1.5.4.5.1 *Cumulation with Other Plans*

The proposed project was considered in light of possible cumulative impacts associated with the implementation of the policies and objectives of the Cork County Development Plan (CDP) 2022-2028. The CDP, which has zoned the majority of subject lands for the proposed development as 'CT-R-01 Residential', was subject to Strategic Environmental Assessment which demonstrates that consideration of environmental issues are central to the development of planning policy in the county.


The Plan was also subject to an Appropriate Assessment (AA) the findings of which were integrated into the Plan. An AA determination was made by Cork County Council that with the incorporation of mitigation measures outlined in the NIS, the plan did not adversely affect the integrity of Natura 2000 sites within the county.

1.5.4.5.2 *Other Relevant Planning Permissions*

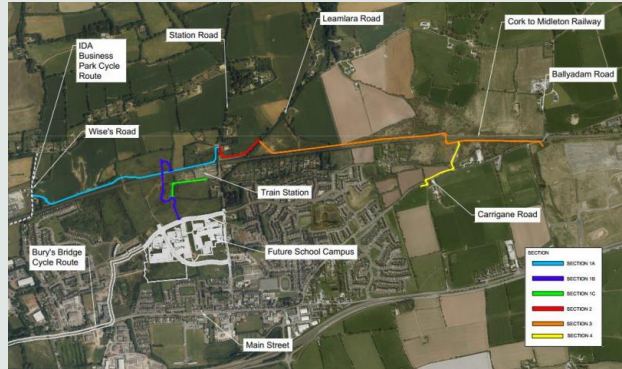
Planning applications within the vicinity of the proposed Castl lake development have been considered in terms of cumulative impacts. The potential for cumulative impacts is addressed in each specialist topic chapter.

Table 1.4, below outlines the planning permissions relevant to the proposed development.

Table 1.4 Other Planning Applications

Ref	Applicant	Description	Status
19/5707	Minister for Education & Skills	<p>Station Road Schools Campus</p> <p>Permission granted for construction of three no. new school buildings and the construction of a main link road with roundabout from Castlake Housing Estate to Station Road and an additional link from the roundabout to Station Road. This campus comprises of two primary schools and one post-primary school.</p> 	<p>Granted. Link Road currently under construction. Construction of schools due to start Q2/Q3 2022 with completion date of September 2023.</p>
19/5836	IDA	<p>Internal road upgrades, IDA Business Park.</p> <p>Internal road upgrades. The proposed development will involve the upgrade of existing internal access roads to provide a dedicated shared use cycleway and footpath, pedestrian and cycle crossing point, bus lane, bus shelter and traffic safety barrier. The proposed development will also include for the provision of a cycleway and footpath adjacent to the L-3616 public road to connect into the L-3615 at the north eastern corner of the IDA Business Park.</p>	Complete
N/A	Cork County Council	<p>Burys Bridge Cycleway.</p> <p>Part 8 consent for strategic cycleway scheme connecting Bury's Bridge at Dunkettle with Carrigtwohill. The cycleway enters the west side of Carrigtwohill to the north of Cobh Cross (N25 Junction 3) and runs parallel to Carrigtwohill Main Street before turning north and running along the Castlake Access Road where it then joins the link roads associated with the new schools campus permitted under 19/5707.</p> 	Approved
N/A	Cork County Council	<p>Carrigtwohill–Middleton Inter-Urban Cycleway Phase 1</p> <p>Part 8 strategic cycleway scheme proposal extending from Wises Road, north of the Cork to Middleton railway line at the western end of Carrigtwohill to the east of the Carrigane Road bridge at the eastern end of Carrigtwohill. The scheme will pass through the Carrigtwohill UEA, cross Wises Road, Station Road, Leamlara Road and Carrigane Road. It will connect to the Carrigtwohill</p>	Approved April 2022

Train Station and the new school campus on Station Road. The scheme will provide connectivity between the existing IDA Business Park to the west of Wises Road and the industrial zoned lands to the south of the Carrigane Road.

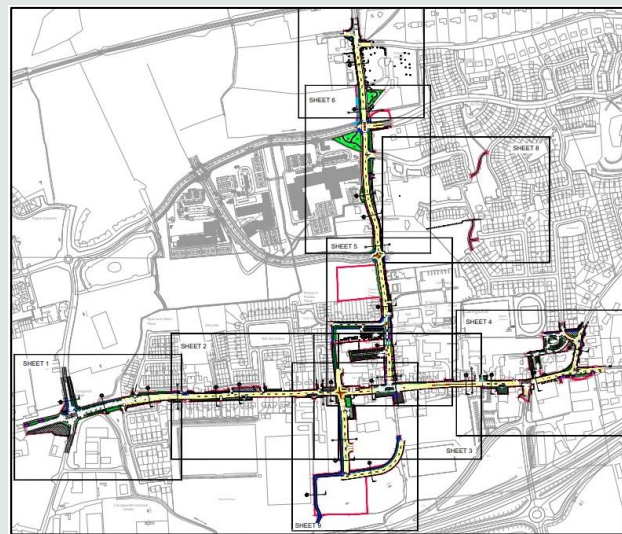


Carrigtwohill URDF – Public Realm Infrastructure Bundle:

Part 8 proposal for Main Street and Station Road Public Realm Works including footpath widening, road re-alignment, resurfacing, signalisation, traffic calming measures, street lighting, demolition of buildings at the junction of Main Street and Station Road along with other small scale demolition works, and provision of new public spaces, upgrade of Wises Road junction, additional capacity measures at N25Junction 3 (Cobh Cross) including widening and realignment of approach roads to the roundabout. It is expected that the proposed development will be advertised before year end 2021.

Pending decision

N/A Cork County Council



18/4693	BAM property Ltd	Construction of a crèche of 581sq.m over one and two storeys, new entrance, carparking and boundaries, and all associated site development works.	Approved
17/4498	Murnane O'Shea Ltd.	Residential development of 25 no. residential units and all ancillary site development works. The proposed development consists of 20 no. 3 bed semi-detached dwellings, 4 no. 2 bed semi-detached dwellings and 1 no. 3 bedroom detached dwelling. The development will be accessed via an upgraded entrance from Church Road.	Approved
21/7130	Connaught Trust Ltd	Construction of 63 no. residential units	Conditional

1.5.4.5.3 *Cumulative impacts associated with phasing of this project*

The cumulative impacts of the internal phasing of the proposed development have also been considered. The phasing is outlined in Chapter 2 Project Description and addressed, where appropriate, in the individual EIA chapters.

1.6 Project Team

The project team, their qualifications and experience are outlined in **Table 1.5** below.

Table 1.5 EIAR Team Expertise

CHAPTER	NAME & QUALIFICATIONS	COMPANY	RELEVANT EXPERIENCE
Chapter 1, Introduction and Methodology	Áine Ryan M.Sc, B.Sc, Dip.	MWP	Áine is an environmental scientist with over 25 years’ experience in environmental assessment. She has particular experience in EIAR for large-scale projects including roads projects, windfarms, pharmaceutical facilities etc. She has significant experience in Waste Management, Environmental Liabilities and Public Consultation.
Chapter 2, Description of the Proposed Development			
Chapter 3, Project Need and Alternatives			
Chapter 4, Population and Human Health	Maura Talbot (BA, MA)	MWP	Maura has a Masters Degree in Human Geography, Honours degrees in Geography and Economics, and 25 years of experience working as a Senior Environmental and Socio-Economic Specialist Consultant on a full time and freelance basis. She as managed and contributed to environmental and social impact assessments (ESIAs and EIAs) of roads, powerlines, mines, biofuel estates, golf courses, conservation, tourism, and residential developments in various African countries. She has also provided specialist input into Strategic Environmental Assessments (SEAs) related to mining developments, conservation, forestry and municipal spatial planning processes. Facilitating stakeholder engagement processes has been a critical responsibility for her in many of these projects.
Chapter 5, Biodiversity	Gerard Hayes (Ba, Sc)	MWP	Gerard Hayes is a Senior aquatic ecologist with over 13yrs experience in environmental consultancy. He is a member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and the Freshwater Biological Association (FBA). He is an accredited Freshwater Pearl Mussel Surveyor. Gerard works on waste assimilation capacity assessment, report writing (EIS, EIA, EA, AA, NIS) and ecological monitoring particularly water quality assessments involving electro-fishing, snorkelling, netting, benthic macro-invertebrate sampling and taxonomic identification (freshwater, brackish, marine).
Chapter 6, Land & Soils	Jasmine Spoerri B.Sc., M.Sc	MWP	Jasmine is an environmental engineering geoscientist who has experience in site investigations, geological assessment of bedrock and design of coastal protection and wind turbine foundation design. She has also contributed to reports on hydrogeology and environmental geology.

Chapter 7, Water (Surface and groundwater)	Fergus Doyle B.A, M.Sc, AMIEnvSc	MWP	Fergus is an environmental scientist with Malachy Walsh and Partners. He has experience working on a number of multi-disciplinary EIAR projects. Fergus has been a contributing author on a number of EIARs, Appropriate Assessment Reports, Natura Impact Statements and Ornithology Reports.
Chapter 8, Air Quality & Climate	Valerie Heffernan (BSc, MSc)	MWP	Valerie has worked as an environmental professional since graduating in 2015 and has been employed as an Environmental Scientist with Malachy Walsh and Partners since 2018. She has considerable experience in renewable energy developments and has had input in a variety of project including solar farms, marine developments, and wind energy. She is experienced in planning and environmental report input and in the preparation of Foreshore Licences.
Chapter 9, Material Assets including Traffic & Transportation	Kieran Barry (BEng, PgD)	MWP	Kieran is an Environmental Scientist with the Environment team at MWP. Kieran works on a variety of infrastructure projects conducting environmental assessments and supporting the delivery of a number of environmental deliverables including Environmental Impact Assessment (EIA) Screening Reports, feasibility and constraints studies, route options assessments and Environmental Impact Assessment Reports (EIAR).
Chapter 10, Cultural Heritage and Archaeology	Avril Purcell, B.A., M.A., MIAI	Lane Purcell Archaeology	Avril Purcell has worked as a licensed consulting archaeologist for over 20 years. She has managed and coordinated a number of major archaeological excavation projects and cultural heritage assessments. Her involvement in projects often extends from pre-planning assessment through to implementation of mitigation including archaeological excavation.
	Musetta O’Leary, B.A., M.A.		Musetta has fifteen years’ experience in all aspects of archaeological consultancy. She has co-ordinated and written the Cultural Heritage section of a large number of diverse EIAR projects ranging from infrastructure, energy, commercial and residential. Her involvement extends through all aspects of the planning process from constraint study and site appraisal, EIAR cultural heritage chapter compilation to oral hearings.
Chapter 11 Landscape and Visual	Ronan Finnegan, B.Sc., PG Dip, CMLI	Cunnane Stratton Reynolds (CSR)	Ronan is a chartered landscape architect with over thirteen years’ experience as a landscape architect which has involved undertaking Landscape and Visual Impact Assessments (LVIA) for a broad range of development types including large residential, infrastructure and renewable energy projects located across Ireland and the UK.
Chapter 12, Noise and Vibration	Peter Barry B.Sc., M.Sc.	MWP	Peter is an Environmental Scientist with 18 years’ experience in the field of environmental assessment. Peter specialises in the measurement, prediction and assessment of Environmental Noise. Peter is a member of the Institute of Acoustics (IOA) and completed the IOA Diploma in Acoustics and Noise Control in 2014.
Chapter 13, Traffic and Transportation	Seamus Quigley BE, CEng, MIEI, CIHT	MWP	Seamus has extensive experience over 25 years in Transport planning and traffic engineering projects including traffic impact assessments, traffic management studies, Feasibility Studies and Road Safety Audits.
Chapter 14, Interaction of Effects	Fergus Doyle B.A, M.Sc, AMIEnvSc	MWP	Fergus holds an MSc in Environmental Protection and Management and is a member of the Institute of Environmental Scientists. Fergus has authored Environmental Impact Assessment Reports, Detailed Site Assessments, Remediation Plans, Appropriate Assessments, Environmental Reports and Construction and Environmental Management Plans for a wide range of projects.
Chapter 15, Schedule of Mitigation Measures			

1.7 Difficulties Encountered

No major difficulties were encountered during the course of the EIA process or in the compilation of the EIAR, such that the prediction of impacts has not been possible.

1.8 Note on Drawings and Graphics

Details of the proposed development are supported by the planning application drawings prepared by MWP in compliance with our internal Quality Management System (accredited to ISO: 9001). These drawings accompany the planning application and are referenced as relevant throughout the EIAR. The 1:50,000 and 1:25,000 mapping that was used to generate many of the figures in the EIAR are the copyright of Ordnance Survey Ireland (OSI licence number EN0015720).

1.9 Typographical Errors

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

1.10 Availability of the EIAR Documentation

This EIAR will be available in printed form from the offices of Cork County Council, and An Bord Pleanála, 64 Marlborough St, Rotunda, Dublin 1, D01 V902. Additionally, prior to lodging this application, the required information has been issued to the Department of Housing, Planning and Local Government's EIA Portal.

The EIAR will also be available to view electronically at the following websites: <https://castlelakeshd.ie/>

1.11 References

Department of Housing, Planning, Community and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);

Department of Housing, Planning, Community and Local Government (2017) Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems;

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

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

Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements Draft September 2015;

Environmental Protection Agency (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;

2. Description of The Proposed Development

2.1 Introduction

The purpose of this chapter is to give an overview of baseline conditions on the site and to provide an appropriate level of detail on the project to present a basis for the EIAR. The aim is to outline and describe the objectives, scope and overall proposed execution of the project while also providing details on the various stages including construction and operation and any the management of environmental emissions associated with these phases. The environmental impacts of the proposed development are examined for each of the environmental topics in separate chapters of this EIAR.

2.1.1 Competency of Assessor

This chapter report was prepared by Áine Ryan, MSc., BSc, Dip., who is an Environmental Scientist with over 25 years' experience. She has worked on EIARs for a variety of large scale infrastructure projects including roads, wind farms, waste/recovery projects and pharmaceutical plants.

2.2 Existing/Baseline Environment

2.2.1 Site Location

The proposed development site is located in Carrigtwohill 16km east of Cork city and 9km east of the Jack Lynch tunnel, on the northern side of the N25 Cork to Waterford road. The proposed development is located circa 500m west of Carrigtwohill village. The site is bounded by agricultural lands to the north, the existing Castl lake housing estate to the west and the Cork Road L3680 to the south. The site can be directly accessed from the Cork Road L3680 and from the west via the Castl lake housing estate. The N25 is easily accessible at junctions to the west and east of the site. The site location is shown in **Figure 2-1**.

The proposed development lands bound the Cork-Midleton Railway line to the north. Carrigtwohill train station is located circa 160m to the north east of the site boundary. The train station serves Midleton and Cobh to the east and south and Cork to the west, with onward links to Dublin and the rest of the country.

The site lies north of the N25 motorway corridor and has both road frontage and main vehicular access road connections onto Station Road with two underpasses constructed along the northern boundary of the site to accommodate future development lands. An east-west link road is currently under construction along the southern boundary of the main land block associated with the development of a new schools campus (Planning Ref: 18/5707).

Carrigtwohill district park, containing sports pitches, running track, playgrounds and an all-weather pitch is within 1km, or 20 minutes walking distance, of the site.

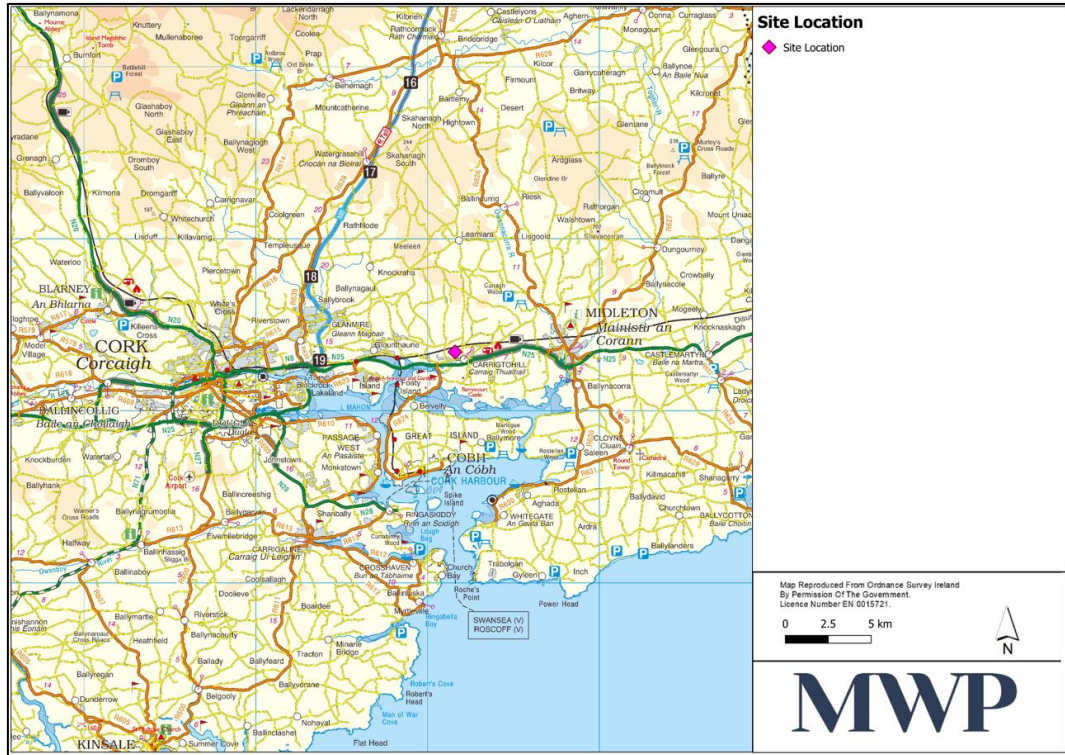


Figure 2-1 Site Location

2.2.2 Site Description

The development site comprises 18.17 hectares of which 16.6 hectares is developable. Refer to **Figure 2-2** for the site boundary in relation to this development.

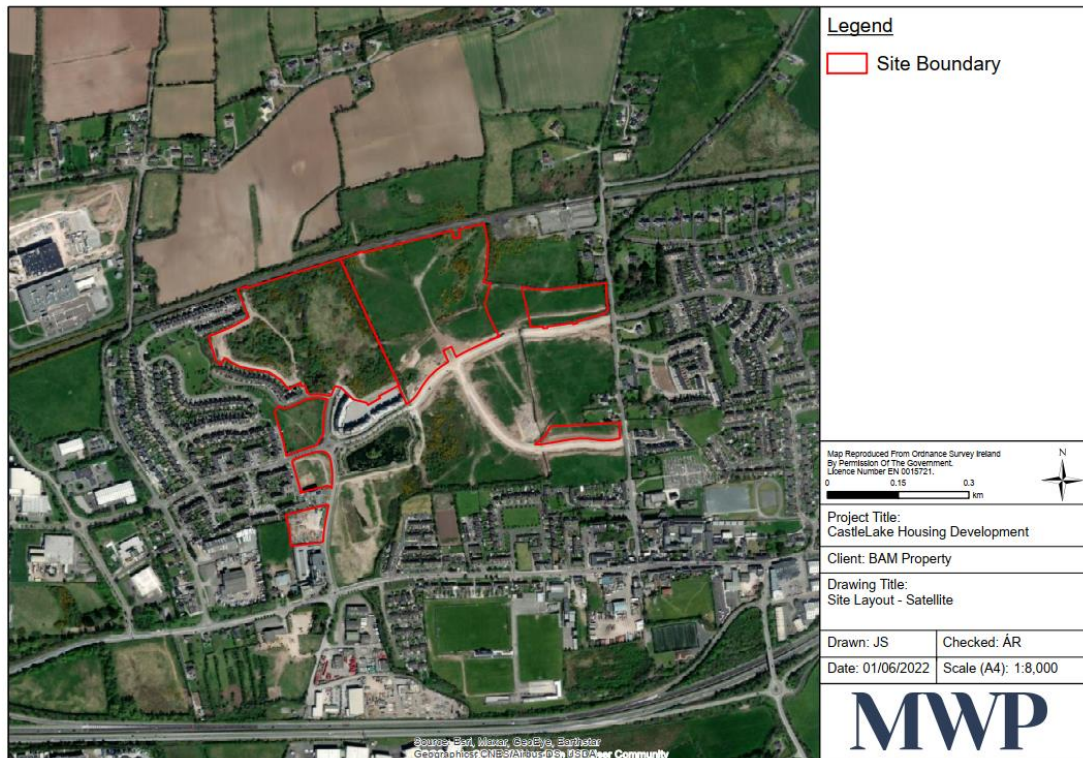


Figure 2-2 Site Boundary

The proposed development lands currently comprise mainly improved agricultural grassland in the eastern portion of the site and mainly scrub and immature woodland in the western portion. There are some treelined hedgerows mainly in the centre of the site and along the boundary with the Woodstock stream at Station Road. There are no buildings on site currently. **Plate 2-1** and **Plate 2-2** show existing views into the site from the north and south.



Plate 2-1 Long Distant views to the south from the north of the site



Plate 2-2 Views towards the north of the site and beyond to ridgeline

The proposed development site is adjacent to an east-west link road which is currently under construction and which abuts the southern boundary of the proposed development. Immediately to the south of the main land parcel lies Castlelake, a manmade lined attenuation pond, and existing apartments which are currently undergoing refurbishment. Refer to **Plate 2-3** To the north east lies Carrigtwohill train station which is within easy walking distance of the proposed development.



Plate 2-3 Castlelake attenuation pool and adjacent apartments undergoing refurbishment

2.2.3 Land Ownership

The lands on which the proposed development will be constructed are in the ownership of BAM Property. Details on the applicant, BAM Property, are outlined in Section 1.1 of Chapter 1.

2.2.4 Surrounding Land Use

In the immediate vicinity the site is bounded to the north by the Cork to Midleton railway line. The lands to the north of the railway line are currently under agricultural use but under the latest County Development Plan (CDP) 2022-2028 are zoned for Residential (CT-R-07), Community (CT-C-03) and for Green Infrastructure (CT-GR-01). Immediately to the west of the site is the existing Castlelake housing development (Planning Ref 00/7674 and An Bord Pleanála PL04.131129) which was built in the early 2000s. To the south of the site at the junction with the L3860 lies a small shopping area/precinct including an Aldi supermarket, a pharmacy, a café and associated carparking. To the north east lies lands owned by Cluid Housing Association beyond which lies Carrigtwohill train station which is in easy walking distance of the proposed SHD development. Between the Station Road South and Station Road North land parcels lie Department of Education lands which have planning permission under Planning Ref 19/5707 for the construction of a schools campus comprising 2 no. primary schools and 1 no. secondary school. Construction of this project is expected to commence in Q2/Q3 2022 with an expected completion date of September 2023. BAM are also the contractors for this project. **Figure 2-3** places the site in local context. There are existing overhead power lines and an associated wayleave located along the western boundary of the proposed development.



Figure 2-3 Site in Local Context

2.2.5 Connectivity

Cycling infrastructure is currently undergoing significant improvement in the vicinity of the proposed SHD development with the construction of the Bury's Bridge to Carrigtwohill cycle route connecting Dunkettle to Carrigtwohill via Glounthaune. This is a dedicated pedestrian and cycle route on the northern side of the L3004 (the old N25). This scheme will be integrated into the access roads currently under construction immediately to the south of the proposed SHD development and will create a link to Station Road and Carrigtwohill Train Station. Refer to **Figure 2-4**. This scheme will also link into Sections 1A, 1B and 1C of the proposed Carrigtwohill to Midleton Inter Urban Cycleway Phase 1, which will mainly run to the north of the existing railway line with a connection to the schools campus and the train station. Refer to **Figure 2-5**.

The IDA Ireland Business and Technology Park road network to the east has recently been upgraded to include a shared footway and cycleway throughout the scheme. At its northern end, the shared footway and cycleway continues offline east of the Park and north along the east side of the L3615 to the north of the railway line.

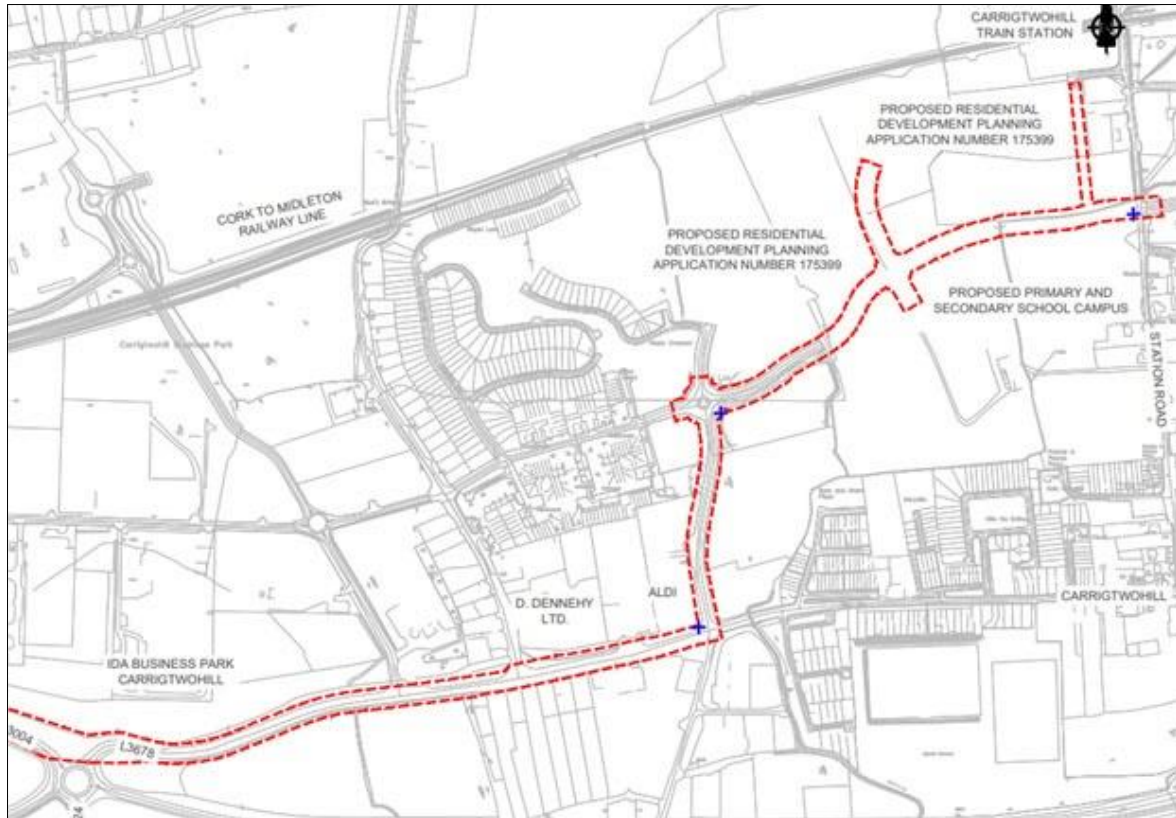


Figure 2-4 Local Section of Bury's Bridge to Carrigtwohill Cycle Route

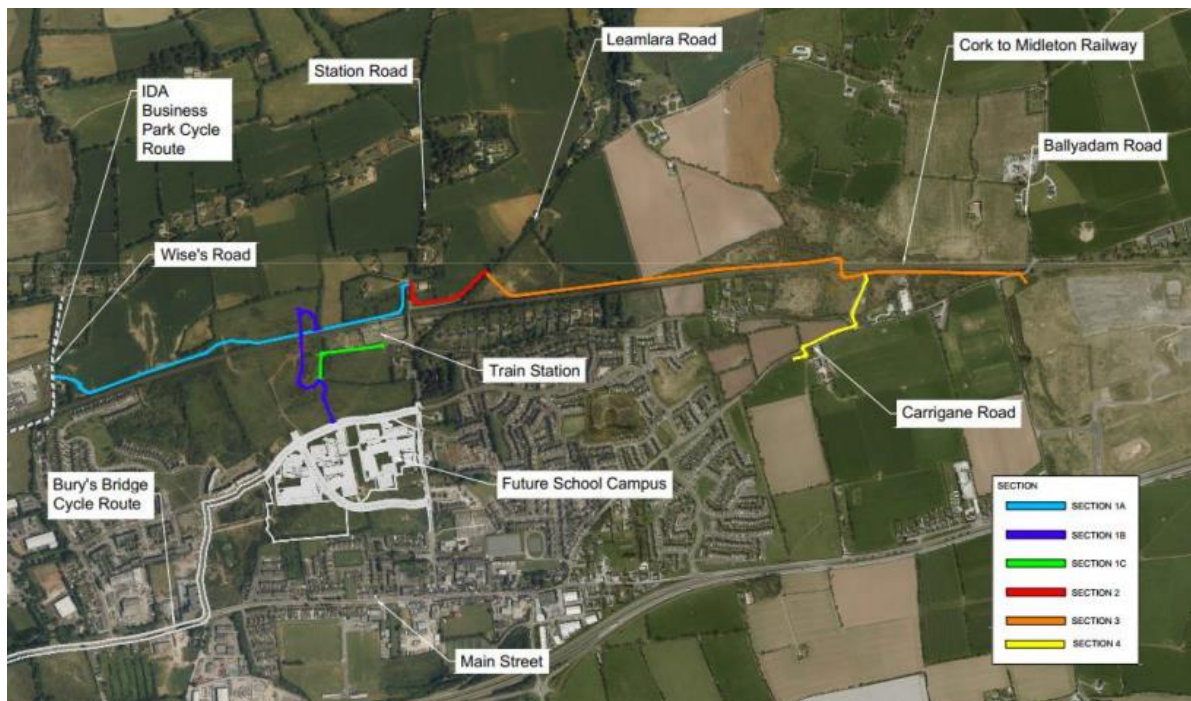


Figure 2-5 Carrigtwohill to Midleton Inter Urban Cycleway Phase 1

The proposed development will also tie in with the proposed Cork County Council Carrigtwohill Urban Regeneration Development Fund (URDF) Public Realm project which is currently going through the Part 8 Planning Process.

In terms of public transport, Carrigtwohill is well served by public transport both rail and bus services. The town is located on the Cork-Midleton rail line which has a rail service to Cork and/or Midleton every 15 minutes during peak times and every 30 minutes during off peak times. Journey times to Cork (Kent) take 15 minutes, to Midleton 7 minutes and Little Island 8 minutes. Refer to **Figure 2-6** for the train links from Carrigtwohill.

Carrigtwohill is served by 4 no. Bus Éireann bus services as outlined in **Table 2-1**.

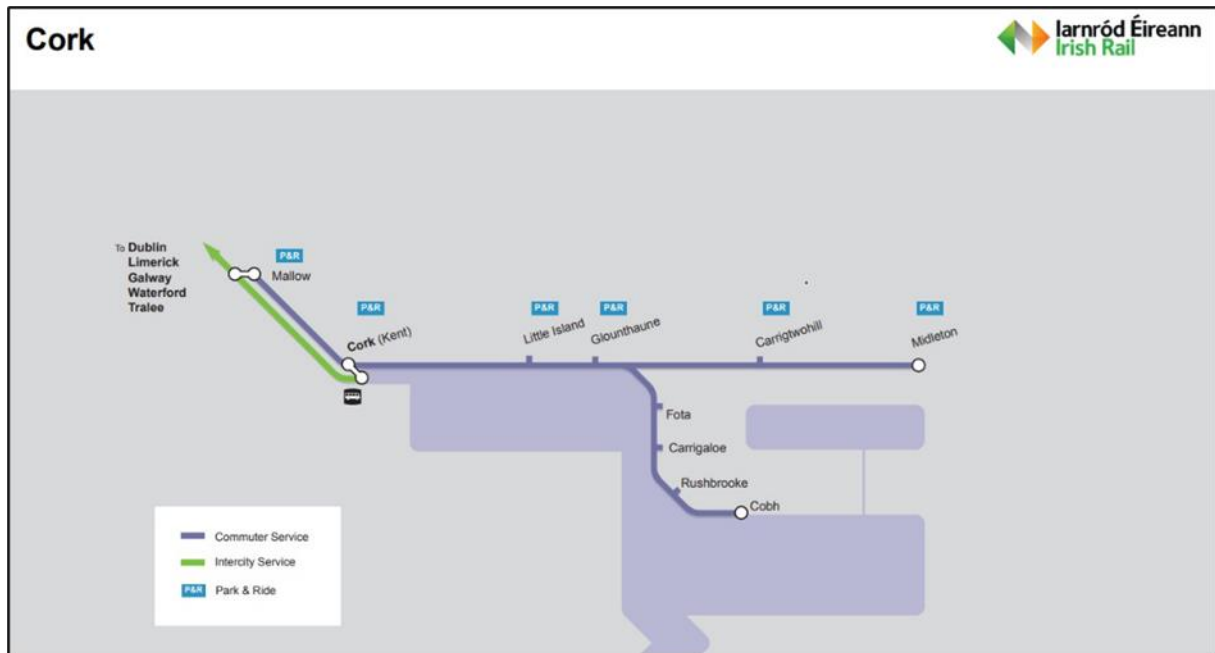


Figure 2-6 Cork Train Services

Table 2-1 Carrigtwohill Main Street Bus Éireann Services

Bus Éireann Service Number	Route
240	Cork-Cloyne-Ballycotton
241	Cork-Midleton-Whitegate-Trabolgan
260	Cork-Youghal-Ardmore
261	Cork-Midleton-Ballinacurra

In terms of road access, the site lies north of the N25 motorway corridor and has both road frontage and main vehicular access road connections onto Station Road with two underpasses constructed along the northern boundary of the site to accommodate future development lands. The Cork Road L3680 lies to the south of the site and provides direct access to Carrigtwohill and to the N25 via the Junction 3 to the west and junction 4 to the east at Carrigtwohill.

Access to the development will be via the Cork Road, the existing main distributor road system in Castlelake, Station Road to the east and the planned connector roads between these and the underpass to the north.

2.2.6 Biodiversity and Natura 2000 sites:

The proposed development lands currently comprise mainly semi-natural habitats and artificial surfaces, made up of mainly improved agricultural grassland in the eastern portion and mainly scrub and immature woodland in the western portion. The site is bounded to the east by the Woodstock Stream which flows along the eastern and southern boundaries of the eastern portion of the site. To the east the Anngrove Stream flows through the existing Castlake housing Estate and into the manmade and lined attenuation pond at Castlake (**Plate 2-4**) from where it flows in a southerly direction towards Cork Harbour. The Woodstock Stream joins the Anngrove stream to the south of the existing attenuation pond. There are also drainage ditches on site which ultimately drain into the Woodstock stream south of the proposed development. The existing ecology of the site and the likely impacts and mitigation measures are outlined in detail in Chapter 5 Biodiversity, of this EIAR.



Plate 2-4 Existing Manmade Attenuation Pond

In terms of Natura 2000 sites, three are present within the zone of potential influence of the proposed development (**Table 2-2**). **Figure 2-7** shows the location of Natura 2000 sites within the 15km (zone of influence).

Table 2-2 Natura 2000 Sites within zone of potential impact influence of the proposal site

Designated Site	Site Code	Proximity of Site to Nearest Point of Designated Site	Hydrological/Ecological Connection? (Yes/No)
Cork Harbour SPA	004030	708m south	Yes. There is a direct hydrological to Cork Harbour SPA via Woodstock stream which runs north-south through the site (EPA code: IE_SW_19T250870).
Great Island Channel SAC	001058	772m south	Yes. There is a direct hydrological to Great Island Channel SAC via Woodstock stream which runs north-south through the site (EPA code: IE_SW_19T250870).
Blackwater River (Cork/Waterford) SAC	002170	12.15km north	No. This SAC is located upstream of the proposed development and lacks a hydrological or ecological connection.

Two Natura 2000 sites are connected to the proposed development. The subject site is hydrologically connected to the Great Channel Special Area of Conservation (SAC) and Cork Harbour Special Protection area (SPA) via the Woodstock Stream which flows through the site and downstream to both these Natura 2000 sites.

An Appropriate Assessment screening report (refer to Appendix 1 of the Natura Impact Statement submitted separately with the planning application) concluded there is potential for significant effects on two Natura 2000 sites due to the following reasons:

- There is potential for impacts to water quality of these sites; and
- There is a potential for invasive species to be spread downstream and alter the habitats for which Cork Harbour SPA and Great Island Channel SAC are designated.

Consequently, a Natura Impact Statement (NIS) has been prepared and is presented *as a stand alone* report. The NIS concludes:

on the basis of the best scientific knowledge available, and with the implementation of the mitigation and restriction measures set out under Section 3.6 (of the NIS) that the possibility of any adverse effects on the integrity of the European Sites considered in this NIS (having regard to their conservation objectives), or on the integrity of any other European Sites (having regard to their conservation objectives,) arising from the proposed development, either alone or in combination with other plans or projects, can be excluded beyond reasonable scientific doubt.



Figure 2-7 Site boundary Natura 2000 sites within 15km (zone of potential influence)

2.3 Description of the Project

BAM property, intend to apply to An Bord Pleanála for a 10 year planning permission for a Strategic Housing Development (SHD) at Castlelake, Carrigtwohill, County Cork. The development is located just east of the existing Castlelake development which was granted planning permission in 2000.

The proposed SHD development will consist of the construction of a strategic housing development of 716 no. units and a 2 storey creche. The proposed development comprises:

- 224 no. detached, terraced and semi-detached houses,
- 284 no. duplex units and
- 208 no. apartments, one to three bed units.
- 2 storey creche.

The two storey houses comprise 48 no. detached, 126 no. semi-detached and 50 no. terraced Houses containing 60 no. two bed units, 139 no. three bed units and 25 no. four bed units. The part-one to part-three storey duplex units are contained in 122 no. buildings providing 82 no. one bed units, 142 no. two bed units and 60 no. three bed units. There are 7 no. apartments blocks ranging in height from part-1 to part- 5 no. storeys.

- Block 1 is 4 no. storeys and contains 34 no. units (7 no. one bed units, 19 no. two bed units and 8 no. three bed units).
- Block 2 is part-1 to part-5 no. storeys and contains 42 no. units (15 no. one bed units, 20 no. two bed units and 7 no. three bed units).
- Block 3 is 5 no. storeys and contains 17 no. units (8 no. one bed units and 9 no. two bed units).
- Block 4 is 4 no. storeys and contains 13 no. units (6 no. one bed units and 7 no. two bed units).
- Block 5 is 4 no. storeys and contains 13 no. units (6 no. one bed units and 7 no. two bed units).
- Block 6 is 4 no. storeys and contains 13 no. units (6 no. one bed units and 7 no. two bed units).
- Block 7 is 5 no. storeys over basement and contains 76 no. units (23 no. one bed units, 41 no. two bed units and 12 no. three bed units).
- All blocks contain ancillary internal and external resident amenity space.

The proposed development also provides for: hard and soft landscaping; boundary treatments; public realm works; car parking; bicycle stores and shelters; bin stores; lighting; plant rooms; and all ancillary site development works above and below ground.

The development comprises new public open spaces in addition to general landscaping, off street parking and new services including foul, storm, ESB, telecommunications, water, cycle parking, bin storage and public lighting. The proposal includes for the construction of new distributor roads which link to existing roads, a network of cycle paths linking to amenity areas, schools, the nearby trains station and the Dunkettle to Carrigtwohill Greenway.

The proposed landscape design strategy comprises a series of open spaces including 2 large neighbourhood parks; 8 local parks, a 'Village Green/Plaza' area; communal amenity space for the apartments; incidental open space; and streetscape planting.

Refer to **Figure 2-8** for the proposed Site Layout. An A3 version of the site layout is provide in **Appendix 2.2**.



Figure 2-8 Proposed Site Masterplan Layout

The application site relates to 7 no. parcels of lands, as illustrated in the **Figure 2-9**, which provide a consolidated plan for the development of these currently undeveloped lands. The land parcels fit in and around the existing built development and the road infrastructure currently nearing completion. The 7 land parcels are described below, from bottom left in a clockwise direction:

1. **Castlelake South – Site 1:** 0.563 hectares (1.39 acres). This parcel is the most southerly of the land parcels and currently characterised as bare ground and/or artificial surfaces. In the phasing plan (described in Section 2.4.1 below) this parcel will comprise part of Phase 5.
2. **Castlelake South – Site 2:** 0.559 hectares (1.38 acres). This plot currently comprises bare ground and artificial surfaces with some scrub. In the phasing plan (described in Section 2.4.1 below) this parcel will comprise part of Phase 2.
3. **Castlelake West:** 0.922 hectares (2.28 acres). This plot is currently under amenity grassland with some trees. In the phasing plan (described in Section 2.4.1) this parcel will comprise part of Phase 2.
4. **Castlelake North:** 8.0 hectares (19.769 acres) of which 7.16 hectares is developable due to presence of ESB wayleave. This land parcel is currently characterised by scrub and improved agricultural grassland, with pockets of bare ground. A tree-line drainage ditch separates Castlelake North from the adjoining Blandcrest land parcel. In the phasing plan, Castlelake North comprises Phase 3 in the eastern portion and Phase 4 in the western half.
5. **Blandcrest:** 7.25 hectares of developable land (17.09 acres). This area is currently characterised as being mainly improved agricultural grassland. The western boundary is marked by a tree-lined drainage ditch. Another east-west drainage ditch traverses the southern section of this plot and joins the aforementioned drainage ditch to the north of the attenuation pond. The majority of this block will be constructed as part of Phase 1 of the SHD development. A small portion in the north east of this land parcel will be constructed as part of Phase 5 and will contain apartments. The Carrigtwohill to Midleton Inter-Urban cycleway will enter this parcel via an existing railway underpass and skirt to the south of the proposed apartment block before turning north and then east to link up to Carrigtwohill train station.
6. **Station Road North:** 1.27 hectares (3.15 acres). This area is currently under improved grassland. It is bounded to the east by the Woodstock stream which is culverted as it turns west along the southern boundary of this land parcel. This land parcel will also be constructed as part of Phase 1 of the proposed development.
7. **Station Road South:** 0.522 hectares (1.29 acres). This area currently comprises mainly improved agricultural grassland. In the phasing plan this area will be built-out as part of Phase 1 of the proposed SHD development.

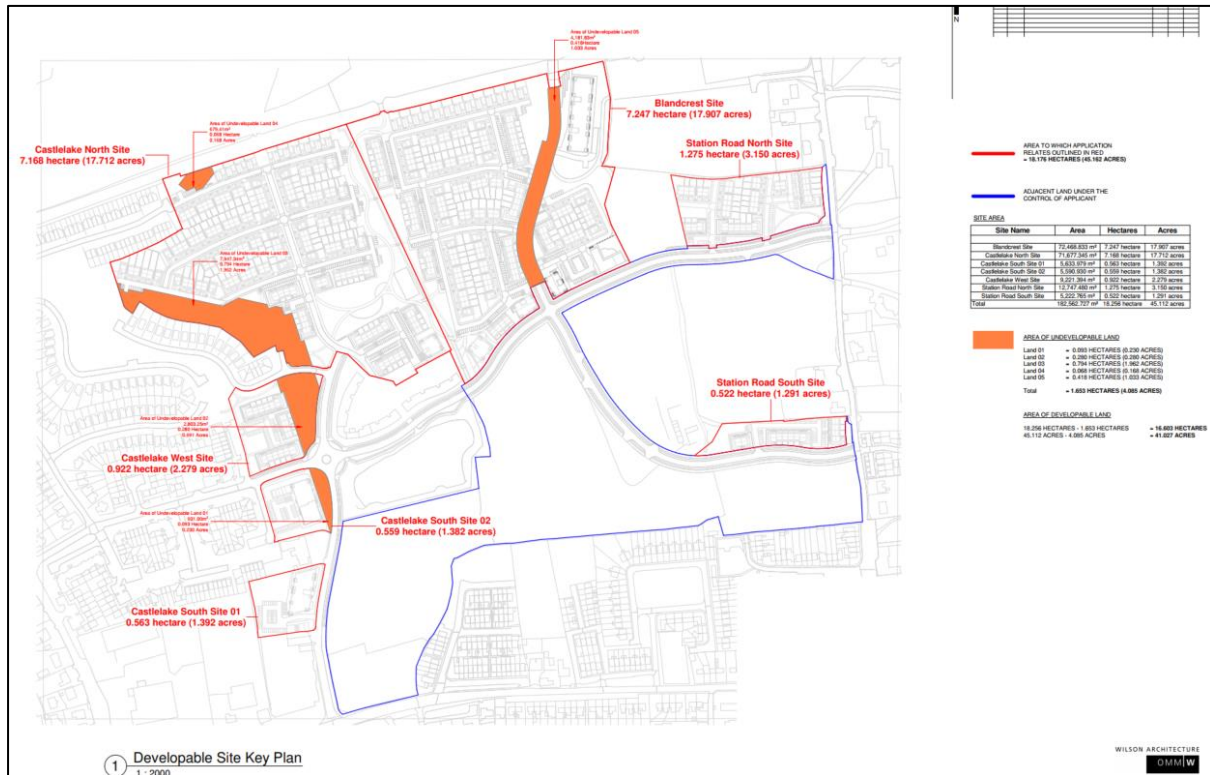


Figure 2-9 Application Land Parcels

The design of the layout and landscape proposal has been informed by the guidance set out in the 2013 Universal Design Guidelines for Homes in Ireland. The main features of the proposed development as follows:

- All buildings houses have level access delivering ease of access for all. The public realm is designed to ensure accessibility on equal terms for people of a range of ages and physical mobility.
- A range of apartment types have been proposed in terms of both size and design meeting the aspirations of a range of people and households.
- The proposed development presents a welcoming and positive aspect to passers-by, creating an accessible urban, public realm and allowing for direct connectivity to open spaces and adjoining lands, thus avoiding unnecessary physical and visual barriers.
- Connectivity to adjoining lands has been incorporated into the design of the layout. The network of paths and cycle routes ensure full permeability throughout the scheme and ensures connectivity from the site to the surrounding area and local facilities beyond.
- Falls and gradients have been minimized wherever possible on site and level access will be provided at all parking locations. All units within the development will meet the requirements of Part M of the Technical Guidance Documents where accessibility is concerned.
- Public spaces, streets and parks, are all designed so that every member of society can use them. Dwellings address these spaces so that they are passively supervised, creating safe spaces for everyone to use. The activity generated here enhances the open space realm.

2.3.1 Open Spaces, Play Areas and Landscape

A key objective of the landscape strategy for the proposed scheme is to provide opportunities for passive and active recreation, by way of fitness areas/exercise stations, kick-about areas, play facilities and pathways through the public spaces. These proposed spaces in addition to providing recreational opportunities, will also promote connectivity within the overall lands and adjoining areas.

The proposed layout successfully utilises the existing landscape elements including the topography, where achievable. The primary design consideration within the landscape was to consider the requirements of the future residents, through the provision of high quality public spaces with a strong landscape character. The proposed landscape strategy forms part of the overall public space network within the overall development. The public spaces are distributed throughout the development to complement and enhance the site layout plan, with the main public spaces located within the centre of the development.

The proposed landscape areas comprise a series of open spaces including:

- 2 large neighbourhood parks;
- 8 local parks;
- A 'Village Green/Plaza' area;
- Communal amenity space for apartments
- Incidental open space and;
- Streetscape planting

Refer to **Figure 2-10** for Landscape Design and Public Realm Strategy. The Landscape Masterplan is presented in **Figure 2-11**. An A3 version of this masterplan is available in **Appendix 11.1**.

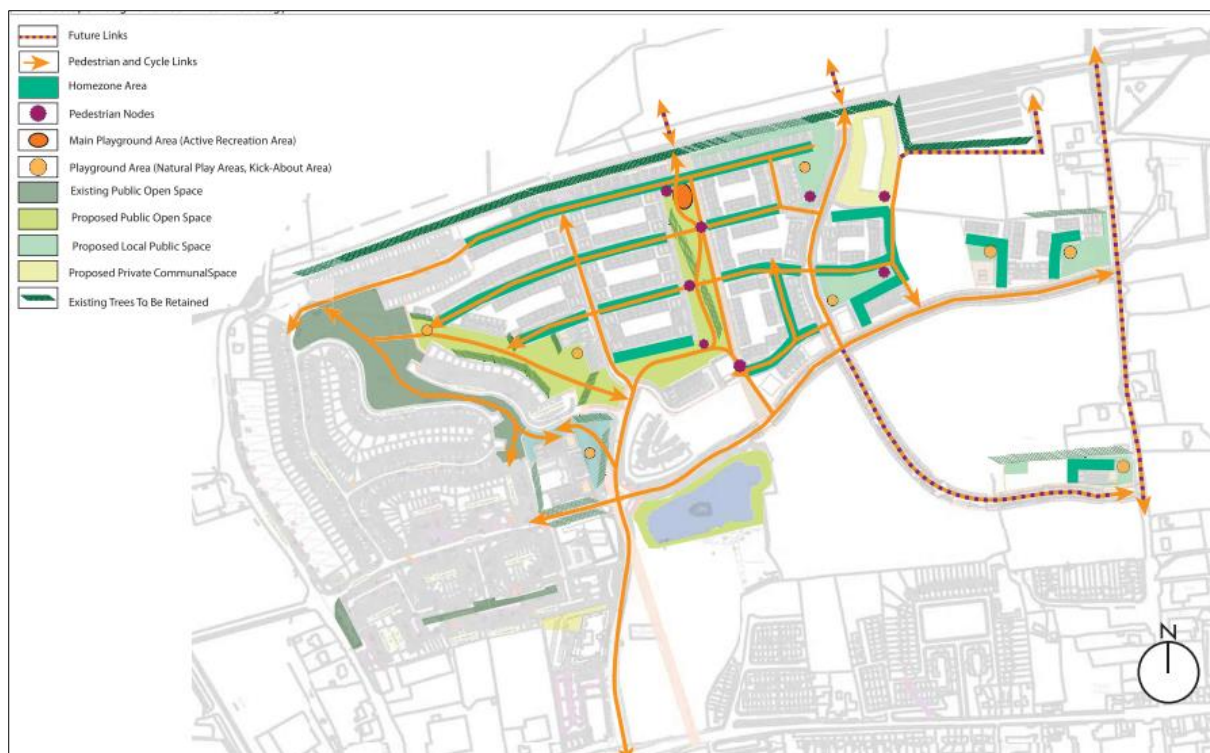


Figure 2-10 Landscape Design and Public Realm Strategy



Figure 2-11 Landscape Masterplan

The green infrastructure plan (**Figure 2-12**) for this SHD development will draw upon that set out in the County Development Plan. The plan will create landscape corridors that can be appreciated as green spaces that are attractive to walk on or cycle along whilst also functioning as green corridors for wildlife. The green corridors have been created to link up all of the open spaces within the development and the wider area. The plan seeks to retain the existing the existing established tree-lined drainage ditch in the centre of the site which will be incorporated into the design in line with recommendations from the project ecologist and arborist.

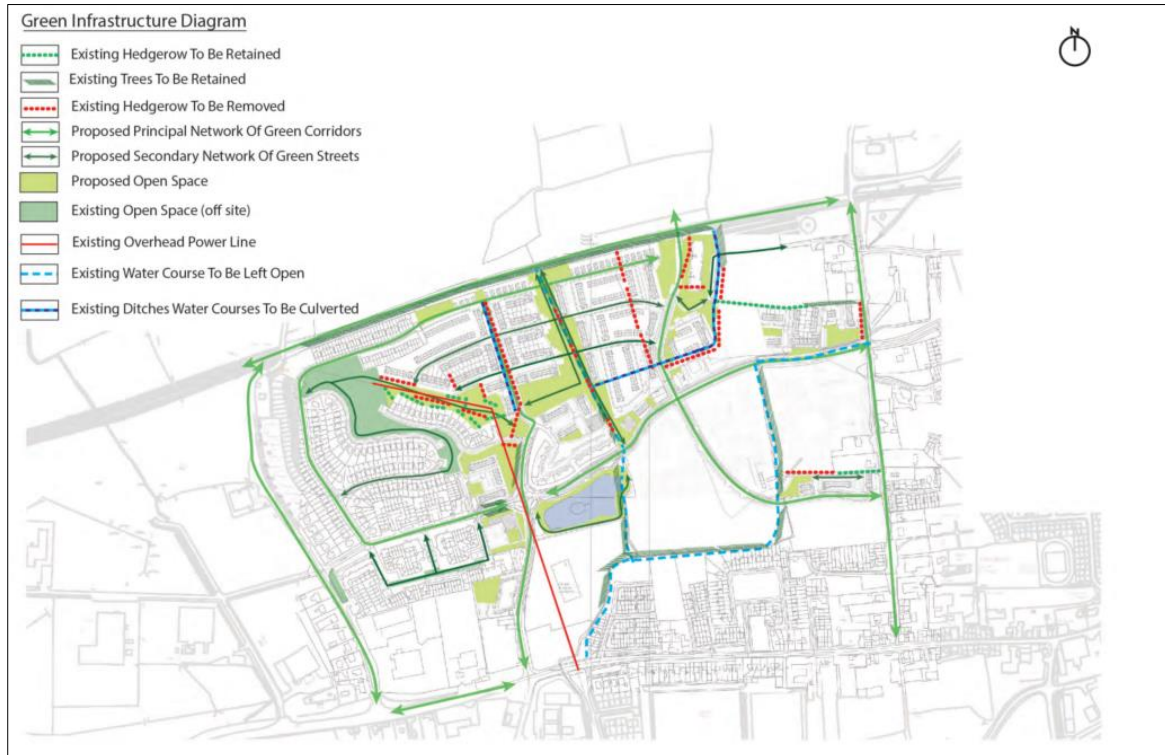


Figure 2-12 Green Infrastructure Plan

2.3.2 Proposed Access Connectivity and Public Realm

The site strategy looks to give primacy where possible to cyclists and pedestrians throughout the development. Dedicated shared pedestrian and cycle routes are proposed along the proposed park along a north-south axis. Cycle connectivity is also proposed between the proposed development and the rail station connecting to a proposed north-south route adjoining the eastern boundary of the development (subject to agreement).

The site strategy provides a pedestrian- friendly, permeable framework that permits pedestrians freedom of movement within the development as well as extending connections beyond the site. These same links allow the wider neighbourhood to enjoy the parks, with existing axes, views and vistas.

The masterplan describes a series of pedestrian routes that north-south and east-west across the site. The site is very permeable for pedestrian access allowing a variation of routes from one end of the site to the other and from focal points within the site to the key destinations outside the site that people may wish to go to. Pedestrians will have a choice of travelling through connecting park areas such as from the central park north to the second underpass. This will be similar to the existing green finger route from the central park to the north west corner of the site.

A key focus of the development is to create a sustainable community that is enhanced by functional open spaces and integrates with the surrounding area including Carrigtwohill Main Street to the south and the train station to the east. New connection points will be provided to existing local amenities through routes/walkways promoted by an active landscape scheme. The development provides a pedestrian friendly, permeable framework that allows pedestrians freedom of movement within the development and onto the wider area. **Figure 2-13** outlines the circulation routes within the proposed development.

The proposed development has been landscaped taking into consideration the proposed Carrigtwohill URDF which seeks to improve the public realm of Carrigtwohill and provide better connectivity with residential developments.



Figure 2-13 Circulation

Bicycle parking will be provided for all properties within the development and access to the open space areas. Bike parking will include:

- 1 external space for visitors attached to the front wall of all terrace houses.
- Parking provided to the rear garden space of each semi-detached house.
- Parking within the enclosed rear garden space of all duplexes.
- 210 bike spaces for apartments and 458 visitor parking stands.

The development has been designed to directly link into the shared cycle and footpaths associated with the Bury's Bridge to Carrigtwohill Greenway and the proposed Carrigtwohill to Midleton Inter Urban Cycleway. This will

provide residents and visitors with the development with easy access to the railway station and dedicated cycle/footpaths across the wider area encouraging less reliance on private cars whilst also promoting active recreational activity.

The east-west road permitted under CCC Reg. Ref 19/05707 is currently under construction and will provide valuable linkages to Station Road to the East. As illustrated on **Figure 2-14**, the Train Station is located within 5 minute walking and cycling distance of the proposed development site.

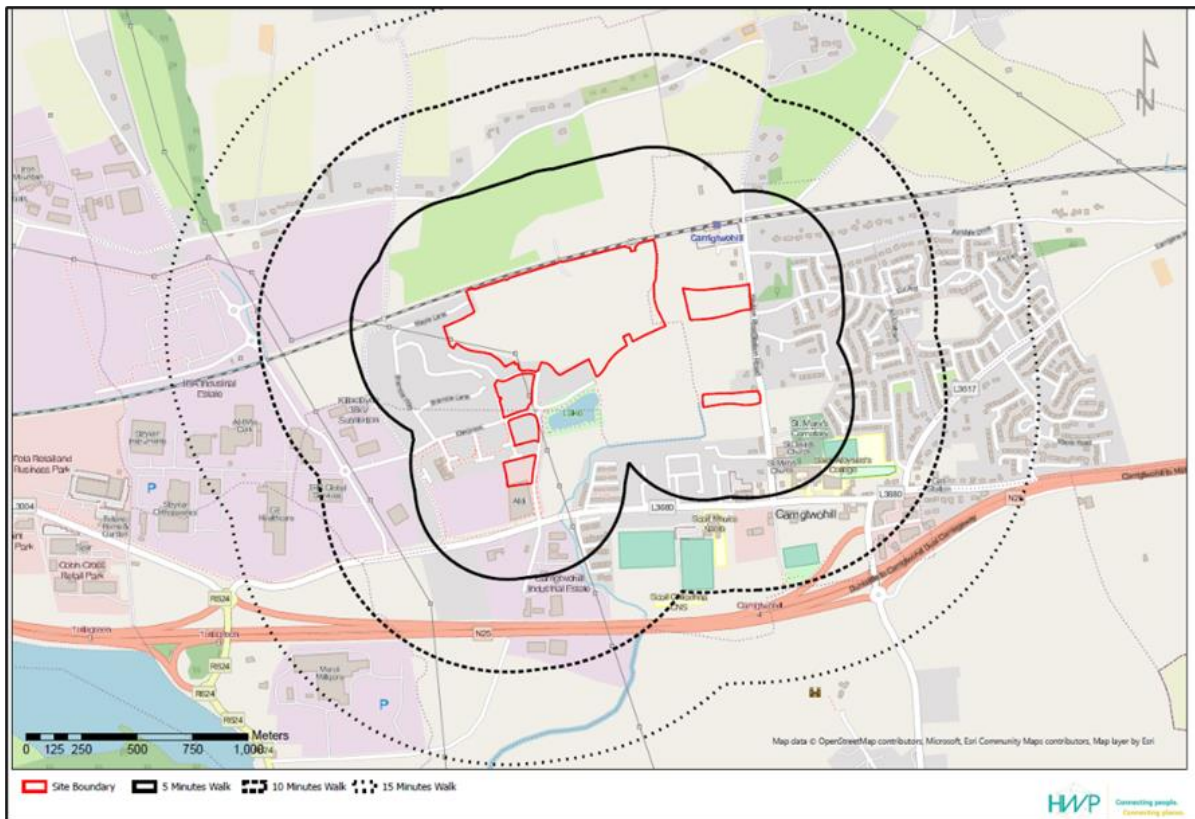


Figure 2-14 Walking Distances / Connectivity

A pedestrian and cycle pathway are provided along the Blandcrest land parcel in the east to facilitate the future connection to Carrigtwohill Train Station. The lands between the application site and the train station are not in the ownership of BAM property. The design of the access and cycle ways for the proposed development has been developed to integrate with the plans as part of the Part 8 applications for Bury's Bridge to Carrigtwohill Greenway and the proposed Carrigtwohill to Middleton Inter Urban Cycleway. The proposed development has also been designed to ensure that any future connections would be subject to passive surveillance.

The proposed development seeks to deliver a consolidated residential development that will successfully integrate with the permitted school campus and road network.

The design allocates 5% of the total apartments and duplex parking spaces as Electric Vehicle (EV) spaces, equating to 30 EV charging spaces.

2.4 Construction Management

This section of the EIAR summarises the construction and phasing of the proposed development and sets out the measures included within the Construction & Environmental Management Plan (CEMP) prepared by BAM Property (refer to **Appendix 2.1**) that are to be used to ensure that the impact of construction activity is minimised. The CEMP is a live document which will be continually updated as required. The CEMP outlines the arrangements in place to manage the construction and environmental management aspects of the project. The CEMP comprises a main document and 3 Appendices:

- Main Document – Construction Environmental Management Plan
- Appendix A – Environmental Management Plan
- Appendix B – Waste Management Plan
- Appendix C – Environmental Emergency Plan

2.4.1 Phasing

A ten-year planning permission is being sought for the proposed development. It is intended that the proposed development is constructed in 5 phases over a period of 10 years. An indicative phasing plan has been developed by BAM Property and is outlined in summary below and should be read in conjunction with the Phasing plan illustrated in **Figure 2-15**.

A determination on the planning application is expected from An Bord Pleanála in Q4 2022. Allowing a reasonable time for mobilisation it is expected that works could commence in Q1 2023, subject to the details of a grant of permission.

Five construction phases are envisaged to complete the proposed SHD development. These are summarised as follows:

- **Phase 1:** This phase is the most extensive phase of the proposed development and will entail the land parcels known as Blandcrest, Station Road North and Station Road South. This phase will include a total of 319 units comprising 116 houses, 164 duplex and 39 apartments. Phase 1 will take an estimate 5 years to construct.
- **Phase 2:** Phase 2 will comprise a total of 78 units which include 36 duplex, and 42 apartments to be constructed over approximately 1 year.
- **Phase 3:** This phase will include a total of 116 units comprising 26 houses, 65 duplex and 17 apartments to be built over a 20 month period.
- **Phase 4:** Phase 4 will consist of 91 units in total comprising 72 houses and 19 apartment units. This phase will take approximately 15 months to complete.
- **Phase 5:** The final phase will involve the construction of 110 apartment units over an 18 month period.

It is envisaged that there may be some overlap between the completion of one phase and the commencement of another. This overlap between phases is likely to be approximately 1 year which will result in temporary to short term effects which will be mitigated and managed by implementation of the CEMP. However, the phasing has been arranged, where possible, to separate the phases spatially within the scheme. The first and largest phase at Blandcrest and Station Road north and south, is at a remove from the existing houses in Castlelake.

The phasing of the entire works will be managed through the implementation of the Construction and Environmental Management Plan (CEMP).

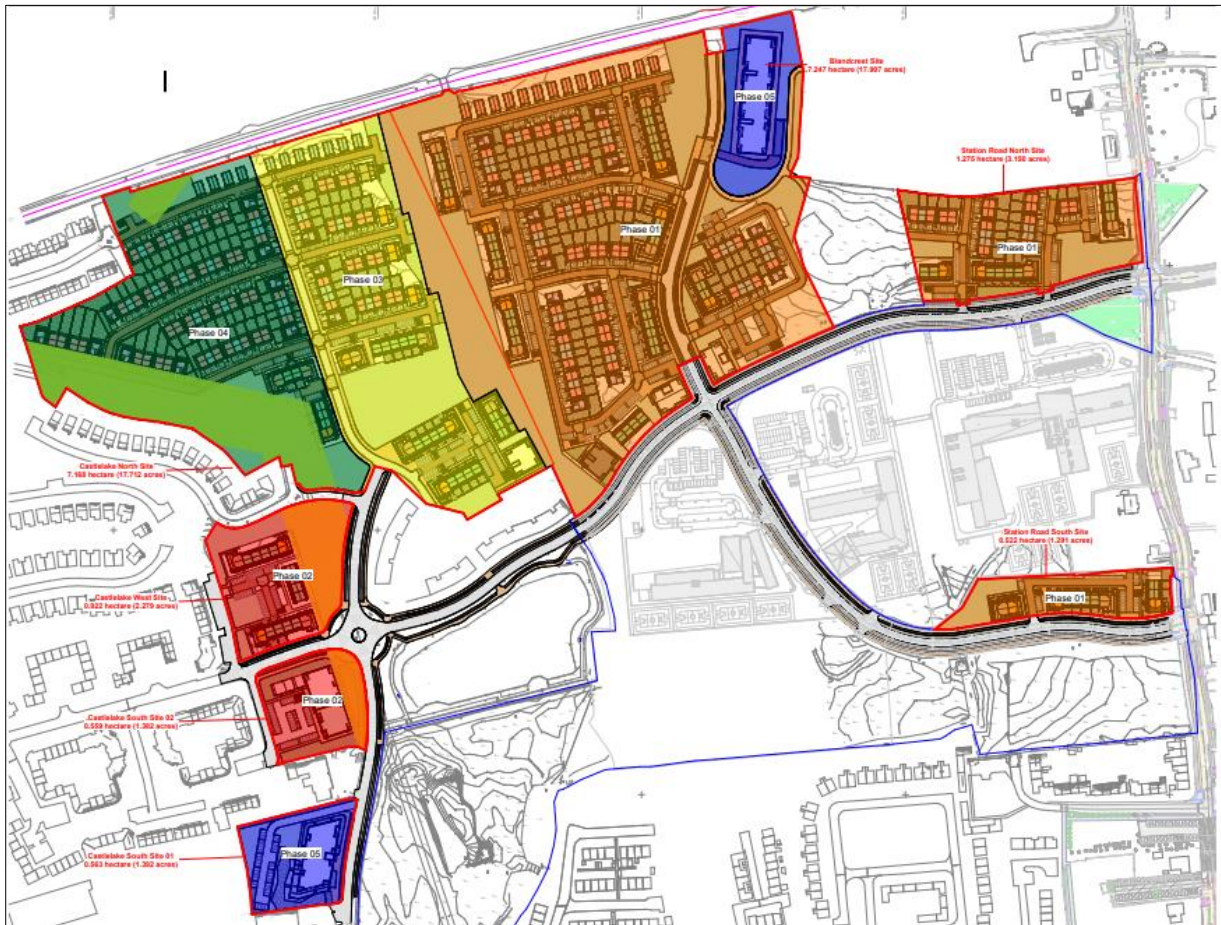


Figure 2-15 Phasing Plan

2.4.2 Sequencing of Works:

The works below will be conducted on a phased basis, as per the phasing plan. The main stages of construction will be progressed in summary as follows:

- Ensure that all pre-construction environmental measures and surveys are implemented/conducted e.g. implement Invasive Species Management Plan (**Appendix 5.4** in Volume 3 Appendices), bat surveys, bird surveys, surface water protection measures or any specific pre-construction planning conditions;
- Set up the temporary construction compound to include site offices, welfare facilities, water connection, waste compound and refuelling area. This will be located in the Castlelake North land parcel. Refer to **Figure 2-16**;
- Set up the construction site enclosures. Protective hoarding will be erected and moved as the works progress;
- Removal of vegetation including identified trees for removal;
- Commence site clearance and topsoil stripping;
- Regrade to formation level;

- Installation of utilities and services. The strategy for the provision of services is outlined in the Infrastructure Report prepared by RPS (**Appendix 9-1**):
 - The proposed surface water drainage network will be installed per phase. Further information can be found in the Infrastructure Report and Chapter 7 Water of this EIA.
 - The proposed foul water collection system will be installed per phase. Further information can be found in the Infrastructure Report and in Chapter 9 Material Assets of this EIA.
 - Potable water supply system will be installed per phase. Further information can be found in the Infrastructure Report and Chapter 9 Material Assets of this EIA.
- Lay foundations;
- Construct roads, footpaths, cycleways;
- Construction of new residential units;
- Connection to public services – public water supply, sewerage system and electricity network;
- Landscaping;
- Complete all site finishes; and
- Completion of any testing and commission services within the development.

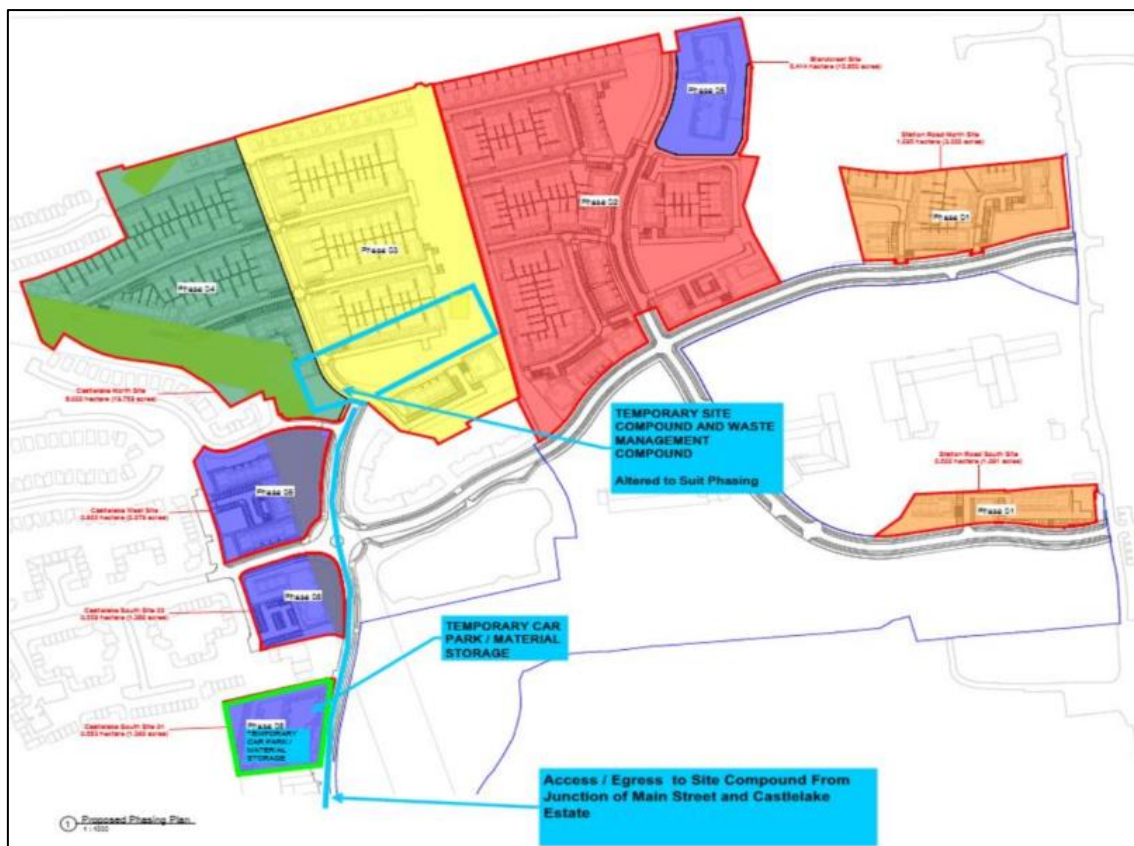


Figure 2-16 Proposed location of Construction Compound, car park and material storage area

2.4.3 Site Access

To minimise the impact on Carrigtwohill village the main access and exit points from the site will be the junction with the L3680 and the existing Castlelake Estate (junction closest to Aldi). Access gates to the site will be manned to control vehicular access and to record all deliveries and removals. Only Safe Pass accredited personnel will be permitted on site and pedestrian access will be strictly controlled via a manned turnstile. Some temporary carparking will be provided however personnel will be encouraged to use public transport, cycle and/or car share where feasible. **Figure 2-16** indicates the location of the site access and the temporary site compound including waste management compound.

2.4.4 Construction Traffic Management

As part of this EIAR a proposed traffic Management Plan has been developed which details site access, working hours and peak construction and staff traffic volumes. During construction, the majority of construction staff will arrive and depart outside peak traffic hours and local schools' start and finish time. Peak construction staff traffic volumes are 67 inbound daily vehicles and 67 outbound vehicles. It is anticipated that peak daily construction delivery and heavy goods vehicles will be of the order of 20 inbound vehicles and 2 outbound vehicles. A wheelwash is recommended to be provided on site and daily road cleaning is also recommended for the construction phase. The Traffic and Transportation Chapter of this EIAR rates the construction impact of the proposed development on traffic as slight to moderate and short-term.

2.4.5 Working Hours

Working hours will be standard for those working in the construction industry. The expected working hours are:

Monday to Friday	07:00 to 19:00
Saturdays	08:00 to 13:00

No works will be undertaken on Sundays, but should the need arise to do so a written submission will be made in advance to Cork County Council. Instances that may give rise to such an occurrence include works on the public road to minimise traffic impact.

2.4.6 Hoarding and Signage

One of the initial works to be undertaken on site will include the erection of hoarding and appropriate security fencing around the entire site to secure the works and to protect the members of the public. The boundary will be maintained and inspected regularly.

2.4.7 Materials Storage

Deliveries to the site will be recorded by a booking system and materials will be delivered in a planned sequence in line with the stage of works. The excessive storage of materials on site will be avoided. Materials will be stored in the compound nearest the Cork Road which will be the last phase to be developed.

2.4.8 Community Liaison

If works interface with local stakeholders, workshops and forums will be held on a regular basis to maintain open relationships and to keep key stakeholders up to date on construction progress. A display board will be displayed outside the site and will identify key personnel, contact addresses and telephone numbers. The contract manager

will be responsible for strategic liaison whilst the project manager will be responsible for day to day logistics and construction related activities.

2.5 Waste Management

A detailed Waste Management Plan (WMP) has been produced by BAM and is appended to the CEMP as Appendix B. The Plan clearly states the arrangements of the management of waste on site in line with best practice, the Waste Management Acts 1996-2013 and associated regulations, and the BAM Environmental Management System.

The plan outlines recycling and waste management goals and targets, permitting requirements, hazardous waste management, waste contractors, waste reporting and tracking of waste.

2.6 Environmental Management Plan (EMP)

BAM Property has developed a comprehensive EMP document to manage environmental performance for the Castl lake SHD development. BAM is certified to ISO 14001:2015, the international stand for environmental management. The EMP is appended to the CEMP as Appendix A and:

- Identifies the environmental obligations and the hazards and risks associated with the Castl lake SHD construction activities;
- Assists in the prevention of unauthorised environmental harm;
- Fulfils the environmental requirements as defined in the contract; and
- Minimises potential impacts on the community that relate to the environmental aspects from BAM's construction activities.

The EMP identifies the environmental responsibilities on site and these are outlined in **Figure 2-17**.

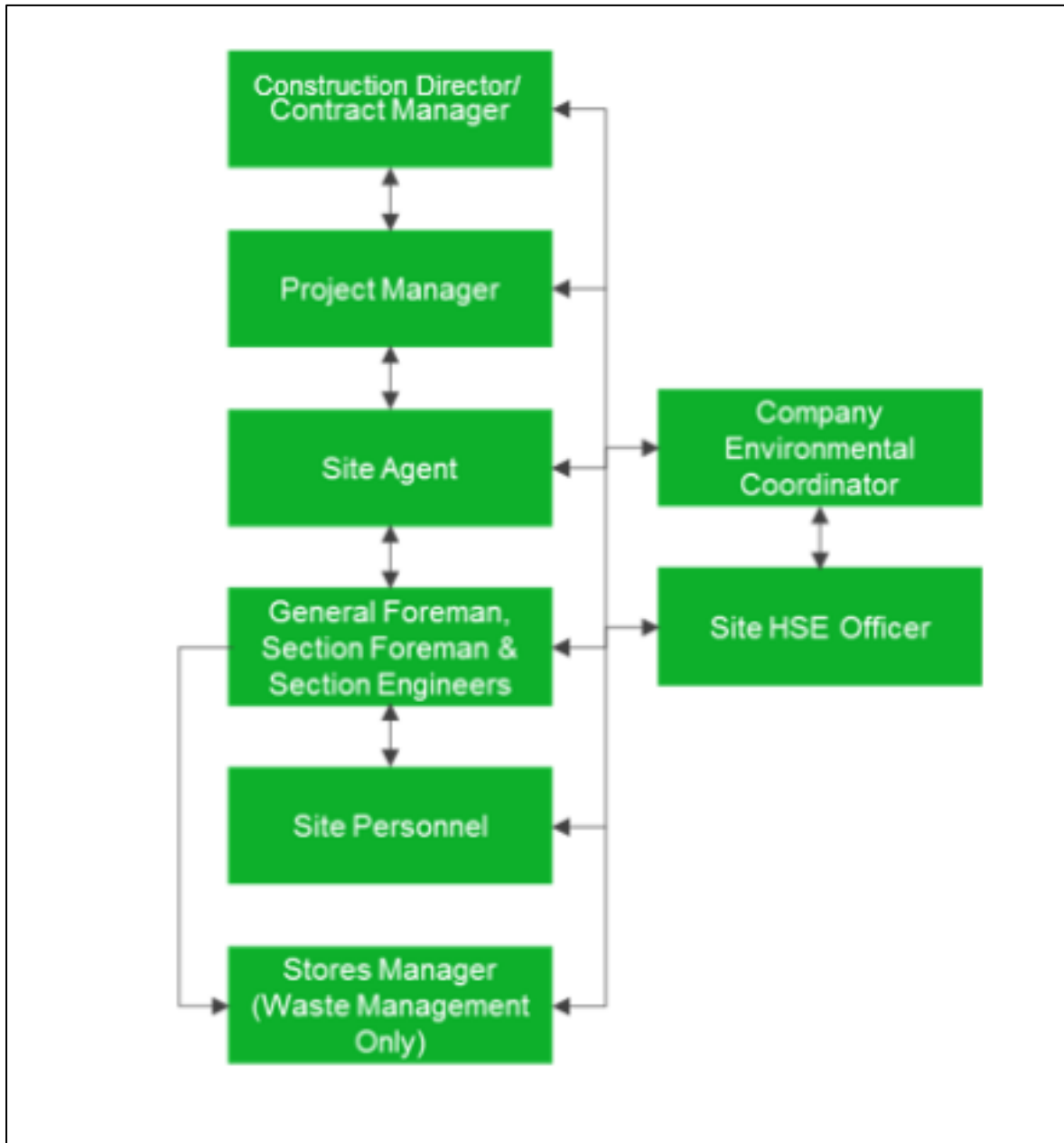


Figure 2-17 Environmental Organisation Chart

The EMP is a comprehensive document which outlines objectives and procedures for:

- Environmental Monitoring and Checking;
- Communications – complaints and reporting of incidents;
- Requirements for sub contractors & suppliers;
- Environmental Risk Assessment;
- Method Statements which must include a section on Environmental and Waste Management;
- Environmental Compliance – which requires compliance with all relevant planning conditions, contract documents, health and safety plans and includes consultation, where appropriate, with relevant

authorities such as Cork County Council, EPA, National parks & Wildlife Service, Inland Fisheries Ireland and Irish Water;

- Design & Life cycle perspective with an emphasis on sustainability for the life cycle of the project; and
- Environmental Objective and Targets set in relation to aspects identified on each site and include measurable targets and responsibilities in relation to:
 - The prevention of pollution, including missions to air, water and land;
 - Nuisance impacts including dust, noise and vibration;
 - Protection of habitat areas and individual species, if applicable;
 - Storage and use of fuels and hazardous substances, including spills; and
 - Waste management.

The EMP outlines a series of Environmental Control Measures in line with best practice and guidelines.

- Water Pollution Control – Section 8.1 of the EMP outlines detailed water pollution control measures which include mitigation measures recommended in this EIAR;
- Noise & Vibration Control – Section 8.2 of the EMP outlines best practice and noise limits for the construction stage;
- Air Pollution Control Habitat (Flora & Fauna) Protection – Section 8.3 of the EMP includes measures for dust and vehicles emission control;
- Habitat Protection – Section 8.4 of the EMP outlines mitigation measures in relation to habitats including protection of fisheries;
- Waste Management – Section 8.5 relates to waste management. Appendix B of the CEMP deal specifically with waste management;
- Hazardous material handling and storage – Section 8.6 of the EMP outlines best practice for protection of the environment from spillages of hazardous material;
- Vermin Control – Section 8.7 of the EMP;
- Landscape Section 8.8 of the EMP; and
- Archaeology – Section 8.9 of the EMP.

2.7 Environmental Emergency Plan

BAM Property have developed an Environmental Emergency Plan which outlines environmental emergency procedures relating to this Project. These measures include:

- Emergency Procedures for sediment release to water (EP-23);
- Containing and cleaning up spills (EP-15);
- Environmental Incident Procedure (EP-06);
- Environmental Complaints and Incidents Procedure (EP-24); and
- BIM online incident tracking system.

For more detailed information please refer to Appendix C of the CEMP which in **Appendix 2.1** of this EIAR.

2.8 Operational Phase of the Project

It is anticipated that the main environmental effects associated with the proposed SHD development will occur during the construction phase. Once the mitigation measures outlined in this EIAR have been implemented and the development enters the operational phase it is expected that the development will operate without resulting in any significant environmental effects. Specific operational impacts are summarised below.

2.8.1 Traffic

The Traffic and Transportation Chapter, Chapter 13 of this EIAR, identifies the access arrangements for the operational phase of the proposed SHD development. It has been identified that the proposed development will have a significant level of bicycle parking spaces (1,908) and is close to greenways and cycleways. The development is also within walking distance of the crèche, schools, bus stops, train station, town centre and Industrial Estates. Using this information, it is calculated that the proposed SHD development will generate a high proportion of non-car, sustainable transport trips, particularly in respect of school, creche and work commuting type trips that occur during peak traffic hours. The operational impact on traffic has been identified as not significant to slight and long term.

2.8.2 Waste

An Operational Waste Management Plan (OWMP) has been produced for the operational phase of the proposed development. Refer to **Appendix 9.5** in Volume 3 **Appendices**. Storage and collection of waste will be undertaken on site in accordance with the Cork County Development Plan and the standard BS 5906:2005 Waste Code of Practice. The plan outlines a strategy for bin storage. Bin stores have been provided for at a rate of three bins per house/duplex unit. Communal waste storage areas for; dry mixed recyclables, mixed non-recyclables, organic waste and glass, will be provide for apartment areas. Refuse truck turning zones have been incorporated into the design of development to allow for ease of collection.

2.8.3 Community Liaison

As each phase of the proposed development is completed residents will move into completed sections. When works interface with local stakeholders, workshops and forums will be held on a regular basis to maintain open relationships and to keep key stakeholders up to date on construction progress. A display board will be exhibited outside the site and will identify key personnel, contact addresses and telephone numbers. The contract manager will be responsible for strategic liaison whilst the project manager will be responsible for day-to-day logistics and construction related activities. Once the phases are completed there will be no longer a need for community liaison by BAM Property.

3. Alternatives

3.1 Introduction

This chapter of the EIA outlines the main viable alternatives examined and considered during the project conception and design process.

3.1.1 Legislative Context

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

d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.

f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected

Annex IV point 2 further expands:

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

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

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

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

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

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

main alternative studied and the key environmental issues associated with each. A 'mini- EIA' is not required for each alternative studied.

The EPA Guidelines (2022) state that:

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.

This chapter provides an outline of the main alternatives examined for the proposed Castlelake SHD project throughout the design and consultation process to indicate the primary reasons for choosing the proposed development.

3.1.2 Alternative sites

At a strategic level, the site has been zoned for residential development by the Cobh Municipal District Local Area Plan 2017 and by various iterations of the Cork County Development Plan, which has been subject to Strategic Environmental Assessment.

In the consideration of *reasonable alternatives* the site is zoned for residential development and is part of an overall masterplan to develop Carrigtwohill in line with the policies and objectives of the Cork County Development Plan 2022-2088. The lands are in the ownership of the applicant BAM Property and the proposed SHD housing development forms part of an overall masterplan for the Castlelake development which was first established in 2000. Given that the zoning for the site supports the development of housing on these lands, no further consideration of alternative sites is deemed necessary. Alternative layouts and design are discussed in more detail in this chapter.

3.1.3 2017 Planning Application

The design for the lands at Castlelake has evolved over time from when the first application was made in 2000 (planning reference 00/7674 and An Bord Pleanála Ref PL04.131129) after which the existing Castlelake development was constructed to the west of the proposed SHD development lands.

In 2017 BAM applied for planning permission (CCC Ref: 17/5399) for 277 residential units on a similar footprint to the proposed SHD Development. See **Figure 3-1**. Planning was granted by Cork County Council but was refused on appeal to An Bord Pleanála for the following reasons:

*"The "Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas" published by the Department of the Environment, Heritage and Local Government in May, 2009, require a high quality approach to the design and layout of new housing. Having regard to the proposed site layout, and in particular the **poor disposition and quality of public communal open space and future connectivity to Carrigtwohill Train station**, the proposed development would constitute a substandard form of development, would provide **an inadequate standard of amenity for future occupants** and, therefore, conflict with provisions of the said guidelines. Furthermore, it is considered that the proposed development, including the revised proposal submitted by the applicant on the 1st day of October 2018 **does not provide an appropriate architectural design response for the site**. The proposed development is considered to be inconsistent with the proper planning and sustainable development of the area."*

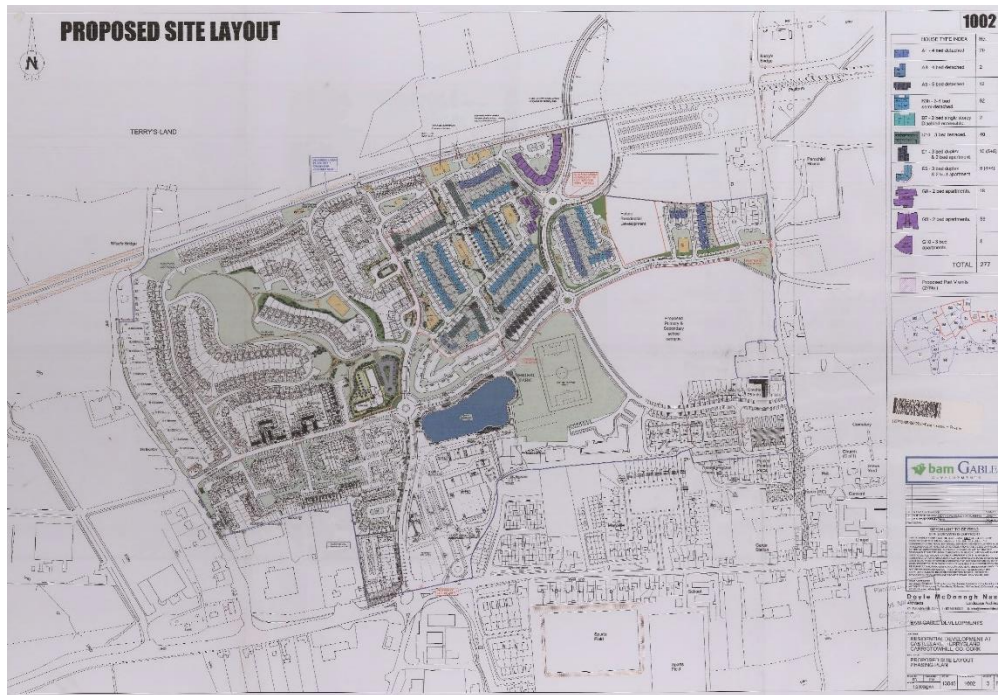


Figure 3-1 2017 Layout Masterplan, Planning Ref 17/5399

The refusal above was based on three main concerns:

1. Poor disposition and quality of public communal open space and future connectivity to Carrigtwohill Train station.
2. An inadequate standard of amenity for future occupants; and
3. The scheme did not provide an appropriate architectural design response for the site

In 2021, BAM commenced the consultation process for a Strategic Housing Development (SHD) on the same lands with an updated scheme (see Layout 1 below). Since then, the scheme has gone through 2 principal iterations, referred to here as Layout 2 and Layout 3. The three layouts are outlined in summary below:

3.2 Alternative layouts

3.2.1 Layout 1 – Section 247 Consultation

The Layout 1 Masterplan was presented at the Section 247 consultation meeting with Cork County Council (Council reference: SHD33) which was held on 15th July 2021. Refer to **Figure 3-2**.



Fig. 1.2.1 - Site Strategy - Presented at CCC Section 247 meeting

Figure 3-2 Masterplan Layout 1 presented for Section 247 Consultation meeting with Cork County Council

The scheme presented proposed a number of strategic site considerations leading on from the density and other concerns which had been raised by An Bord Pleanála in the refusal of the 2017 planning application, which had proposed a scheme layout representing a change of layout and house types on part of the lands previously permitted under the overall 'Castlelake' development granted permission under planning reference 00/7674.

1. Poor disposition and quality of public communal open space and future connectivity to Carrigtwohill Train station:

The An Bord Pleanála Inspector had several concerns regarding the 2017 application regarding the location, usability and quality of open space. The Inspector was of the opinion that the proposed MUGA and District Play Area were isolated in the north of the development and were severed by the proposed pedestrian underpass and that the open space was somewhat piecemeal and incidental.

In response to this Cunnane Stratton Reynolds Landscape Architects prepared a landscape masterplan to address the concerns previously raised by An Bord Pleanála, with particular emphasis on framing the underpass accesses with planting to ensure a safe environment that encourages pedestrians and cyclists to use the future link which will be subject to passive surveillance from adjacent housing units. The updated scheme was designed to tie in with Cork County Council's Part 8 application for public realm works in Carrigtwohill.

For this layout the landscape architects considered the visual connections between the open spaces and the underpasses to develop a functional and safe scheme. Refer to **Figure 3-3** below.

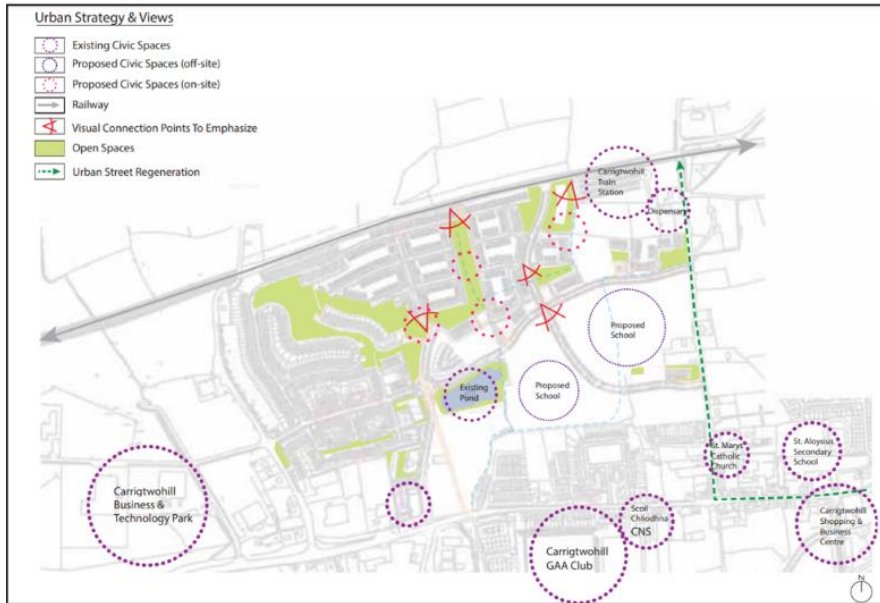


Figure 3-3 Urban Strategy and Views (Cunnane Stratton Reynolds)

The updated scheme increased the extent of open space from 16.9% to 27%. The revised landscape masterplan identified a number of key character areas including homezones, local parks and neighbourhood parks. The hierarchy of open space provided a variety of playgrounds, kick about areas and natural play areas.

In terms of connectivity to the Carrigtwohill train station the scheme presented is within 5 minutes walking distance of the train station and has been designed to link in with Cork County Council Part 8 applications which include the delivery of pedestrian and cycle connection to Carrigtwohill train station. Refer to **Figure 3-4**.

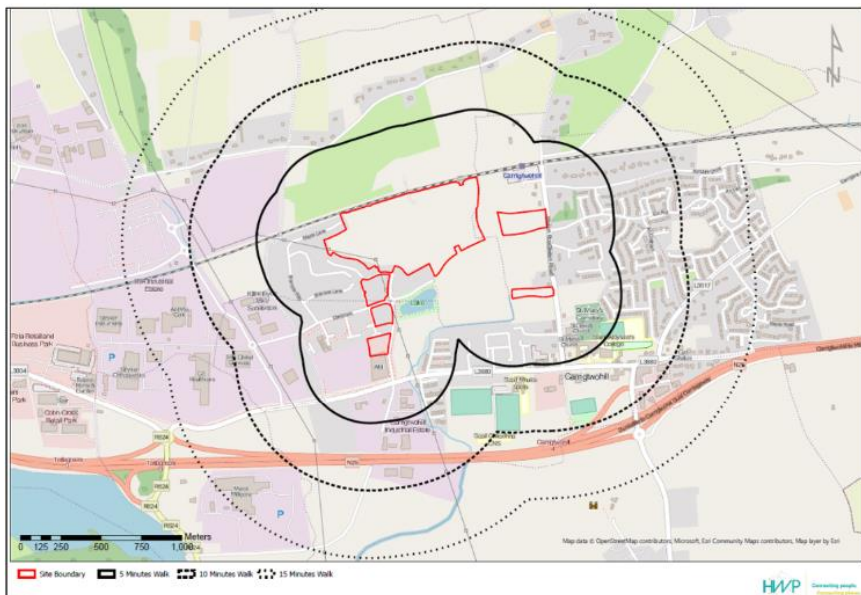


Figure 3-4 Walking times from site

2. Residential amenity for future occupants:

The design of Layout 1 was developed in accordance with the relevant national, regional and local planning policy guidance. A Statement of Consistency was prepared by HW Planning, and a Design Statement and Housing Quality Assessment were prepared by Wilson Architects to demonstrate how the design was developed having regards to Guidelines on Sustainable Residential Development in Urban Area and other best practice guidelines.

3. Architectural design response for the site

The ABP Inspector observed that the density of 30 units per hectare was below the appropriate density target for housing in this location and as such represents an unsustainable form of development. The observation was also made that the site should be developed at a sufficiently high density to provide an acceptable level of efficiency in the use of serviced lands and having regard to excellent public transport connectivity.

In response to the above comments, the density of the design was increase to 46 no units per hectare.

Following on from the Section 247 consultation meeting, Cork County Council representatives noted the following in relation to the proposal:

- The proposed density is appropriate for the area and that the east/west connectivity will assist the development
- Concerns about useability of open space and that the masterplan would need to be fleshed out more to reference the proposed character of areas. It was also noted that potential noise impacts from the railway needed to be considered for units adjacent.
- The linking in and alignment of the SHD proposal and other infrastructural works, and the wider constraints of the road network. It was noted that issues such as local impacts from proposed school development needed careful consideration.

The scheme in Layout 1 comprised 706 units in total:

- 217 no. apartments;
- 250 no. duplex units;
- 239 no. two storey houses; and
- A 2 no. storey creche.

In summary, the site layout proposal adopted an urban design approach that:

- Proposed a development layout that delivered a density of 43 units to the hectare with the useable open space quotient increasing from 2017 levels of 16.9% to 18.6%.
- Improved pedestrian connectivity throughout and proposed a landscape scheme with passive surveillance over the public open space
- Proposed multi unit buildings at corner and other key nodal site locations with 3 storey units on the distributor roads
- Delivered a number of 4 storey apartment buildings with semi private space, with own doors where possible and generally in cul-de-sacs

In addressing the An Bord Pleanála Inspector's specific concerns regarding the 2017 planning application outlined above the following changes were incorporated into Layout 1 which was presented for the Section 247 Consultation Meeting with Cork County Council.

3.2.2 Layout 2 – Section 5 Consultation

Based on the comments from Cork County Council following the Section 247 meeting, and following internal discussions between the project team, an updated scheme (Layout 2 – Refer to **Figure 3-5**) was developed. This layout was presented at the Section 5 tripartite consultation meeting which took place on 3rd February 2022 between the applicant - BAM Property and their representatives, Cork County Council and An Bord Pleanála. The Planning Authority submission, whilst welcoming the completion of the existing residential development at Castlelake as being consistent with the Council’s overall plans and policies for the area, recognised a number of requirements for further design development and clarification for overall scheme proposal under the following key headings:

1. Compliance with CDP Policy, Local Area and Carrigtwohill URDF
2. Urban Design Approach
3. Public open space quantum and quality, landscaping and ecology
4. Traffic, transport and connectivity
5. Noise Impact Assessment and railway line

These concerns and the design team’s response are further discussed in section 3.2.3 below.

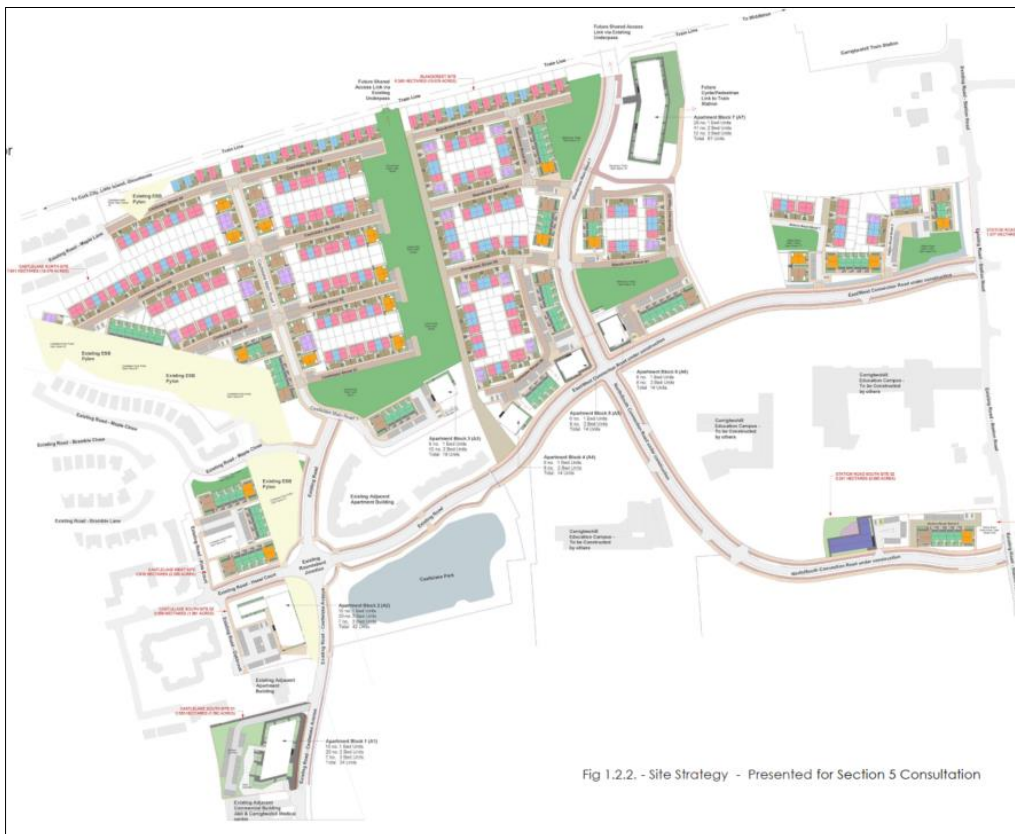


Figure 3-5 Masterplan (Layout 2) presented for Section 5 Consultation meeting

3.2.3 Layout 3 – Proposed SHD Masterplan Site Layout

The final proposed site Masterplan layout evolved as a result of the various formal and informal consultation exercises with Cork County Council, An Bord Pleanála, Inland Fisheries Ireland and discussions within the project team.

The final Masterplan layout for the proposed SHD development is for 716 no. units comprising:

- 224 no. houses,
- 284 no. duplex units and
- 208 no. apartments
- 2 storey creche.

The proposed development also provides for: hard and soft landscaping; boundary treatments; public realm works; car parking; bicycle stores and shelters; bin stores; lighting; plant rooms; and all ancillary site development works above and below ground.



Figure 3-6 Proposed Final Masterplan (Layout 3)

In terms of addressing An Bord Pleanála and Cork County Council’s concerns, the final design addressed the key issues identified by ABP and CCC as follows:

Compliance with CDP Policy, Local Area and Carrigtwohill URDF:

- An Bord Pleanála representatives sought further consideration on the following; Density, core strategy, mix of tenure.
- Integration with the wider area; to the north, to existing residential to the west, to the train station, to the school site and to the 'TC' zoned site.

Applicant Response:

Cork County Council considered the density appropriate and in compliance with the County Development Plan (CDP). The Urban Design strategy anticipates a phasing of the residential development from west to east across the land parcels, to integrate initially with the existing Castle Lake Development with more conventional housing to the western end of the site. The proposed development will contain 46 units per hectare – upper end of the 20 – 50 u/ha set out in the CDP. The scheme provides 7 apartment blocks positioned along the main East-West/North-South distributor roads recognising the higher density of the apartments as more appropriate when fronting onto these road locations. Density increases in the proposed developments further east towards the train station with provision made for connectivity to the train station. The scheme design has cognisance to the Northern Station road and the Southern Station road, the School Site and the Town Centre site.

Urban Design Approach

An Bord Pleanála representatives sought further consideration on the following;

- Justification that the proposal provides a high-quality approach to the design and layout of new housing.
- Justification at application stage for the architectural design approach chosen.
- Justification of the housing and open space layout and connectivity in the context of the existing pattern of development in the area.

Applicant Response:

Scheme Design:

The urban design principles applied to the proposed development have cognisance of distributor roads and connectivity to the underpass. The design approach proposes a clear street network which provides safe secure permeability connectivity, is based on higher density on wider roads and closer to the train station, buildings turn corners and open spaces are well overlooked and supervised while the distributor roads have been clearly defined to discourage through-traffic in the centre of the site. The homezone network will create neighbourhoods of distinctive character. A DMURS compliant scheme has been proposed with resident and pedestrian safety prioritised, with the materiality of these streets enabling a sense of pedestrian ownership and safety.

A number of cul-de-sacs are incorporated into the Castl lake scheme layout as terminations of the road network onto the edge of this park with pedestrian and cycling connectivity extended across open space and play areas to the east of the park, where the edge condition with the park places greater emphasis on home zone areas. The shared surface on the eastern side of the central Neighbourhood Park will be designed to soften and allow for a less formal approach between road, parking and pedestrian/cycling route.

Public Open Space Landscaping and Ecology

The revised urban design proposal seeks to integrate the public realm with public open spaces of varying characteristics and dimensions. These spaces, together with the varying buildings across the scheme, create a series of landscaped routes and pedestrian connections designed to provide an animated streetscape through the provision of dedicated play areas and larger open spaces with site topography and existing natural features further integrated into the Landscape Plan. The Masterplan incorporates a hierarchy of open space; the Neighbourhood Park, Local Parks, Communal Open Space, Pocket Parks and Play Areas.

Following consultation with Cork County Council, An Bord Pleanála, Inland Fisheries Ireland and advice from the project ecologist, one of the major changes was the revision of the Masterplan design for the main north-south drainage ditch. Previous layouts had incorporated a culvert over part of which houses were constructed. The final design incorporates the existing tree-lined drainage ditch in its entirety to create a green spine running from north to south through the development. The evolution of the landscape design in this area is indicated on **Figure 3-7**.

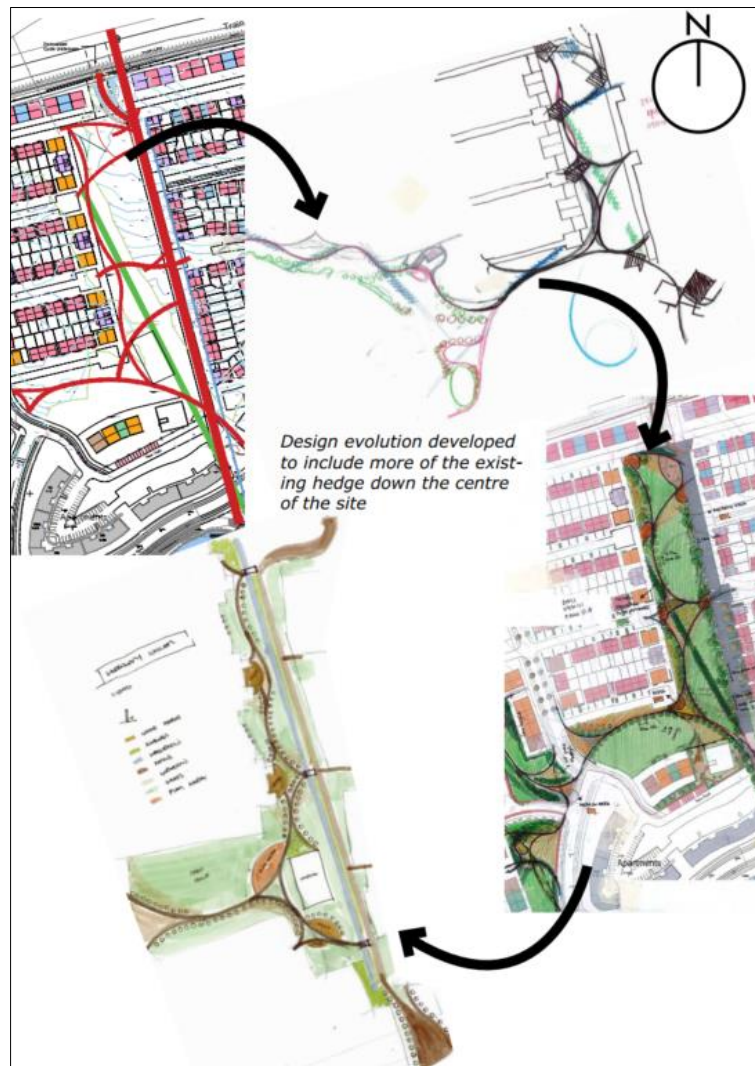


Figure 3-7 Evolution of design to incorporate north-south drainage ditch

The landscape design in this area includes the use of curved pathway and cycleways and strategically placed seating areas such that the tree-lined ditch will form a central feature in the site's blue and green infrastructure. This green and blue spine will act as a corridor for wildlife and will link to all open spaces within the proposed development. The watercourse will be crossed at intervals by the pathways/cycleways creating a more interactive experience for residents and those using the park. Trees will be retained where possible and planting will be enhanced with the use of native waterside plants and native deciduous trees. Refer to **Figure 3-8** for artist's impression



Figure 3-8 Artist's impression of Neighbourhood Park

Traffic and Transport

A Traffic and Transportation Assessment has been carried out as part of the EIA which looks at existing and predicted traffic volumes and proposes mitigation measures. Consultation was undertaken between the project design team and the HIIT Department at Cork County Council. Discussions relating to the proposed route of this cycleway through the application site have taken place between the design team and Cork County Council. As a result of these discussions the SHD site layout has been changed to incorporate the Inter-urban Cycle Way design. See **Figure 3-9**. The design of the cycle path in this location has been updated in Layout 3 to more closely follow the curving design associated with the Inter-Urban Cycleway.



Figure 3-9 Extract from Proposed Site Layout Plan for Inter Urban Cycleway

Concerns were also raised by Cork County Council on how Apartment Block A7 would interact with the 4m wide cycle and pedestrian route proposed on the Carrigtwohill to Midleton Inter-urban Cycleway, in particular, the layout proposal's potential to compromise the alignment of the route, the geometry of levels and its connection to the development. These issues have been addressed in the current scheme with an adoption of the original layout and a resolution of the vehicular access to Apartment 7 with a recognition that the proposal is an important, key north south route high quality route to connect the schools complex to housing.

It is proposed that the cycleway route is to pass the entrance to Apartment A7 at similar grade, but the cycleway has been designed to have priority at all times over vehicular traffic entering the car park of Apartment A7. The surface finishes have been designed to indicate that priority is to be provided to the cycleway. Tactile paving will be provided to alert the cycleway users to the upcoming arrangement, but they will not be required to yield, as they will have priority. Refer to **Figure 3-10**.

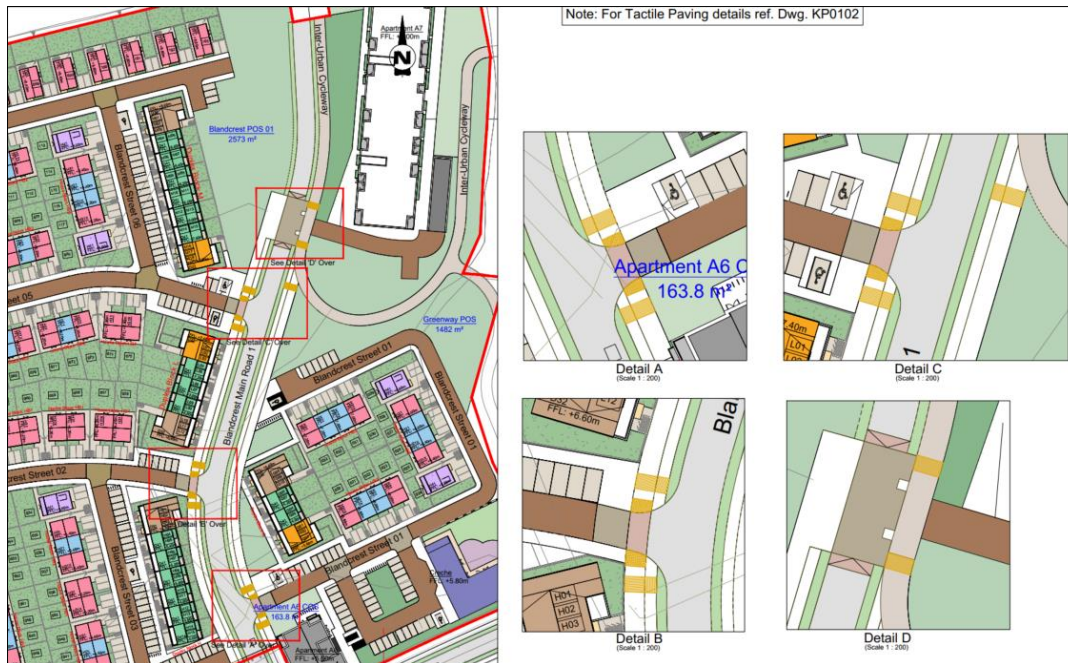


Figure 3-10 Extract from Proposed Site Layout Plan for Inter Urban Cycleway

Noise

In addition to incorporating good acoustic design into the proposed design Wilson Architecture have specifically designed the houses adjacent to the railway line specifically to mitigate and potential noise impacts. The noise is mitigated by the absence of openings in the north and west facades of all the houses and by high walls enclosing the private spaces.

The Noise and Vibration Impact Assessment predicts no significant impact from noise or vibrations to future residents living adjacent to the train line.

Childcare Facility

The creche has been relocated from the south of the proposed SHD development (depicted by the lilac L-shaped structure on Figure 3-5) to a new location to the north of the Carrigtwohill Education Campus (Refer to Figure 3-6) which is currently under construction. The new location is more centralised and better integrated into the proposed scheme and will be easily accessible by walking or cycling for future residents. The proposed 2 storey creche will provide a complementary use to the schools campus and cater for the needs of c. 150 children.

Drainage

Following the pre-planning submission, Cork County Council raised some comments in relation to the proposed surface water strategy. They advised that the drawings appeared to be “unclear/disaggregated and involves discharge of attenuated flows through the amenity pond and further attenuation and construction of another private attenuation tank outside of this planning application area. Discharge rates are not noted on the drawings. The applicant should provide a robust analysis of the attenuation capacity within the existing amenity pond and how drainage will be dealt with adequately.”

As a result of these comments, the proposed surface drainage system has been made clearer within the proposed drainage drawings, and the final connectivity of all attenuation structures to the receiving infrastructure has now been shown. Proposed attenuation rates from each of the proposed attenuation areas have now been included on all relevant drawings. To provided support to the proposal, a detailed description and supporting calculations

for all proposed attenuation has now been provided within the accompanying Infrastructure Report, available in Appendix 9.1 Volume 3 Appendices.

Ultimately, the attenuation structures within the applicant site have been designed to allow for the collection of runoff from the entire site and provide sufficient storage capacity to restrict the runoff discharged to the Woodstock Stream to an equivalent pre-development greenfield runoff rate.

References

Article 94 and Schedule 6, paragraph 1(d) of the Planning and Development Regulations 2001

EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU

EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA (2022)

4. Population and Human Health

4.1 Introduction

This chapter considers the potential effects on population and human health arising from the Proposed Development. A full description of the proposed development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on population and human health arising from the overall project has been assessed. The assessment comprises:

- A review of the existing receiving environment.
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

Some potential impacts on human population and health have been assessed in other chapters of the EIA and are not repeated here. These include Noise and Vibration (Chapter 12); Air Quality and Climate (Chapter 8); Material Assets (Chapter 9); Landscape and Visual Resource (Chapter 11); Land and Soils (Chapter 6) and Water (Chapter 7).

4.1.1 Competency of Assessor

The assessment was completed by Zeba Haseeb, BS Hons. (Environmental Science), MS Environmental Science, Environmental Scientist and Maura Talbot MA (Human Geography), BA Hon (Geography), BA Hon. (Economics) at Malachy Walsh and Partners (MWP). It assesses the potential impacts of the proposed development on population and human health. The 2014 EIA Directive (2014/52/EU) has updated the list of topics to be addressed in an EIAR and has replaced 'Human Beings' with 'Population and Human Health'. It is considered that the change from 'human beings' to 'population and human health' in relation to EIA is primarily for clarification and to ensure consistency with, in particular, the SEA Directive.

4.1.2 Legislation

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

- Guidelines for Planning Authorities and An Bord Pleanála in carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, August 2018)
- Guidelines on the Information to be Contained in Environmental Impact assessment Reports (Environmental Protection Agency (EPA), May 2022); and
- Advice Notes for Preparing Environmental Impact Statements (EPA, draft September 2015).

The Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) state 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 the EIAR e.g. under the environmental factors of air, water, soil etc.'

Recital 22 to the EIA Directive provides that *“In order to ensure a high level of protection of the environment and human health, screening procedures and environmental impact assessments should take account of the impact of the whole project in question, including, where relevant, its subsurface and underground, during the construction, operational and, where relevant, demolition phases”*.

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

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

The assessment of the likely significant effects of the proposed development on population and human health was conducted by reviewing the current socio-economic environment of the environs of Carrigtwohill. This included site visits and visual assessments of the proposed site and the surrounding area, as well as an analysis of aerial photography and Ordnance Survey (OS) mapping.

Demographic trends were analysed at state, county, and local level, with the latter comprising the Electoral Divisions where the Carrigtwohill is located or those in closest proximity. Information was gathered with respect to the demographic and employment characteristics of the resident population within the study area sourced from 2011 and 2016 Census data. The data included information on population, structure, age profile, travel patterns and employment. A desktop analysis of the following documents and websites was also prepared;

- Cork County Development Plan (CDP) 2022-2028 (<https://www.corkcoco.ie/en/cork-county-development-plan-2022-2028>)
- Cobh Municipal District Local Area Plan (LAP) 2017;
- Central Statistics Office (CSO) www.cso.ie.

Consultations with statutory bodies were also used to ensure that environmental issues, including socio-economic, recreational and amenity issues relating to the proposed development were addressed. Further information on the consultation process and responses received is provided in **Chapter 1 Introduction**. The focus of this chapter is to establish the potential impacts on population and employment in the area and impacts of the community including residents, working and visiting community.

4.2 Methodology

The methodology used for this study included desk-based research of published information and site visits to assemble information on the local receiving environment. This chapter of the EIAR document has been prepared with reference to the Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in May 2022. A desktop study of the following published policy documents and data was undertaken to appraise the location and likely and significant potential impact upon population and human health

receptors and to assess population trends in the subject site and in the wider hinterland. The desk study included the following activities:

- Review of the most recent CSO Census of Ireland data to establish settlement demographics and economic context of the study area.
- Review of Ordnance Survey Mapping and aerial photography to establish existing land use and settlement patterns within the study area.
- Review of local and regional development plans and planning policy in order to identify future development and identify any planning allocations within the study area.
- Review of Cork County Council's Planning Register to identify relevant development proposals currently under consideration by the Council.
- Review of planning policy and strategies to identify, way-marked walking and cycling routes and other Rights of Ways within the study area.
- Review of tourism data including Tourism Ireland, Fáilte Ireland and local websites to identify tourism data and visitor attractions within the study area.

This assessment is a study of the potential indirect and direct socio-economic impacts of the construction phase and the operational phases of the development. Effects on receptors were assessed in terms of magnitude, quality, significance and duration.

4.2.1 Study Area

The Study Area for the purpose of this assessment on Population and Human Health primarily focuses on the local receiving human environment in the vicinity of the proposed housing development site, local environs and infrastructure within 2 km area. These include those who reside, work, visit, or use the local road networks in the general area. Electoral Divisions (EDs) are the smallest legally defined administrative areas in the State for which Small Area Population Statistics (SAPS) are published from the Census of Population. Therefore, in order to discuss the receiving human environment and other statistics in the vicinity of the proposed development site, the Study Area for this assessment has regard to EDs within or located close to the proposed development site.

Although this chapter predominantly describes the human environment in the vicinity of the proposed development, sensitive human receptors in the broader human environment are considered in the other specialised environmental topics including the following;

- Landscape and Visual Impact;
- Cultural Heritage Impact; and
- Material Assets Impact (including Traffic and Transportation, Telecommunications and Aviation).

4.2.2 Scope of Assessment

Table 4-1 outlines the issues which the EPA guidance documents suggest may be examined as part of the human environment study.

Table 4-1 Issues relevant to the Human Environment

Topic Area	Potential Issues
Economic Activity	will the development stimulate additional development and/or reduce economic activity, and if either, what type, how much and where?
Social Consideration	- will the development change patterns and types of activity and land-use?
Land-use	- will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately to alter the character and use of the surroundings?
Tourism	will the development affect the tourism profile of the area?
Health and Safety	- vectors through which human health impacts could be caused e.g. will there be risks of death, disease, discomfort or nuisance?

Accordingly, the scope of this assessment is made with respect to these topic areas and considers the effects of the construction, operation and decommissioning of the proposed development in terms of how the proposal could affect population and settlement, economic activity, employment, land use, amenities and tourism, and health and safety.

4.2.2.1 Human Health

The European Commission document ‘Guidance on the preparation of the Environmental Impact Assessment Report, 2017; provides that: *“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”.*

Similarly, the EPA Guidelines on the information to be contained in environmental impact assessment reports (2022), states that *‘In an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc.. The Advice Notes provide further discussion of how this can be addressed.*

The EPA (2022) guidance also advises that *‘The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment.’*

Human health, in this chapter of the EIAR, is therefore considered in relation to health effects/issues and environmental hazards arising from the other environmental factors and the assessment is made with regard to the established international health-based guidelines limit value necessary to protect the public.

The potential wellbeing and nuisance effects of the proposed project on the local human environment have been identified as follows:

- Dust emissions from construction activities
- Noise emissions during construction activities and operation
- Public safety

- Visual impacts during operation
- Traffic nuisance during construction
- Interference with telecommunication signals during operation

Each of these issues have been fully assessed and are documented in other chapters of the EIAR as set out in Table 4-2. These assessments were reviewed to inform this study.

Table 4-2 Nuisances and Health and Safety issues and relevant assessment

Development Phase	Potential Nuisance / Health & Safety Issue	Addressed in EIAR Chapter
Construction Phase	Noise emissions and vibration	Chapter 12 Noise
	Dust emissions	Chapter 8 Air and Climate
	Public safety	Chapter 2
	Traffic nuisance	Chapter 15 Traffic and Transport Assessment
Operational Phase	Noise emissions and vibration	Chapter 12 Noise
	Visual impacts	Chapter 11 Landscape
	Air quality impacts	Chapter 8 Air and Climate
	Shadow Flicker nuisance	Chapter 12 Shadow Flicker
	Telecommunications interference	Chapter 9 Material Assets
	Public safety	Chapter 2

4.2.2.2 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022) (as set out in Table 4-3 below).

Table 4-3 Impact Assessment Criteria

	Term	Description
Quality of Effects	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative /adverse	A change which reduces the quality of the environment
Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequence
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant	An effect which, by its character, magnitude duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude duration or intensity alters most of a sensitive aspect of the environment

	Term	Description
	Profound	An impact which obliterates sensitive characteristics
Duration of Effect	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 than can be undone e.g. through remediation or restoration
	Frequency	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effects	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create a larger, more significant effect.
	‘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 SO _x and NO _x to produce smog).

Source: EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022)

4.2.3 Statement on Limitations and Difficulties Encountered

In preparation of this Chapter, the following difficulties were encountered.

- The most recent census data which informed this chapter’s analysis are from 2016 and may be somewhat out of date. Data from the 2022 census was not available at the time of writing.
- This chapter has been prepared during the Covid-19 pandemic.

Notwithstanding the above, we consider that the data collected, and analyses outlined reflects an accurate representation of the population and human health considerations with respect of the proposed development.

4.3 Baseline Environment

A desktop study of the following published policy documents and data was undertaken to appraise the location and likely and significant potential impact upon population and human health receptors and to assess population trends in the subject site an in the wider hinterland.

- Central Statistics Office (CSO) Census 2011 & 2016 data;

- Cork County Development Plan 2014;
- Cork County Development Plan (CDP) 2022-2028 (<https://www.corkcoco.ie/en/cork-county-development-plan-2022-2028>)

The Strategic Environmental Assessments (SEA) for the Cork County Development Plan has also been reviewed, to provide a consideration of Population and Human Health. This assessment is a study of the potential indirect and direct socio-economic impacts of the construction phase and the operational phases of the development. Effects on receptors were assessed in terms of magnitude, quality, significance and duration.

4.3.1 Site Location and Description

The study area for this section was defined based on an evaluation of the location of the subject site in relation to Electoral Divisions (EDs), the smallest legally defined administrative areas in the State. The defined study area for this chapter includes the directly affected electoral division and some neighbouring division which may be affected by the proposed development. The proposed development site falls along the northeast boundary of the Carrigtohill ED. The adjoining ED of Caherlag, was also included in the study area as it lies immediately to the west of the site and includes the settlement of Caherlag. Fota Island (census small area 47106013) was included as it is both easily accessed via the Cobh branch of the suburban rail line,.

Carrigtwohill was a small rural village which has become one of the fastest growing suburbs around Cork City centre during the last 20 years. It is located 15km east of the city centre and is connected to the city via the N25 national road and the Irish Rail railway line between Cork and Midleton (see **Figure 4-1**). These transport routes have facilitated the growth and development of the town as a commuter centre. The Cork County Council Development Plan (2022-28) for Carrigtwohill is to facilitate “significant population growth in order to maximise the value of the suburban rail project, grow the employment base of the town as a key location for the delivery of the economic targets for the whole of Metropolitan Cork, and build a vibrant, compact and accessible town centre that provides for the needs of the expanding community, while retaining the unique character and community spirit of the town”.

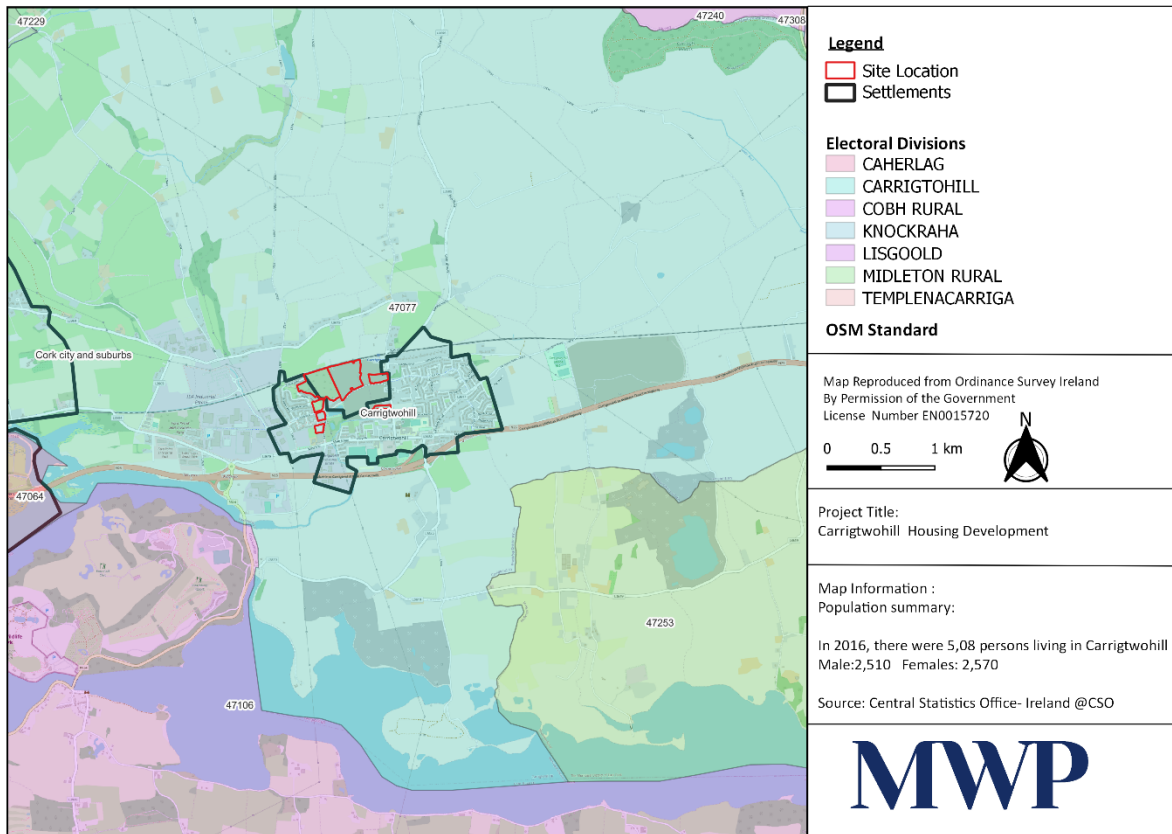


Figure 4-1 Carrigtwohill Settlement Map

4.3.2 Land Uses

The proposed development lands are located on greenfield sites within the ‘development boundary’ of Carrigtwohill. The land north of the development site includes undeveloped agricultural lands along with the railway line and Carrigtwohill train station, while on the east, there are a number of individual residential properties. To the south and west of the proposed development site there are a number of housing estates. There are two roads adjacent to the site currently under construction. This includes the west-east (Castlelake to Station Road) connection road, and the north south connection road that intersects with the East/West connection road and the proposed Blandcrest Main road 1 coming in from the north through the proposed development. Between these new east/west and north/south connection roads there is a greenfields site where the development of a new Carrigtwohill educational campus has been approved and will proceed with construction in the next year. Three existing schools, one secondary and two primary, will be relocated to this site once it is completed in September 2023.

4.3.3 Population Trends

The most recent national Census data is for 2016. Between 2011 and 2016 the overall population in the Carrigtwohill increased by 10%. This was considerably higher than that for the county and state population increases of 5% and 4% in the same period. There was also rapid population growth in Fota Island (small area 04710613) where the population doubled up in that same period. Carrigtwohill, experienced exceptional

population growth of 109% between 2002 and 2016 period (see table 4-4). The CDP (2022-28) expects the town’s population to grow to 13,486 by 2028 and 15,770 by 2031, which represents a doubling from the 2016 population. Cork County has developed plans to facilitate and accommodate this population growth. These plans include the development of an Urban Expansion Area to the north of the railway line, the infilling of existing greenfields areas within the existing urban fabric (which include this proposed development), the reorganisation and upgrading of the town centre and the development of new parking areas, roads, pedestrian walkways and cycle routes (CDP 2022-2028).

Table 4-4 Population Trends

Area	2002	2006	2011	2016	% Change 1991-2016
Carrigtwohill	3507	4875	6665	7334	109%
Caherlag	5720	6555	6958	7481	31%
47106013 Small Area			153	323	
Cork County	447,829	481,295	519,032	542,868	29%
State	3,917,203	4,239,848	4,588,252	4,761,865	31%

4.3.4 Settlement Patterns

Table 4-5 below indicates that the standard household size in Carrigtwohill is 3 persons per household. This is larger than the state, city and county average household sizes of 2.63, 2.45 and 2.83 persons respectively. The overall population in Carrigtwohill as per CSO, 2016 was 7,334, while in Caherlag, the population recorded was 7,481.

Table 4-5 Household Data

Area	Number of Households	Persons in Households	Average household size
Carrigtwohill	2444	7329	3.00
Caherlag	2423	7462	3.08
47106013 SA	41	108	2.63
Cork City	49,411	120,980	2.45
Cork County	146,442	414,062	2.83
State	1,702,289	4,676,648	2.75

(Source: Census 2016 data)

The high average household size in the study area at 3 persons per household indicates a high percentage of families in the area including children between preschool and adolescent family cycle stages. The state average for family members in this cohort is 54%. An extraordinarily high level of families with young children (80%) is documented in the Fota Island 47106013 census Small Area, with the children mainly being in the pre-school and early school stage. A parallel trend is evident in Carrigtwohill ED (66%) and to a lesser extent Caherlag ED (61%).

The 2016 census data indicates there were 2,444 existing residential units in this area (see table 4-5). According to the CSO 2016 data, see **Table 4-6** below, 90% of the population of Carrigtwohill (2207 persons) were living in a house/bungalow, with 9% (433 persons) living in apartments. This data differs from the 2022 Cork County Development Plan which indicates 2040 dwellings in the Carrigtwohill area.

Table 4-6 Household Structure in the Study Area (2016)

Types of Accommodation	Number of persons	% Persons	Persons per Household	Average Persons per dwelling
House/Bungalow	2207	90	6792	3.01
Flat/Apartment	209	9	433	2.07
Bed-sit	1	0	2	2
Caravan/Mobile home	2	0	5	2.5
Not stated	25	1	97	3.9
Total	2444	100	7329	3

4.3.5 Travel Patterns and Commuting

Table 4-7 below indicates that the number of people using private motor vehicles to travel to work/school and other purposes in the area is substantially higher than those using public transport or commuting by bicycle or on foot. **Table 4-7** presents data from the 2016 census which shows that 52% of all persons resident in Carrigtwohill who were commuting in 2016 travelled by car, and just over 5% travelled by public transport and 5% travelled by walking or cycling.

However, the use of public transport is in line with the City trend. The pattern overall corresponds more closely with the state average figures and use of sustainable modes of transport is in excess of that in the County or rural areas.

Table 4-7 Commuting Pattern (2016)

Commute Mode	On-Foot or Bicycle	Public Transport	Car, motorbike, or van
Carrigtwohill	498 (5%)	423 (5%)	3,845 (52%)
Caherlag	450 (6%)	429 (5%)	4,203 (57%)
Cork County	25,984	22,342	2,06,647

In Caherlag ED, out of all the people residing in this area, 4,203 (57%) commute to work by car/motorbike/van. While in Carrigtwohill ED, out of all the people living there, 3,845 people commute to work by car. The proportion of residents using pedestrian and bicycle travel modes for work/school travel in 2016 was very low.

Table 4-8 Public Transport Services in the Area. Source: Irish Rail

Route ID	Route Name	Weekday Midday Frequency
Irish Rail	Mallow-Cork-Midleton	30 minutes
205	UCC-CIT	30 minutes
261	Ballinacurra-Cork bus station	2 hours

4.3.6 Economic Activity

The Cork County Development Plan (2022-2028) reports that 2336 (68%) of Carrigtwohill residents over the age of 15 years were employed and 82.1% of these persons travelled to work by motor vehicle. The percentage of persons commuting to work by car was even higher at 89% when looking at all those who are employed in the Carrigtwohill area. Only 1% travelled by train and 2% cycled. A key sustainable development objective for the Cork County Council is to reduce commuting and increase the use of public transport and cycling as a means to get to work or school. Stimulating the growth of industry, retail and business in the Carrigtwohill and surrounding areas is a key component of this plan. Consequently, significant land has been set aside for industrial development, as well as the redevelopment of the town centre, and road and parking infrastructure. Existing industrial estates around Carrigtwohill and accessible via the N25 highway include the Carrigtwohill estate (764m west of town centre), the Fota Retail and Business Park (2km west), the Springhill business park (2.3km north west), the Courtstown Industrial Estate (5km south east), the Skyways Business Park (6km east), the waterfront business park (7.5km south east), the Little Island Industrial estate (6km east) and North Esk Business Park (8km east).

4.3.7 Retail

Significant regeneration of the Carrigtwohill town centre itself has not yet taken place and the current retail / service offering within the town is limited. Convenience shopping is provided in the form of a discount food store to the west of the town (Aldi), a Centra in the centre of the town and a Costcutter supermarket at the eastern end. The town has a development of over 8,000sqm of retail warehousing at Fota Retail and Business Park on the western boundary of Carrigtwohill. Other retail service providers in the area includes Carrigtwohill Shopping and Business Centre, MACE Carrigtwohill, C&K Carrigtwohill Food Store on the south of the town. See **Figure 4-2** below.

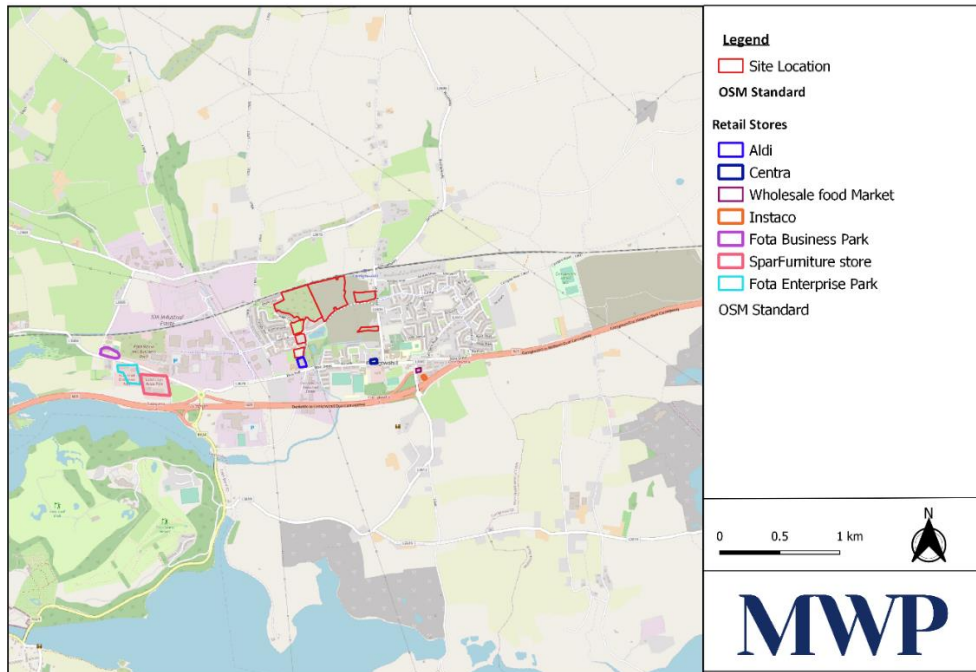


Figure 4-2 Retail Facilities within 2km of Area

4.3.8 Amenities

Carrigtwohill is identified as functioning as a ‘Metropolitan Town’ within the County Metropolitan Strategic Planning Area. The town provides for a broad range of present community and social infrastructure assets which will serve existing and future residents of Carrigtwohill. See **Figure 4-3** below. This includes three primary schools, two secondary schools, a garda station and a church, as well as a community centre, located in the heart of the settlement on the main street which is new state of the art All-Weather facility opened in Carrigtwohill accommodating four 5-a-side pitches and one full size pitch. There is also a children’s playground and all weather pitch to the south of Main Street. These include a badminton, basketball, athletics, tennis and activities offered by the Community Games Programme for young people. There are also public open spaces, and a range of sports facilities including Carrigtwohill GAA and Carrigtwohill United clubs (which has 3 pitches, a gymnasium and handball alley), East Cork Glenmary Basketball Club, local playgrounds, all weather facilities and additional gyms, Pilates/yoga centre. Carrigtwohill United Football Club has new facilities at Ballyadam to the east of the town where they have 3 playing pitches, 2 training pitches and a clubhouse with dressing rooms.

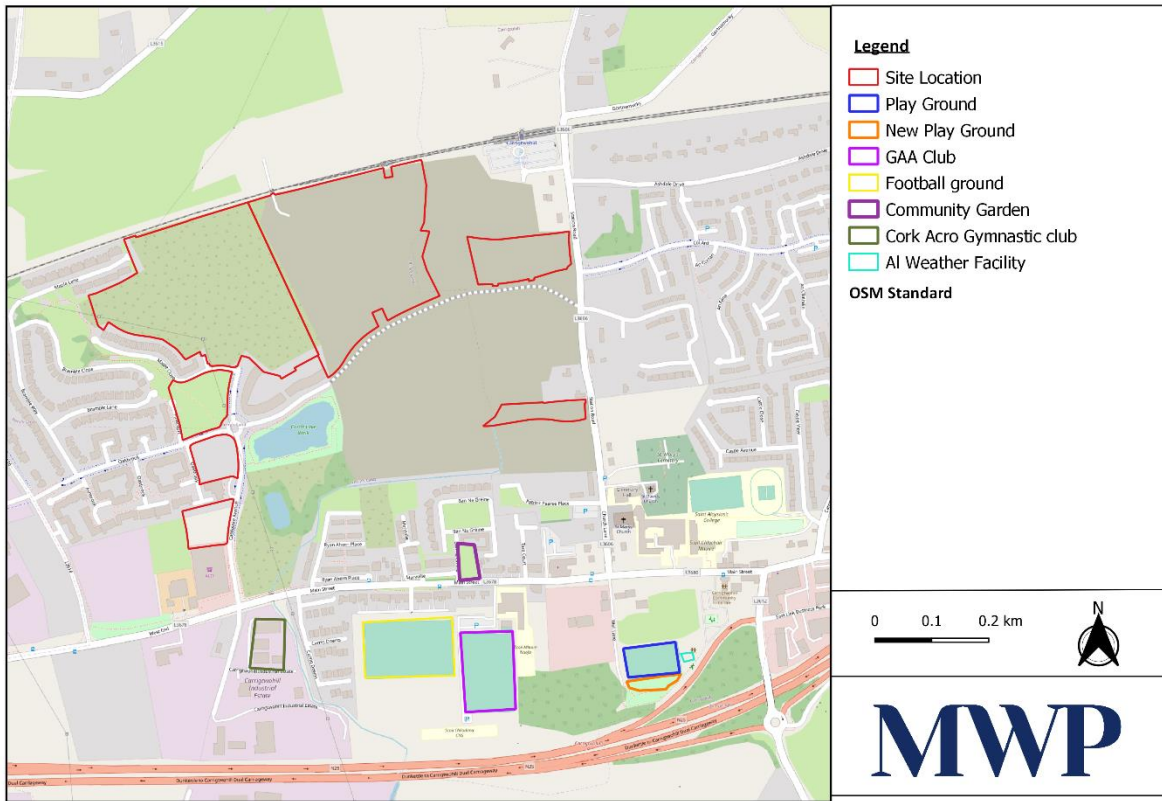


Figure 4-3 Location of Community and Sports Facilities in Carrigtwohill

4.3.9 Educational Facilities

In terms of educational facilities, Carrigtwohill, contains 8 no. educational facilities within 2km of its centre. These include the Wendy House Montessori Pre school, St Marys Convent National School, St. Aloysius' College Catholic Girls Secondary School, Scoil Chlochair Mhuire National School, Carrigtwohill Pre-School, Scoil Mhuire Naofa, Scoil Chliodhna CNS, and Carrigtwohill Community College. Refer to **Figure 4-4** for location of schools. **Table 4.9** below indicates the capacity within the schools. Three of these schools will be relocated to the new education campus to be constructed adjacent to the proposed development site.

Table 4-9 Existing Educational Facilities within 2km

Number	Educational Facility	Type	Capacity
1	The Wendy House Montessori Pre school	Mixed	16
2	St Marys Convent National School	Mixed	356
3	St. Aloysius' College Catholic Girls Secondary School, Carrigtwohill	Girls	784
4	Carrigtwohill Pre-School		
5	Scoil Chlochair Mhuire National School	Mixed	400
6	Scoil Mhuire Naofa	Mixed	468
7	Scoil Chliodhna CNS	Mixed	307
8	Carrigtwohill Community College	Mixed	536

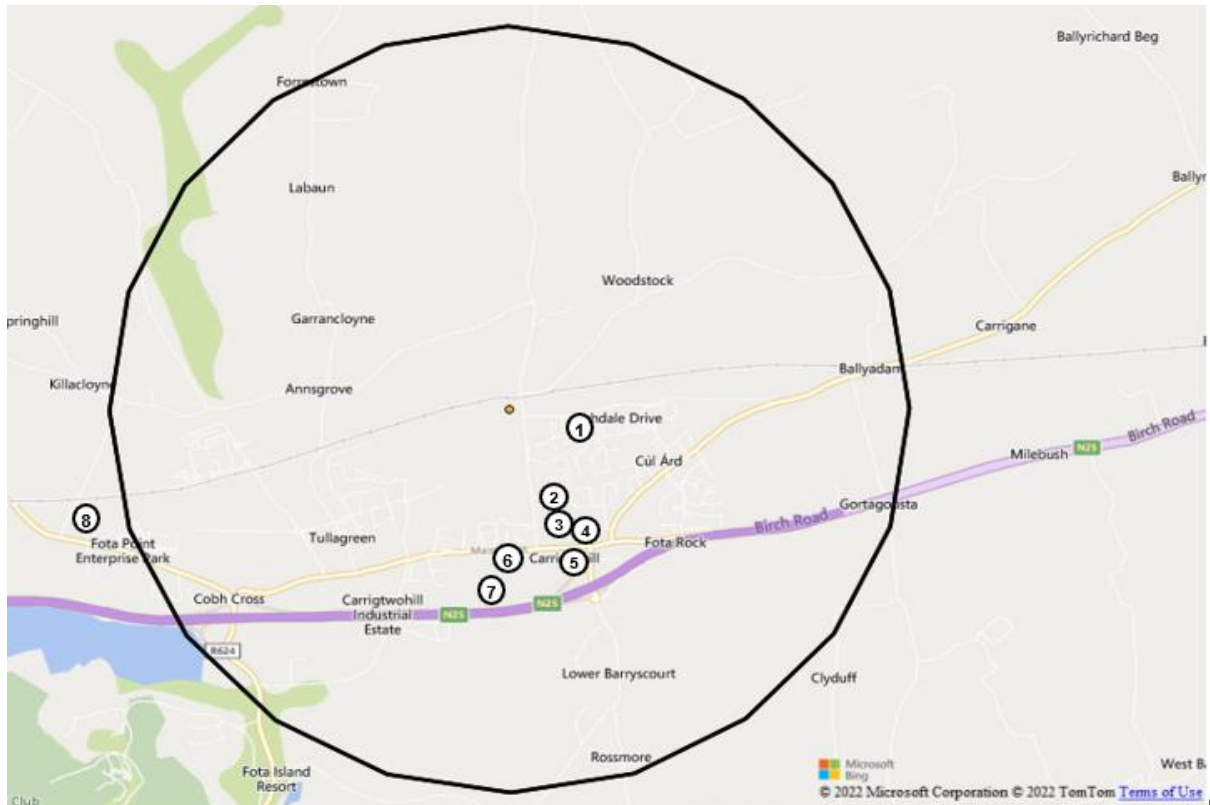


Figure 4-4 Educational Facilities within 2km Area

4.3.10 Public Health

There is a large range of healthcare facilities within the 2km of the proposed development site that includes Carrigtwohill Primary Care Centre, The Dispensary, GE Healthcare, Carrigtwohill Dermatology Clinic, Barryscourt Medical Centre, Carrigtwohill Pharmacy, Cotter's Pharmacy, McCarthy's Pharmacy Carrigtwohill, Praxis care Cork-Greenville campus, Cork Association for Autism, Special Kids Medical Clinic and Elizabeth Oakes Cork Clinic are within 2km. **Table 4-10** below indicates the existing healthcare facilities within 2km area. Outside 2km the Midleton community hospital is situated to the east (see **Figure 4-4**).

Table 4-10 Existing Healthcare Facilities within 2km Area

Number	Healthcare Facilities
1	The Dispensary
2	Cotter's Pharmacy
3	Carrigtwohill Pharmacy
4	Barryscourt Medical Centre
5	Carrigtwohill Dermatology Clinic
6	McCarthy's Pharmacy Carrigtwohill
7	Cork Association for Autism
8	Praxis care Cork- Greenville campus
9	GE Healthcare
10	Special Kids Medical Clinic
11	Elizabeth Oakes Cork Clinic

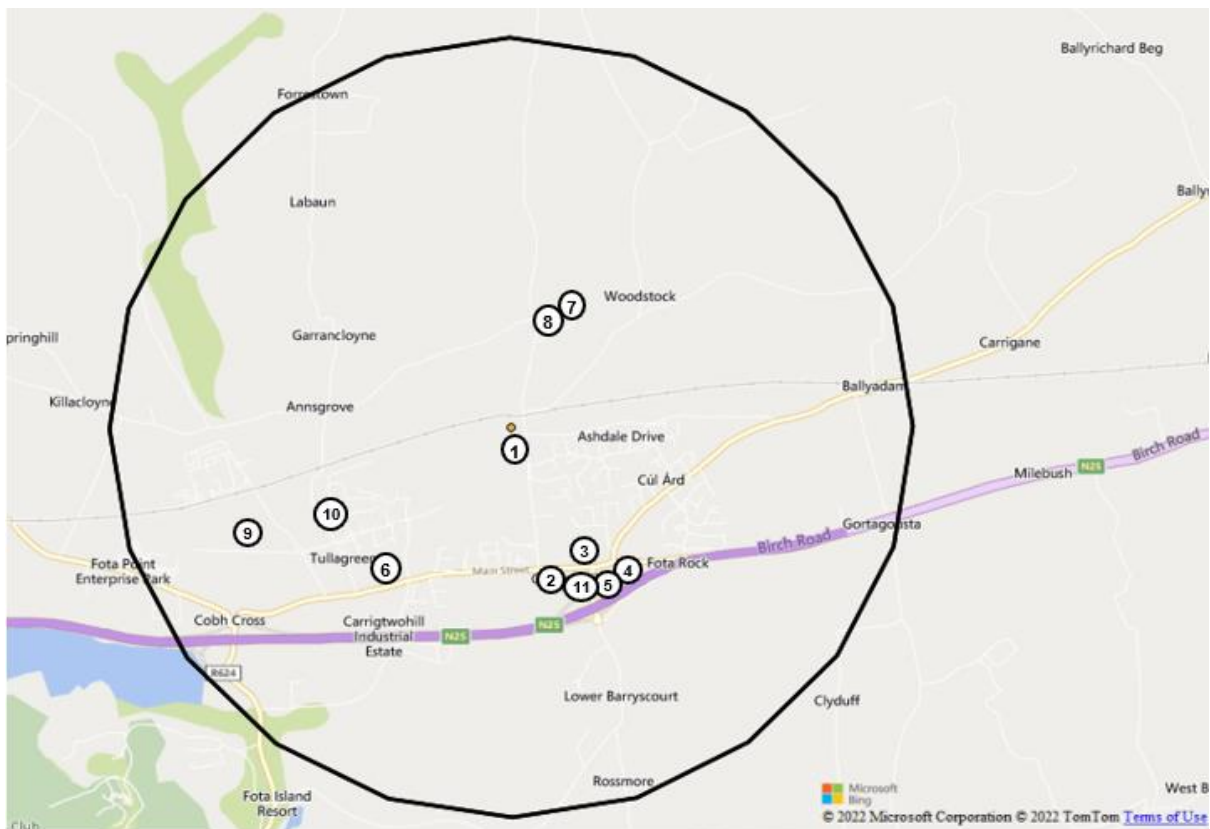


Figure 4-5 Medical facilities within 2km Area

4.3.11 Public Transport

The proximity of Cork Metropolitan Rail Network and the presence of several existing bus routes to Carrigtwohill, make this one of the most sustainable settlements in the Cork Metropolitan Area in terms of public transport provision. The train Station provides one of the most steady and high frequency rail facilities in the country, being

situated on both the Cork – Midleton and Cork – Cobh lines. This results in rail services every 15 minutes (Monday-Saturday) during peak times to the city centre (Kent Station) and a service every 30 minutes to other urban centres including Little Island, Midleton, Cobh and Carrigtwohill.

Carrigtwohill Main Street is served by the Bus Éireann service numbers 240, 241, 260 and 261 linking Cork City to east Cork and west Waterford.

4.3.12 Tourism

Carrigtwohill is generally not a tourist destination. Fota Island Wildlife Park and Fota House and Gardens and Fota Island Resort are situated 3km south west of Carrigtwohill and provide a unique tourist offering in the area.

4.4 Assessment of Impacts and Effects

4.4.1 Construction Impacts

4.4.1.1 Existing Human Population and Health

Construction works are expected to take place on a phased basis over a 10 year period. The first phase comprises the largest portion of the development and will take an estimated 5 years to construct (see **Figure 4-6**- the areas in brown shading). This includes the Blandcrest and Station Road north and south sections. The second phase will take about 1 year to complete and will include the Castl lake West and Castl lake South 2 sites (see two red shaded blocks in **Figure 4-6**). The third phase will be the eastern half of the Castl lake north site and will take around 20 months to construct (see yellow shaded area in figure 4-6). The fourth phase involves the development of the western half of the Castl lake north site and will take around 15 months to construct (see green shaded area in **Figure 4-6**). Phase 5 will involve the construction of the two apartment blocks over 18 months (see the two blue shaded areas in **Figure 4-6**, one adjacent to the train station and the other in the Castl lake south 1 site). The construction of these phases will overlap partially with no more than 2 phases overlapping at any one time.

During the construction period, there will be no loss of rights of way as a result of the proposed project. The construction methods used and the hours of construction intended will be designed to minimise potential negative impacts to nearby residents. Construction of the proposed development will be applied in accordance with the Construction and Environmental Management Plan (CEMP) prepared by BAM which is included in **Appendix 2.1** of this EIAR. These documents describe a suite of mitigation measures to be rigorously implemented and monitored during the construction phase of the development. It is expected that the construction workers will travel from their existing residence rather than taking temporary accommodation in the local area.

Traffic management measures will be required at off peak times or at night time hours, where road opening is required to deliver utilities. It is expected that residual impacts will be not-significant following application of the identified mitigation measures in the CEMP and the Traffic Management Plan. Further details on the impacts on traffic and transportation are discussed in Chapter 13 Traffic and Transpiration.

There are likely to be some negative impacts associated with construction traffic and possible nuisances associated with construction access requirements. The proposed construction of footpaths, pedestrian crossings, and the construction of the apartment building on the Castl lake side may result in additional traffic congestion for a short period.

In terms of landscape impacts, the proposed development will result in the conversion of green fields into an urban landscape. This impact is rated as temporary and neutral as the proposed housing scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality. In terms of visual impact, the assessment of 19 viewpoints found that the construction phases will result in **medium term/ temporary neutral to moderate visual impacts**, out of which 8 are having neutral effects, while 11 have moderate adverse effects. The proposed landscaping mitigation planting scheme, which will be implemented during the construction phase, will mitigate the long-term impacts of the loss of current high specimen trees, particularly in the proposed development.

In the absence of mitigation, long term potential negative impacts on current services such as water, communications, electrical infrastructure resultant from connections, may occur from the proposed development to existing local services which would significantly impact the local population for short periods. Impacts on services are outlined in Chapter 9 Material Assets.

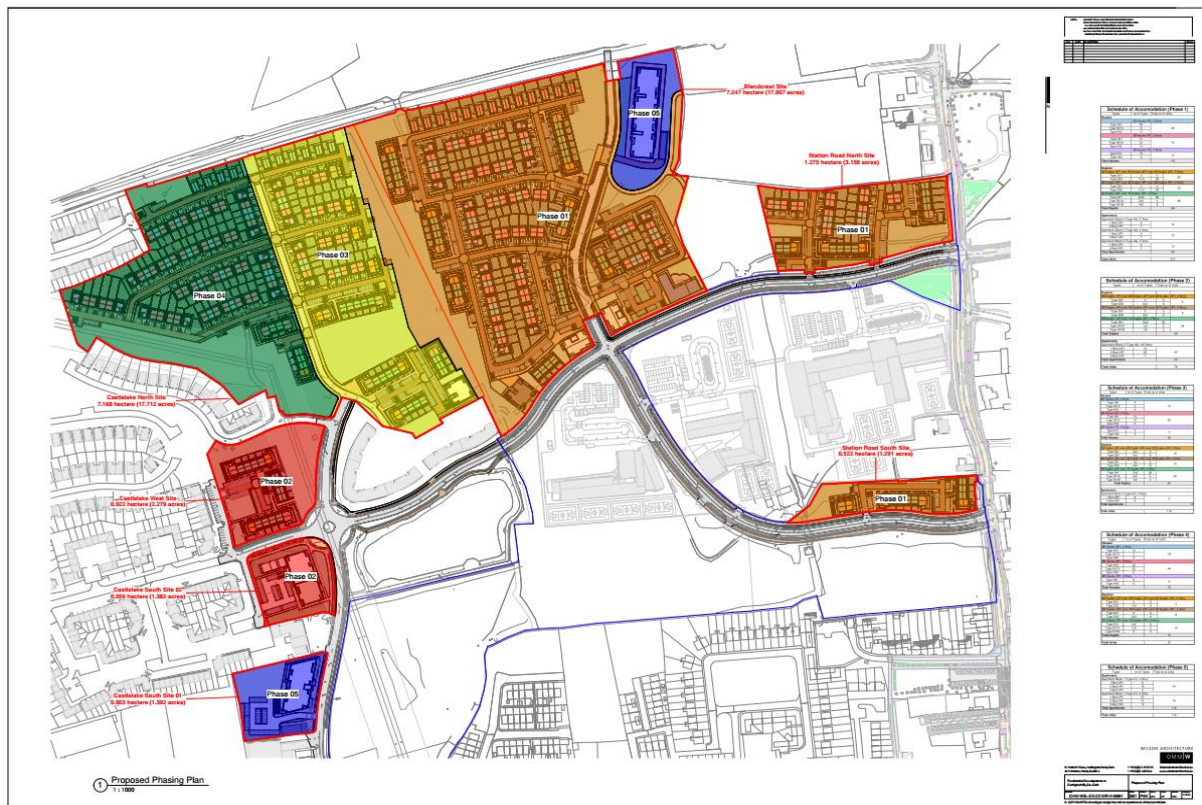


Figure 4-6 Proposed Phasing of 10 year Construction Process

Regarding human health effects, there may be impacts associated with noise and dust. Some hydrocarbons will be used onsite during construction. However, the volumes will be small given the scale and phasing of the project construction activities and use and storage will be managed in accordance with best practice mitigation measures.

It is predicted that the potential residual impacts associated with soil or ground contamination and subsequent health effects are negligible. Refer to EIAR Chapter 6. Potential health effects are associated with negative impacts on public and private water supplies and potential flooding. With the proposed site design and mitigation measures outlined in EIAR Chapter 15 and the CEMP, the potential for impacts on the water environment are not expected to be significant.

During the construction phase the development the above mentioned negative impacts will be minor and temporary in nature. The impact on population and settlement during the construction phase is rated as **negative, medium-term, indirect** and of low negative significance overall. This impact is considered easy to mitigate and the residual impact would be low or insignificant. A series of mitigation measures will be introduced to address any negative impacts during the construction of the proposed development. Potential impacts arising from the construction phase such as impacts on noise, air quality and visual amenity are also addressed in other chapters of this EIAR.

4.4.1.2 Economic Impact

The proposed development has the potential to create additional construction related employment for the Carrigtwohill and surrounding areas during the construction phase. The proposed development will involve the employment of an average of 70 on-site construction staff, and a peak on-site total of up to 120 construction staff. These construction workers will likely be recruited from the wider Cork area. In addition to direct employment, there will be significant off-site employment and economic activity as a result of the supply of construction materials and the provision of professional services associated with the project.

The impact on employment during the construction phase is rated as **moderate, positive and medium-term** overall.

The duration of the construction phase is also likely to result in moderate medium-term positive impacts for the local retail economy. Construction workers will likely be of benefit to local retail outlets and restaurants in mornings and lunchtimes.

The impact on economic activity during the construction phase is rated as **positive medium-term, direct and indirect and of slight significance** overall.

4.4.1.3 Local Amenities, Open Spaces and Sports

The construction phase will result in a change of land use from agricultural to residential area. The subject land is improved grassland but is currently unused and inaccessible to the public. It is not used as a public open space. There will be no loss of agricultural production and no loss of public amenity for neighbouring residents during the construction phase.

4.4.1.4 Human Health

Risks to Human Health related with works during the construction phase in relation to land and soils include work which puts persons at risk of burial under earthfall (e.g. during basement excavation), works that could undermine existing foundations, access and egress from the site and interface with site staff and / or the public (e.g. risk of slips, trips and falls), dust generation, use of machinery, noise exposure for construction workers and potential hearing damage that may be caused due to exposure to high levels of noise. The mitigation measures for noise, visual, dust etc outlined in the CEMP will effectively avoid and minimise the potential for health impacts associated with construction.

The impact on human health during the construction phase is rated as **adverse, slight, short term** and temporary.

Air Quality and Climate Change

The construction phase will result in increased vehicle emissions and noise. Best practice mitigation measures are recommended for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source.

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. Therefore, the air quality impact of construction of the proposed development will be **short term, imperceptible, and adverse** with respect to human health.

In relation to the climate change, the construction phase of the proposed development will have increased carbon emissions from vehicles. The manufacturing and transportation of the construction materials will also produce the emissions. This impact is rated as **slight, indirect, adverse, short-term and localised impact/effect**. It is also a cumulative impact that is **irreversible**.

4.4.1.5 Major Accidents and Natural Disasters

Having regard to the topography, nature and location of the subject site, and based on the location of the built elements of the development within Flood Zone C (as established in the Site Specific Flood Risk Assessment (FRA) prepared by JBA consultants submitted with the application), it is therefore not considered likely that there will be any impact related to a major accident or disaster associated with flooding during the construction phase of the proposed development, stemming internally from within the development, or externally.

To summarise, the FRA concludes that the site is not at risk of flooding nor will the project have an adverse impact on flooding. The works proposed will be governed by best practice and appropriate safety procedures, ameliorating any risk of a major accident in those contexts.

This impact is rated as **rare, slight and localised impact/effect**.

4.4.2 Operational Phase

4.4.2.1 Impact on Existing Human Population and Health

The proposed development of 716 new homes will impact positively on housing provision for County Cork through the development of a site which is located in a designated urban expansion area and predominantly zoned for residential development. The development of a high quality residential development comprising a range of house types and sizes at this site will help to reinvigorate Carrigtwohill in accordance with the objectives of the County Development Plan. The location of the development adjacent to the high capacity light rail service and proximate to bus services, including the ample provision of bicycle parking facilities on site, will encourage the use of sustainable transport, which has positive public and human health implications when compared to development at less accessible locations which encourage reliance on private cars.

This housing project will result in a sizeable addition to the emerging Carrigtwohill area. This is considered a significant positive impact, particularly in the context of current housing demand, while also taking account of the location's access to places of employment and public transport services and infrastructure.

Once constructed there will be no adverse significant outward noise impact from the development. Any ancillary noise (residents and residential services) will be typical of any housing development and will form part of the natural urban soundscape (See Chapter 12 Noise and Vibration).

The split in am and pm peak traffic movements will not result in an adverse impact on local air quality at any of the junctions and it is expected that the impact of the additional car engine exhaust emissions will have a negligible change on local ambient air quality. No significant increases to greenhouse gas emissions are expected to occur and there will be no significant impact to Ireland's contributions to global emissions (See Chapter 8 Air and Climate).

With regard to visual impacts, the proposed landscaping in the development will consist of a range of suitable native and non-native species planted across the network of various open spaces and gardens. This will help to soften the appearance of the buildings and act as a visual barrier. Tree lines are proposed across the proposed development to add structure and act as vertical screens. The lighting across the proposed development will be designed to prevent light spillage pollution into the surrounding urban and rural areas (See Chapter 11 Landscape and Visuals). Pathways have been designed to allow good accessibility for all ability users across the proposed development and to directly connect into the adjoining shared pedestrian/cycle paths currently under construction along the connection road to the south and the proposed inter urban cycleway to the east.

Overall the impact on human health during the operational phase is considered a **long-term, significant positive, localised and metro-wide direct impact**.

4.4.2.2 Land Use and Housing

The greenfield site will become a compact high density residential area that will contribute to addressing the critical shortage of housing in the region and country. This significant increase in housing provision is planned and consistent with the planning policies and land use designations of the site, as well as the County's housing and services policy targets and priorities. The Carrigtwohill and Cork 2022-28 Development Plans proposed to expand and upgrade Carrigtwohill. Key components of this include 1) developing the remaining greenfield areas within the existing urban area – such as the proposed development site, 2) expanding the town area north of the railway line, and 3) redevelop the town centre area in ways that retain the historical character of the town centre but also intensify land use and ensure good accessibility, amenity value and traffic flow.

The proposed development will contribute to these development goals in the following manner:

1. the provision of a range of residential types and sizes including 7 apartment blocks of between 4 and 5 storeys with 208 one to three bedroom apartments, 284 duplex units and 224 detached, terraced and semi-detached houses. This amounts to a total of 716 residential units.
2. the development of existing greenfields areas within the existing urban area,
3. provide a creche adjacent to the future planned education campus,
4. provide a main public road through the development which will link up to the train station on the northern boundary, the future planned urban expansion area north of the railway line and encourage permeability and convenient pedestrian and cyclist movements.
5. The proposed landscape areas consist of a series of open spaces including 2 large neighbourhood parks; 8 local parks, a 'Village Green/ Plaza' area; communal amenity space for the apartments; incidental open space; and streetscape planting. All public open spaces have been clearly defined by both the housing development and the various proposed apartment blocks, which ensure quality, well designed amenities with both active and passive uses.

It should be noted that the original planning application for this development provided a density of 35 residential units per hectare and was declined by the Cork County Council. It was rejected on the grounds that it did not meet the Cork County Council requirement for high density residential accommodation in the Carrigtwohill area

which has a maximum density of 50 units per hectare. The revised planning application for this project has now been intensified to provide 46 residential units per ha. This BAM development would increase the housing units in Carrigtwohill by 29% and will provide 22% of the target number of housing units for 2028. This is a significant increase in housing for this area and will contribute significantly to meeting the housing provision targets.

Consequently, this impact is rated as definite **significant positive, direct, long-term and localised impact/effect**, as well as a **significant beneficial impact for County Cork**. It is also a positive cumulative impact that is irreversible. No mitigation is required so there is no residual impact. The Do-Nothing alternative would have a significant negative impact that would undermine the potential to reach the Cork City and Carrigtwohill future housing provision targets aimed at addressing the housing shortage and meeting population growth needs.

4.4.2.3 Economic Impact

The proposed development will result in significant permanent positive impacts on the growth of the local economy. The projected increase in population of Carrigtwohill discussed in the previous section will create additional demand for local retail and service provision, providing increased business and local employment opportunities and making existing businesses more sustainable. The development will also support the long-term future of Carrigtwohill train station and public transport services.

One of the concerns related to this rapid growth of the town is the fact that the original town center has not yet been redeveloped and is currently experiencing considerable traffic and parking constraints and provides limited opportunities for retail development. The draft Cork County Development Plan 2022-2028 intends for the town centre to develop into an attractive mixed-use development area where a significant amount of the goods and services required by the town's population can be provided without the need to travel to other locations. In order to minimise traffic within the greater Cork city area, the city wants to ensure that the range and scale of convenience goods shopping in Carrigtwohill should be sufficient to provide for the weekly shopping needs of the resident population. The parallel development of a good range of comparison goods shopping would add significantly to the overall attractiveness of Carrigtwohill as a place to live and work.

The County's strategies to achieve the redevelopment of the town centre involves consolidating and enhancing the town center, alleviating traffic congestion, improving parking, redeveloping five identified inappropriate, underutilised and derelict properties in the town centre, improving the public realm spaces and connectivity, and enabling additional suitable mixed-use developments for retail, offices, housing and parking. The plan envisages some relocation of existing parking in the main street to more suitable areas at the back of the main street properties. All of these measures are critical complementary interventions needed to ensure the sustainable development of the town and a good quality of life for the residents. This additional development would be achieved through a combination of public and private sector investments, all of which depend on the growth in demand for services and in revenue for the local municipality, which this development will contribute to facilitating.

In increasing the provision of housing and the population of the town the proposed development will also support the growth and development of the regional and Cork economy by providing housing for job seekers and making Cork a more attractive area to live and work.

Consequently, this impact is rated as **moderate positive, direct, long-term and localised impact/effect**. No mitigation is required so there is no residual impact. The Do-Nothing alternative would have a significant negative impact that would undermine the potential to reach the Cork city and Carrigtwohill future employment and sustainable and integrated city growth and development planning objectives.

4.4.2.4 Education Services

The proposed project will include the development of a creche for 181 pre-school children at a site immediately south of the future planned Carrigtwohill Educational Campus development (permitted by Cork County Council Ref. 19/5707). This future approved Educational Campus will accommodate two primary schools and a post-primary school. The two existing primary schools in Carrigtwohill which are clustered along the Main Road in Carrigtwohill will be relocated to this campus which will serve as a more central educational centre for the town and alleviate current traffic congestion problems in the town centre during peak periods.

The proposed development will therefore provide additional education facilities needed in Carrigtwohill to serve the needs of its growing population and is aligned with the educational and residential development plans for the town.

Consequently, this impact is rated as a definite **significant positive, direct, long-term and localised impact/effect**. It is also a beneficial cumulative impact that is **irreversible**. No mitigation is required so there is no residual impact. The Do-Nothing alternative would have a significant negative impact that would undermine the potential to reach the Cork county and Carrigtwohill future housing and educational provision targets.

4.4.2.5 Human Health

Currently there are a wide variety of medical facilities that are available in the study area and others in the broader region that are accessible via the public and private transport services.

Once operational, the population increase created by the proposed development will result in increased demand for local healthcare services, particularly in the settlements of Carrigtwohill and Caherlag. This might create a shortage of medical services in the area in the short-term until new medical businesses respond to the increase in demand. This will occur in the context of the national shortage of medical services and under-provision nationally, which the covid-19 pandemic has exacerbated over the last few years. National policies are needed to facilitate and incentivise increased health care services.

On the other hand, increased housing provision and a reduction in the housing shortage will improve human health for those struggling to access affordable housing. The implementation of the integrated and sustainable urban development plans in Carrigtwohill will also improve living conditions and quality of life for local residents and potentially alleviate congestion in other parts of Cork city. All of these benefits will improve human health.

Consequently, this impact is expected to be a likely **slightly adverse, in-direct, short-term and localised impact**. Effective mitigation of this negative impact is not within the power of the developers of this project to ensure.

In the long term the growth of the settlement will create more demand and make increased medical services more economically viable and likely. This is rated as a **likely slightly beneficial, in-direct, long-term and localised impact**. The Do-Nothing alternative would make no changes to the existing situation and have no impact.

4.4.2.6 Local Open Spaces

The delivery of high quality and function public and communal open spaces has been a key consideration in the proposed site layout and has been designed to address the concerns raised previously by the planning authorities. The net developable site area is 16.6 ha. The County Development Plan requires there to be 12-18% of a site area to be allocated for open spaces, which can be dropped to 10% if the quality is particularly high (See Chapter 11 Landscape and Visual).

The proposed development will provide 41,461 sq m (27%) of functional public open space with the developable site area. A further 8,718 sq m of open space is provided to the west of the site but has been excluded from the above calculation of public open space due to the presence of existing ESB infrastructure (non-developable area).

This scheme also complies with the open space requirements linked to the amount and kind of accommodation provided.

The landscape masterplan for this project has identified a number of key character areas within the site including homezones, local parks and neighbourhood parks which will have distinct functions within the overall development. This hierarchy of open spaces will provide a variety of playgrounds, kick about areas and natural play area for future residents and visitors, that are linked to provide a series of open spaces that enhance the connectivity of the area. These public open spaces have also been designed to provide for the retention and protection of habitats of ecological value as far as possible. This has been accommodated by retaining a public open space along the existing stream/drainage course through the site. These green open spaces are illustrated in **Figure 4-7** below.

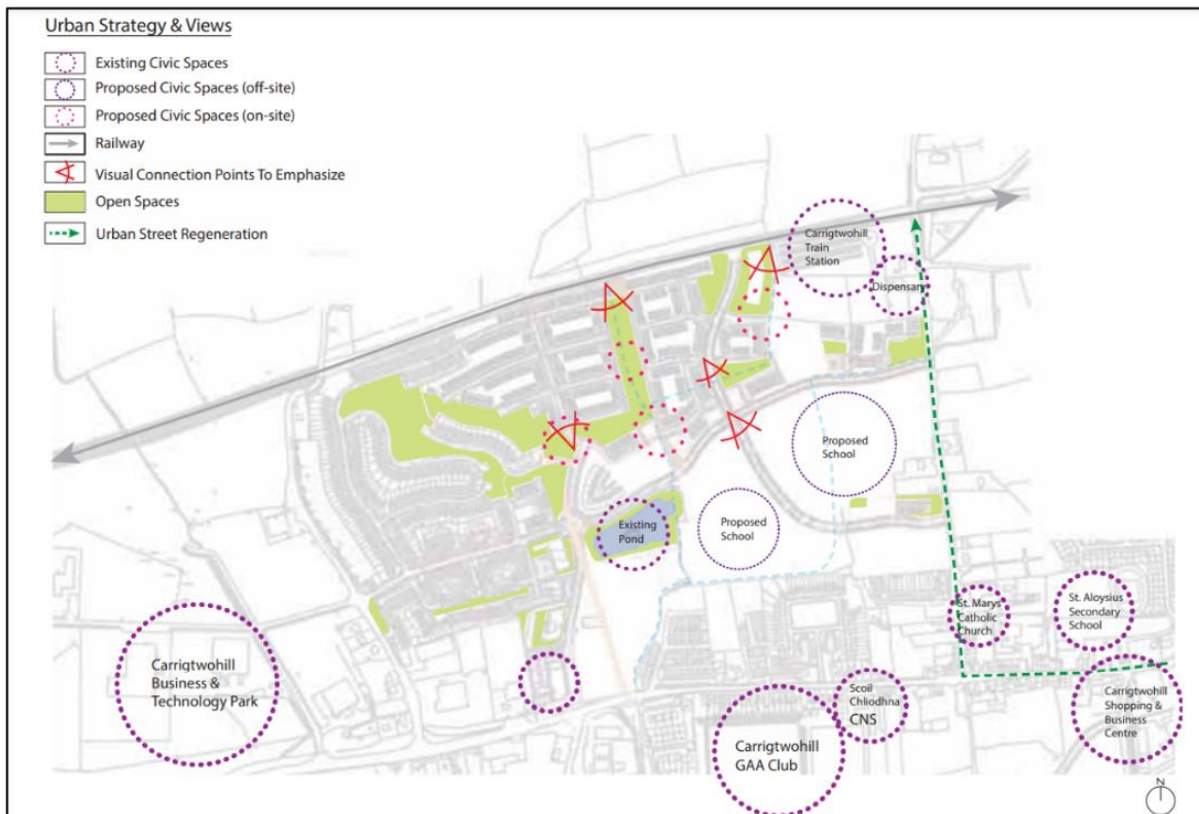


Figure 4-7 Illustration of proposed open and amenity spaces in and around the proposed development

Consequently, this impact is rated as a **definite significant positive, direct, long-term and localised impact/effect**. No additional mitigation is required so there is no residual impact. While the Do-Nothing alternative would retain existing habitats of ecological value, it would not provide functional public open spaces for the existing and future population as this land is not currently accessible to the public.

4.4.2.7 Other Amenities

The Cork County Development Plan 2022-2028 considers there to be a deficit of sports facilities for the expected growth and this will be addressed by the development of the future educational campus. In addition, the suburban rail network and greenway to Carrigtwohill will enable the future residents of Carrigtwohill and the proposed development to avail of amenity and sport facilities in the neighbouring settlements such as Caherlag.

The proposed Strategic Housing Development will increase the population of the town and the demand for community and sports facilities. This may improve the financial and human resources essential for the

sustainability of these activities. The location of the development adjacent to the proposed new education campus will also ensure that the sport and community facility needs of the residents of the development, especially for young people, will be well catered for.

Consequently, this impact is rated as a likely **significant positive, in-direct, long-term and localised impact/effect**. No additional mitigation is required so there is no residual impact. The Do-Nothing alternative would make no changes to the existing situation and have no impact.

4.4.2.8 Transport Services

As mentioned previously, the Cork County Development Plan 2022-28 envisages considerable expansion and redevelopment of Carrigtwohill in order to accommodate the expected population and economic growth. This growth includes improvements to the existing road network and parking facilities in ways that ensure good connectivity and facilitate/encourage the use of public transport and cycling infrastructure.

Carrigtwohill is serviced by the railway line between Cork and Midleton and the Bus Éireann service numbers 205, 240, 241, 260 and 261 linking Cork City to east Cork and west Waterford. The use of private transport in Carrigtwohill is still very high relative to the use of public transport services, with many residents commuting to other areas for work, shopping or education. Encouraging the use of public transport and cycling is a major priority for the Cork County Council to reduce emissions and household transport costs and ensure sustainability. Ultimately, Cork County Council would like to see those who work locally wanting to live locally in the first instance, or along the rail corridor generally, and to travel by sustainable mode. The development plans for the county are aimed at trying to enable and encourage this outcome. As part of this, the Cork County Council has secured funding and will be imminently lodging a Part VIII application for public realm works in Main street and upgrades to Station Road, relocating car parking off Main street and the delivery of infrastructure to the north of the railway line.

Cork County Council also wants to ensure that any future residential development in greenfields areas to the south of the rail line allows for permeability between housing areas and in particular, direct, safe and convenient access to the rail station by pedestrians and cyclists. This is particularly important on the proposed development site where providing appropriate connectivity with lands in Carrigtwohill North (future development area) is essential. There is a need for the provision of a link road through Castlelake to Station Road that would ultimately connect up with the existing link road from Station Road to the Carrigane Road.

The proposed private development being assessed in this study will include the construction of Blandcrest Main Road 1 as a main link road linking up to the intersection of the new east-west and north-south connection roads currently under construction along the north and west boundaries of the proposed educational campus. Blandcrest main road connects up with the underpass for the railway line at the north of the development site and will facilitate access to the new development areas north of the railway line. The proposed development also includes a cycleway coming south from the railway underpass along Brandcrest Main road and branching off to the east to connect up with the proposed cycleway to the Carrigtwohill train station (see **Figure 4-8**).

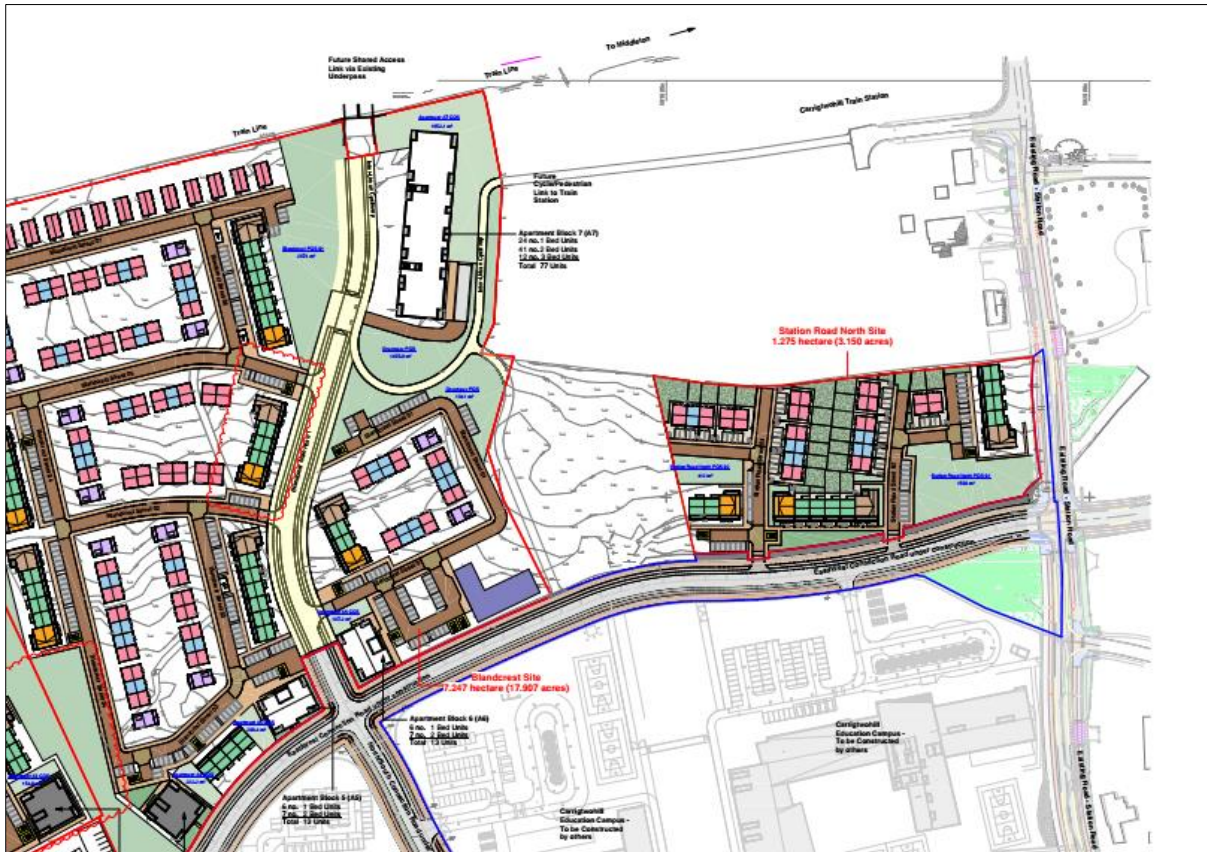


Figure 4-8 Image of part of the proposed residential development plan showing Blandcrest Main road 1 (pale yellow) and the two roads under construction that it will link up with (in grey)

The cycleway coming south from the railway underpass and branching east from Blandcrest Main road 1 toward the train station is also illustrated in pale yellow). The provision of cycling infrastructure and its connectivity with the railway station will also facilitate the use of the railway services and cycling options.

The internal residential roads on the western side of the proposed development will also link up to the existing Maple Crescent road associated with the Castlelake housing estate and through that to the roundabout which will link up with the new west/east road joining up to Station Road that is currently under construction. Together these new roads will serve to provide the connecting road network required to facilitate the growth and redevelopment of Carrigwohill.

Consequently, this impact is rated as a likely **significant positive, direct, long-term and localised impact/effect**. No additional mitigation is required so there is no residual impact. The Do-Nothing alternative would make no changes to the existing situation and have no positive impact and would impede the growth of the town.

4.4.2.9 Tourism

The subject site is not located in a tourist area or along a tourist route. The development and growth of population in the area will enhance the usage of the Fota Island park, and castle lake walk because of the proximity of these tourist sites.

Consequently, this impact is rated as a likely **slight positive, in-direct, long-term and localised impact**. No additional mitigation is required so there is no residual impact. The Do-Nothing alternative would make no changes to the existing situation and have no impact.

4.4.2.10 Climate Change

The traffic-related air emissions have the potential to increase carbon emissions and air pollutants, contribute to climate change, and undermine policy efforts to reduce emissions. However, the development plans for the town and this part of County Cork and good access to public transport services are expected to encourage residents to live and work locally and make more use of public transport than private vehicles. The proposed development will provide energy efficient housing and a link road to the train station as well as cycle and pedestrian routes that will improve and facilitate access to the train and buses, as well as the educational campus. The high cost of fuel is also expected to encourage more use of public transport and bicycles.

Consequently, the proposed development will contribute to achieving the intended sustainable outcomes of the County Development Plan. This is rated as a likely **significant positive, in-direct, long-term, localised and regional impact**. The Do-Nothing alternative would make no changes to the existing situation and have no impact.

4.4.2.11 Major Accidents and Natural Disasters

The proposed development will be located on land which is not at any significant risk of flooding. A site specific flood risk assessment (SSFRA) has been carried out by JBA consultants for the subject site and is included as a standalone report.

In addition, the road traffic arrangements and parking within the development have been designed so as to avoid and minimize any risk of major accidents associated with the surrounding road network. Therefore, it is considered that there is no significant risk related of major accidents or disasters, external or internal, man-made or natural in respect of the proposed development. For further details please refer to the Transportation Assessment Report, Flood Risk Assessment (FRA) and associated documentation prepared by MWP.

4.4.3 Cumulative Impacts and Effects

There are a number of planning applications and planning permissions in the Carrigtwohill area which are relevant to this proposed development that are currently underway or at design stage. These include 18/5707 Station Road Schools Campus, 19/5836 Internal Road upgrades, IDA Business Park, Carrigtwohill URDF–Public Realm Infrastructure Bundle, Bury’s Bridge Cycleway and Carrigtwohill–Middleton Inter-Urban Cycleway Phase 1, which are all described in Chapter 2. Cork County Council is also proceeding with plans to provide road and services infrastructure in the urban expansion areas north of the railway line and wants to see additional housing developed in this area. The urban development plan also includes the infilling of greenfield spaces within the existing urban area with residential and commercial developments, as well as the redevelopment of the town centre and the existing school sites once the schools have been moved to the new education campus. This will include the improvement of public open spaces, roads, pedestrian pathways, parking facilities and retail developments. This is part of their integrated sustainable urban development programme for County Cork and Carrigtwohill in particular. The construction of some of these projects may overlap with the construction phase of the proposed development which will take 10 years.

The cumulative impact of the proposed development together with all these other developments needs to be assessed in this EIAR. Consideration also needs to be taken of the phasing of the proposed development over the 10 year construction period (as outlined in section 4.4.1.1 of this report).

Assessing the cumulative social impacts of the construction phase of the development is contingent on a number of other proposed developments in the area, which are currently in the planning application process. For the purposes of this assessment of impacts a ‘worst case’ scenario has been assessed based on the information contained in the above mentioned planning applications and the other projects mentioned above. It is envisaged that subject to the implementation of mitigation measures proposed in the Construction Environmental

Management Plan for this development and all the others that are approved, that there will be no significant negative construction impacts relating to air quality, noise, vibration, traffic or visual amenity.

Once constructed, the proposed development will be permanent and non-reversible. It is considered that potential cumulative negative impacts relating to human health factors including traffic, road safety, air quality, water quality, noise and vibration will be effectively managed through the development of the proposed new roads and upgrades to the town facilities urban growth and expansion plans. Consequently, the negative impacts on health and welfare are not expected to be significant.

The **positive cumulative and indirect human health and economic** impacts will likely be **significant** due to the synergies between all the existing and proposed urban growth and upgrade developments and the increase in demand for goods and services. Together these developments will result in residents benefiting from high quality, visually attractive living environment, with ample opportunity for active and passive recreation, strong links and pedestrian permeability, and direct and convenient links to high frequency public transport modes that connect them with the wider county and city areas and the growth of commercial activities enabled by the growing population.

4.5 Mitigation and Monitoring Measures

4.5.1 Mitigation Measures

4.5.1.1 Construction Phase

The potential impacts on the human environment relate to other environmental features such as air quality, noise and vibration, water quality and traffic and where required, the related mitigation measures are dealt with in the corresponding chapters of this EIAR. All mitigation and monitoring procedures during construction phase are explained in the CEMP (**Appendix 2.1**). The CEMP has been particularly designed and will be monitored to make sure that any negative impacts arising from the construction phase of the development on neighbouring properties or surrounding areas are minimised through mitigation measures.

The construction phase will be in agreement with guidance included in the British Standard BS 5228-1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites. In addition to the CEMP the appointed Contractor will ensure any engaged subcontractors will also be required to undertake the required safety reviews to ensure that all requirements of the proposed Project are complied with. Where issues are identified, corrective actions will be implemented to amend design issues prior to issuance of final design for construction. A Project Supervisor for the Construction Stage (PSCS) will be appointed as part of the construction stage.

In order to relieve any traffic congestion and noise impact during construction, all deliveries to site within working hours will be managed and arrangement made for noisier activities to take place earlier in the day. Noise and vibration mitigation measures will be adopted as outlined in the CEMP.

The delivery of materials to the site during the construction phase shall be organised so that deliveries are spread out and minimised and do not cause traffic hazard. Deliveries will not be permitted a peak traffic times between 8.00am to 9.00am and 5.00pm to 6.00pm and all construction vehicles will be parked within the site. A traffic management plan will be implemented for a safer and smoother flow of traffic.

A Dust Management Plan will be executed. A monitoring system will be put in place to protect neighbours & neighbouring properties with a full and detailed vibration, noise, dust, and groundwater monitoring regime put in place for the duration of the works.

4.5.1.2 Operational Phase

The site layout responds to the site’s topography and the evolving development context in Carrigtwohill. The proposed landscape and planting strategy will assist in mitigating the tree loss required to accommodate the proposed housing development. The development will not only benefit future residents of the scheme but ensure enhanced road safety and promote the usage of public transport as a viable means of commuting to nearby urban centres. The proposed public open spaces, creche, commercial and community uses will all significantly positively and permanently contribute to the communal and public facilities in Carrigtwohill. The design of the proposed development has been formulated to provide for a safe environment for future residents. The paths, roadways and public areas have all been designed in accordance with best practice and the local transport infrastructure.

4.5.2 Monitoring Measures

In relation to the impact of the proposed project on Population and Human Health it is considered that the monitoring measures outlined in regard to the other environmental topics such as water, air quality and climate and noise etc. sufficiently address monitoring requirements.

4.6 Residual Impacts and Effects

Residual impacts refer to those impacts that remain following the implementation of mitigation measures. **Table 4-11** below provides a summary of the potential residual adverse impacts associated with the construction of the proposed development, subject to the mitigation measures outlined in the CEMP, CDWMP and EIAR being implemented.

Table 4-11 Residual Impacts and Effects

Impact Name	Significance Pre-Mitigation	Mitigation Measures	Residual Effect (Post-Mitigation)
CONSTRUCTION IMPACTS			
Traffic Impact associated with road openings & construction vehicles	Short term and Not Significant	Traffic Management Measures for off-peak and night times.	Short term and not significant
Soil and Ground water contamination	Short term and not Significant	CEMP	Negligible
Landscape/Visual Impact	Medium term and neutral to moderate negative.	Landscaping and screening included in CEMP and project design	Slight to Moderate and short-term
Noise and dust health impacts	Slight and short-term	CEMP noise and dust management measures applied	Insignificant and short term
Overall impact on existing population and health	Medium term and Slight	CEMP management measures applied	Insignificant

There are no residual (post-mitigation) adverse impacts associated with the operational phase impacts. The proposed development will however result in many positive and permanent residual impacts including:

- The creation of a new community in Carrigtwohill, orientated around a high frequency public transport link which can promote sustainable commuting patterns to nearby urban and employment centres.

- The increased demand of goods and services and the delivery of a new creche and community and commercial units which will positively contribute to Carrigtwohill childcare, economy and community facilities.

4.7 **References**

www.education.ie

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Cork County Development Plan 2014.

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Cork County Councils Planning Enquiry System.

5. Biodiversity

5.1 Introduction

This chapter considers the potential effects on biodiversity arising from the Proposed Development. A full description of the Proposed Development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on biodiversity arising from the overall project have been assessed. The assessment comprises:

- A review of the existing receiving environment;
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

5.1.1 Summary of the proposed development

BAM Property is applying to An Bord Pleanála for a Strategic Housing Development (SHD) at Castlflake, Carrigtwohill, Co. Cork. Permission is being sought for the construction of 716 No. residential units with a childcare facility, landscaped open spaces and associated works and services (hereafter referred to as the 'proposed development'). This project is outlined in further detail in **Chapter 2 Project Description**.

5.1.1 Legislation

The most important legislation underpinning biodiversity and nature conservation in Ireland are the:

- Wildlife Acts 1976 to 2018;
- European Communities (Birds and Natural Habitats) Regulations 2011-2015 (transposes EU Birds Directive 2009/147/EC and EU Habitats Directive 2009/147/EC, 92/43/EC);
- European Communities (Quality of Salmonid Waters) regulations (S.I. No. 84 of 1988);
- Freshwater Fish (78/659/EEC); and
- International Convention on Wetlands of International Importance 1971.

The Wildlife Act, 1976, is the principal national legislation providing for the protection of wildlife and the control of some activities that may adversely affect wildlife. The aims of the Wildlife Act, 1976, are to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims. A diversity of flora and fauna, rare at a national level, are protected under the provisions of the Wildlife Act 1976, as amended, and the orders and regulations made thereunder, such as the Flora Protection Order (2015).

The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 Network of protected sites and the strict system of species protection. The Directive protects over 1000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance. The Habitats Directive 1992 has been transposed into Irish law. In addition, obligations of the Habitat Directive have been transposed by the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

The Convention on Wetlands of International Importance especially as Waterfowl Habitat, more commonly known as the Ramsar Convention, was ratified by Ireland in 1984 and came into force for Ireland on 15 March 1985. Ireland presently has 45 sites designated as Wetlands of International Importance, with a surface area of 66,994 hectares.

All Irish bat species are protected under the Wildlife Acts (1976 to 2021)¹ and by the Habitats Directive² which protects rare species, including bats, and their habitats. All bat species are listed in Annex IV of the Habitats Directive as species protected across their entire natural range and the lesser horseshoe bat is further listed, under Annex II, as a species for which core areas of their habitat must be protected within the Natura 2000 network of protected sites. Under Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations 2011-2021, any person who, in regard to the animal species listed in Annex IV of the Habitats Directive,

- a. *deliberately captures or kills any specimen of these species in the wild,*
- b. *deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*
- c. *deliberately takes or destroys eggs of those species from the wild,*
- d. *damages or destroys a breeding site or resting place of such an animal, or*
- e. *keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.*

Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

Section 171 of the Fisheries (Consolidation) Act 1959³ creates the offence of throwing, emptying, permitting or causing to fall onto any waters deleterious matter. Deleterious matter is defined as not only as any substance that is liable to injure fish but is also liable to damage their spawning grounds or the food of any fish or to injure fish in their value as human food or to impair the usefulness of the bed and soil of any waters as spawning grounds or other capacity to produce the food of fish. It is necessary to get written permission from Inland Fisheries Ireland to proceed with works in any areas where disturbance to the spawning and nursery areas of both salmonids and lampreys occur. Salmon, all lamprey species and their habitats are further protected under the EU Habitats Directive.

The Water Framework Directive (WFD), (2000/60/EC) is EU legislation and a major driver for achieving sustainable management of water in Ireland and across the EU. The objective of this directive is to prevent any further deterioration in status of all inland and coastal waters and to restore polluted waterbodies to at least 'Good' ecological status. 'Good ecological status' means achieving satisfactory quality water, suitable for local communities' drinking, bathing, agricultural, industrial and recreational needs, while maintaining ecosystems that can support all the species of plants, birds, fish and animals that live in these aquatic habitats.

¹ Collective citation for the following: Wildlife Act 1976 (no. 39 of 1976); Wildlife (Amendment) Act 2000 (no. 38 of 2000); Wildlife (Amendment) Act 2010 (no. 19 of 2010); Wildlife (Amendment) Act 2012 (no. 29 of 2012) and Heritage Act 2018 (no. 15 of 2018), Part 3. Planning, Heritage and Broadcasting (Amendment) Act 2021 (no.11 of 2021), Chapter 3.

² Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora enacted in Ireland as European Communities (Birds and Natural Habitats) Regulations 2011-2021 (Collective citation for the following: S.I. No. 477 of 2011, S.I. No. 499 of 2013, S.I. No. 355/2015, S.I. No. 293/2021).

³ Inland Fisheries Acts 1959 to 2017: this Act is one of a group of Acts included in this collective citation, to be construed together as one (Inland Fisheries (Amendment) Act 2017 (16/2017)).

Under Section 3 of the Local Government (Water Pollution) Act, 1977 (as amended by Sections 3 and 24 of the 1990 Act) it is an offence to cause or permit any polluting matter to enter waters. Suspended solids would be a key parameter here. Likewise, any visual evidence of oil/fuel in the river would constitute an offence.

5.1.2 Statement of authority

Field work and compilation of this chapter was undertaken by Gerard Hayes and Marc Shorten.

Gerard is a Senior Aquatic Ecologist with over 15 years' experience in environmental consultancy. He is a member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and the Freshwater Biological Association (FBA). Gerard has a diverse ecological profile, with Phase 1 habitat, tree, mammal (including bats), fish, bird, amphibian and macroinvertebrate survey experience. He has had numerous responsibilities including report writing (EIAR, EIA, EA, AA, NIS) waste assimilation capacity assessment and ecological monitoring. His area of expertise covers the infrastructure projects ranging from wind energy development, waste-water treatment, roads/bridges, water supply, flood defense and hydroelectric schemes. He is co-author and/or carried out surveys for NPWS Irish Wildlife Manual Nos. 15, 24, 26, 37, 45.

Marc has over 15 years of professional experience in consulting ecology, private research science and national regulatory bodies. Marc has expertise and experience in conducting a range of ornithological surveys, including breeding bird surveys as well as species-specific survey techniques (having been a field surveyor for both the National Red Grouse (*Lagopus lagopus*) Census and Blackwater River Catchment Kingfisher census (*Alcedo atthis*) with BirdWatch Ireland. In addition, he is experienced in bat surveying from privately contracted environmental consultancy. Marc has extensive reporting experience through roles in academic research, private industry biological research, environmental consultancy as well as the production of fisheries management statistics while with the Sea-fisheries Protection Authority.

Marc holds a research MSc in marine animal behaviour and a first class honours BSc in Zoology and Applied Ecology from University College Cork. Significant experience in collaborative research projects and reporting stems from five years as Senior Researcher of a marine/environmental research company, primarily coordinating research to feed reporting to National and European statutory bodies (BIM, the Sea-fisheries Protection Authority, the Department of Agriculture, Food and the Marine, the European Commission, Interreg and others). Marc has a number of publications relating to work on regulatory legislation of natural resource management. Marc has assisted in compilation and delivery of appropriate assessments and environmental research assessments.

5.2 Methodology

This section describes the methodologies followed in the compilation of this chapter. Recognised guidelines were followed in relation to every aspect of the scoping, surveying and assessment.

5.2.1 Consultation

The following statutory and non-statutory bodies were consulted in 2022 in relation to the proposed development:

- Cork County Council;
- National Parks and Wildlife Service (NPWS);
- Inland Fisheries Ireland (IFI);
- An Taisce

An initial pre-planning consultation took place with the Cork County Council (Planning Authority) on Thursday 15th July 2021 followed by a further second consultation on Thursday 16th September 2021. On 21st December 2021, Cork County Council (CCC) issued an opinion on what considerations relating to proper planning and sustainable development may have a bearing on An Bord Pleanála's decision. This opinion included observations on ecology / biodiversity. The only response received to date in relation to ecology is from IFI.

5.2.1.1 Cork County Council

The ecological points provided by CCC are summarised in their opinion document and are set out below.

Consideration shall be given to the preparation of an Ecological Impact Assessment Report which should consider the following:

- A description of the habitats and species occurring at the site, and an assessment of possible implications of what is proposed for protected species and / or for any habitats of high natural value identified to be occurring within the zone of influence of the proposed works area. Particular attention shall be given to the field boundaries, semi natural grassland, wetland habitats and areas scrub / woodland on site.

Response

These aspects of the receiving environment and implications have been addressed in Sections 5.3 and 5.4 respectively. It is noted that much of the site is a mosaic of habitats and that the field boundaries are sometimes continuous with the habitats within the 'fields'.

- Consideration shall also be given to the presence of protected species (EU Habitats Directive and/or Wildlife Acts) such as bats, badger and amphibians, avian species of conservation concern, along with plants listed on the Flora (Protection) Order 2015.

Response

Protected species have been considered in all the relevant sections of this report.

- An assessment of the proposed development on the aquatic environment of the Anngrove Stream and any other open drainage channels/ wetland areas on site.

Response

These surface water features have been assessed in **Section 5.3.2.14** and **Section 5.3.2.15**

- The EclA should be prepared to accord with CIEEM Guidelines and provide details of ecological survey methods and techniques used for habitats and species surveys completed for this project. Detailed results shall also be submitted. Relevant experience of consultant ecologist(s) should also be cited within the report.

Response

Guidance on Ecological Impact Assessment (CIEEM, 2018) recommends categories of nature conservation value that relate to a geographical framework (International, through to Local). The value of the ecological receptors was determined using the ecological evaluation guidance given in the National Roads Authority (NRA) Ecological Assessment Guidelines (NRA, 2009). The NRA Ecological Impact Guidelines (2009) clearly sets out the criteria by which each geographic level of importance can be assigned. Locally Important (lower value) receptors contain habitats and species that are widespread and of low ecological significant and of any importance only in the local area.

The potential effect or effect of the proposed development on the identified key ecological receptors and confidence levels was carried out with regard to the criteria outlined in CIEEM (2019).

Watercourses: The Engineering Services Report refers to the planned culverting of two streams, East-West and “North-South”, two tributaries of the Woodstock Stream. The Ecology Office is not in favour of the realignment and/or culverting of watercourses and strongly encourages the site to be designed around any naturally occurring watercourses onsite. It is recommended that the applicants are advised to have regard to ‘Inland Fisheries Ireland Planning for Watercourses in the Urban Environment Guidelines’ in providing for the design and should the applicants wish to bridge, drain or alter etc. any watercourse on site then the applicant should liaise with Inland Fisheries Ireland. A fisheries and biodiversity impact assessment should be undertaken to determine the loss to local biodiversity from this proposal, with mitigation measures proposed to ameliorate the effective destruction of an aquatic habitat.

Response

The recommended IFI document⁴ which refers to O’Grady (2006) has been used in the design and landscaping of water features as per **Section 6.3**, relating to enhancement of existing aquatic environments. The landscaping plan indicates the sections of surface water and vegetation features that will be retained and lost. It is noted that the surface water features requiring culverting are of low ecological value, as per **Section 5.3.2.14**. A fish habitat assessment and survey concluded that the surface water features on site were drainage ditches of low ecological value. Following this consultation, the design was modified so that the main north-south drainage ditch is no longer culverted but left open to enhance biodiversity and to create a green/amenity corridor. It can be expected that the water features that remain open during operation stage will be of greater ecological value than the existing drainage ditches as they have been designed to maximise biodiversity, as per landscaping. Mitigation outlined in **Section 6.3.1.2** of this report outlines measures that will also help aquatic biodiversity.

Trees and Hedgerows: From an ecological perspective it would be desirable that these would be retained and enhanced as part of any landscaping proposals. Where removal of hedgerows or treelines is unavoidable, landscape planting should be used to compensate for loss or damage to these valuable habitats. It is recommended that native species would be used in landscaping plans. This approach could have benefits from an ecological / biodiversity perspective generally but should also have positive benefits in terms of landscape and amenity value. Where trees are required to be removed, then it is recommended that a summer bird breeding survey and bat survey should also be carried out to support the application which can form part of the EclA.

Biodiversity Enhancement: It is recommended that the applicants would be encouraged to explore opportunities for biodiversity enhancement while designing their scheme. Use of native and pollinator friendly species in landscape planting is one example where such opportunities can be explored. It is recommended that applicant would get input from the appointed ecologist in relation to site planting.

It is recommended that the applicant utilise Nature Based Solutions for surface water drainage systems when and where possible. Should the applicant wish to tie into any pre-existing nature-based water retention basins in the surrounding environment, then it is recommended that these areas should also be enhanced and developed to represent a more naturally occurring wetland feature which incorporates native landscape planting both within the feature and its riparian zone.

In the interest of preventing a no net loss biodiversity onsite it is recommended that the applicants explore and be encouraged to development wild refuges onsite (e.g. Green roofs, wetland systems, Habitat/Green walls, wildflower meadows – generated from existing seed bank etc.) and incorporate artificial nest boxes, with particular reference to Swifts into the design of structures onsite of which there appears to be numerous opportunities to do this. See Saving Swifts.

⁴ <https://www.fisheriesireland.ie/sites/default/files/migrated/docman/IFIUrbanWatercoursesPlanningGuide.pdf>

With reference to open / green spaces, given that the site appears to contain valuable habitat/seed sources that could be lost as result of the proposal, it is recommended that applicant provide for the retention and reuse of topsoil i.e. the seed bank, on site through landscaping.

Response

Mitigation measures in this report, in conjunction with the landscape plan will enhance biodiversity. The recommended Birdwatch Ireland document⁵ has been used in the design and landscaping of water features. Wetland features will be developed in areas currently degraded through modification of surface water features, through landscaping and use of mitigation in this report (**Section 5** and **Section 6**). For example, nest boxes for swifts and other bird species (**Section 5.5.4.2**) and bat boxes (**Section 5.5.4.1.1**) are recommended.

Invasive Species

Consideration should also be given to the presence of invasive species on site and associated management measures if required.

Response

Invasive species distribution at the proposed development site has been mapped. Invasive species within Castl lake and downstream is also documented. An invasive species management plan has been prepared and measures to prevent the spread of such plants are outlined in **Section 5.5.2.9**.

Planning Policies/Objectives

It is recommended that applicants would have regard to CDP Policies HE 2-1, HE 2-2, HE 2-3, HE 2-4, HE 2-5, HE 2-7, GI 3-2, WS 5-1, WS 5-2 and WS 5-3 and Cobh MD LAP Policies CT--GO--03, CT---GO---15, CT--GO--16 and LAS---01. Consideration shall also be given to CCC Guidance - Biodiversity and the Planning Process in the development of the scheme and completion of required assessments.

Response

The proposed development as it pertains to biodiversity has been landscaped to maximise both amenity and biodiversity assets, with both aspects interconnected in spaces outside of built areas, taking account of policies and legislation.

Other Environmental Issues / CEMP

It will be very important to ensure that construction methods do not pose any risk of release of potentially toxic contaminants into the SAC and SPA. To that end, it is recommended that the planning documents would include a Construction and Environmental Management Plan which would include all of the necessary details relating to the measures and environmental controls which are to be employed to protect the SAC and SPA and environmental resources/ecological resources generally. The plan should be prepared by a qualified and experienced person and should accord with recommended best practise in this area. In the event that it is deemed necessary to prepare an Invasive Alien Species Management Plan for this development, the provisions of same should be integrated into the CEMP.

Response

A Environmental Management Plan has been prepared by the developer. It will be updated prior to construction and will be implemented for the duration of the works. The Environmental Management Plan is set out in **Section 5.5.2.2** of this report.

⁵ https://birdwatchireland.ie/app/uploads/2019/10/Saving-Swifts-Guide_pdf.pdf

5.2.1.2 Inland Fisheries Ireland

IFI replied on the 2nd February as follows:

It appears it may be proposed to dispose of septic effluent from the development to the public sewer. IFI would ask that Irish Water signifies there is sufficient capacity in existence so that it does not overload either hydraulically or organically existing treatment facilities or result in polluting matter entering waters. Should this not be the case then please forward proposals for alternative treatment and disposal options.

IFI would ask that there be no interference with, bridging, draining, or culverting of any watercourse its banks or bankside vegetation to facilitate this development, without a complete impact assessment including an electro-fishing survey and the prior approval of IFI.

The issue of management and control of sediment (and other potential pollutants) to prevent their entry to waters during the construction phase also needs to be addressed.

Indeed, under the Fisheries Acts it is an offence to:

- a) injure or disturb any riverbed, bank or shallow where the spawn or fry of salmon, trout or eels maybe.*
- b) empty, throw, cause or permit deleterious matter (which may include silt or other suspended solids) to enter waters.*

IFI would ask that the impact assessment of the scheme ensures there can be no potential for a contravention of the Fisheries Acts as a result of the development.

Response

Irish Water have confirmed that subject to a valid connection agreement being put in place the proposed connection to the Irish Water network(s) can be facilitated (letter dated 27th October 2021: CDS21006488 pre-connection enquiry - Subject to contract | Contract denied Connection for Multi/Mixed Use Development of 725 unit(s) at Castlelake, Carrigtohill, Co. Cork).

Regarding the impact assessment for watercourses, it is considered that the detail provided in this report is sufficient for impact assessment. While an electrical fishing assessment has not been carried out, no additional species to those encountered within the proposed development site would be envisaged by carrying out such a survey, due to poor habitat quality. Due consideration has been given to the Fisheries Acts.

5.2.2 Desktop Study

In order to complete the assessment, certain information on the existing environment is required. A desk study was carried out to collate available information on the subject site's natural environment. This comprised a review of the following publications, data and datasets:

- OSI Aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS)
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- BirdWatch Ireland (BWI)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- NPWS, 2019. The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished Report, NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- Other information sources and reports footnoted in the course of the report

Prior to conducting field surveys, a review of available atlases and databases was conducted. Previously completed faunal survey reports were reviewed. OSI mapping and ortho-photography was reviewed to determine the range of habitats with potential to support protected fauna within the study area, including ecological connecting features in the landscape (e.g. hedgerows/tree-lines, woodland edge habitat and watercourses). The document '*Quantification of the freshwater salmon habitat asset in Ireland*' by McGinnity *et al.* (2003) was also reviewed to classify the salmonid habitats in the study area.

5.2.3 Database Searches

Data on protected flora and fauna within the 10km hectad within which the site is situated (W87) was accessed from NBDC.

Online aerial mapping and satellite imagery was used in conjunction with publicly available GIS files (NPWS Database) to generate mapping, which together, helped inform the desktop study.

5.2.4 Field surveys

The aim of these survey was to characterise the site and environs and establish the ecological features and resources at the site, particularly in relation to the features of interest of the protected sites.

Multidisciplinary ecological surveys were conducted at the site during summer 2021 and February – May 2022. The surveys encompassed the entire red line boundary. The aim of these surveys was to characterise the site and environs and establish the ecological features and resources at the site. The following surveys were undertaken:

- Phase 1 habitat and protected flora survey;
- Non-volant mammal survey;
- Bat habitat suitability and activity survey;
- Breeding bird survey; and
- Aquatic ecology (fish and macroinvertebrates and their habitats, flora and water quality)

Aerial photography was used together with GPS to accurately enable field navigation. Notes were made on all habitats encountered, including notes on dominant and indicative vegetation. Signs of protected species were noted. An assessment was also made of the topography and drainage, disturbance, and management of the area. The presence of any invasive plant species was also recorded.

5.2.4.1 Habitat Survey

A walkover survey of the study area incorporated recording semi-natural vegetation and other wildlife habitats. Each habitat type/feature was defined by way of a brief description and allocated a specific name, an alphanumeric code to enable habitat mapping and habitat evaluation. This survey was conducted on 16th August 2021.

Habitat mapping was undertaken with regard to guidance set out in 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.*, 2011). The botanical survey also aimed to confirm the presence of protected species, map the location of the individuals/populations using a GPS and estimate the population size or extent of any found to be present. The survey timing fell within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). Habitats were classified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000).

A survey for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted parallel to habitat surveys. Their location and extent was noted and recorded in the field using GPS and mapped using GIS software.

5.2.4.2 Mammal Survey (excluding bats)

Searches were made for protected non-volant mammal (i.e. land-based mammals that cannot fly) target species during spring 2022. The scope of the non-volant mammal survey and determination of target species was informed by species previously recorded in the 10km square W87 which covers the study area and environs. Targeted species included those protected under the Wildlife Acts, species listed in Annex II, Annex IV and Annex V of the Habitats Directive, and Irish Red Listed species. These were badger (*Meles meles*), red squirrel (*Sciurus vulgaris*) and otter (*Lutra lutra*).

During these surveys the study area was surveyed for signs of mammals. Prints, paths/trails, burrows, dens and other resting places, faecal pellets/droppings/scats, food caches, scratching posts or disturbed vegetation occurring were recorded using field notes and/or handheld GPS units subsequently digitised using GIS software.

Surveys were undertaken in accordance with:

- NRA's (2009b) 'Ecological Surveying Techniques for Protected Flora and Fauna During the Planning of National Road Schemes'
- JNCC's (2004) 'Common Standards Monitoring Guidance for Mammals'.
- Mammal Society publication 'How to Find and Identify Mammals' (Muir *et al.*, 2013)
- 'Animal Tracks and Signs' (Bang and Dahlstrom, 2004) was followed during all mammal surveys.
- 'Surveying for Badgers: Good Practice Guidelines' (Scottish Badgers, 2018).
- 'Monitoring the Otter *Lutra lutra*' (Chanin, 2003a).

Otter signs include spraints, footprints, tracks, couches, holts and were sought following the 'Ecology of the European Otter' by Chanin (2003b). The northern bank of the watercourse was examined while walking upstream and the northern bank examined while walking downstream.

Trailcams (4 No.) were set at locations suspected to be used by mammals, based on the presence of trails / potential dwellings and droppings. These were deployed on 30th March and retrieved on 7th April. Trailcam locations are provided in **Table 5.1** and can be seen in **Figure 5.1**.



Figure 5.1 Location of trailcams, bat detectors and aquatic survey sites

Table 5.1 Trailcam locations

Trailcam ID	Location (ITM)	
	X	Y
Trailcam 1	581838	573250
Trailcam 2	581717	573739
Trailcam 3	581330	573597
Trailcam 4	581327	573664

5.2.4.3 Bat Roost Suitability Survey

A walkover survey of the proposed development site was undertaken to identify potential tree roosting habitats. The value of trees were noted according to potential for use by bats for roosting in accordance with the publication 'Bat Surveys: Good Practice Guidelines' (Collins, 2016).

Detailed inspection of the exterior of trees were carried out to identify features that bats could use for roosting (Potential Roost Features, or PRFs) from ground level. The aim of this survey was to determine the actual or potential presence of bats and the need for further survey and/or mitigation. The inspection was carried out on 22nd February 2021 during daylight hours from ground level, and information was collated on the tree species, type of PRFs and evidence of bats (if any).

A site visit was undertaken on the 27th of January 2022. The landscape plan was reviewed to determine which trees would be felled at construction stage. A tree assessment in relation to PRFs was undertaken, where trees that could provide a roosting space for bats were classified using the classification system used in Collins (2016).

PBRs include:

- Rot holes;
- Other horizontal or vertical cracks or splits (e.g. frost cracks) in stems or branches;
- Lifting bark;
- Knotholes arising from naturally shed branches or branches previously pruned back to the branch collar;
- Man-made holes (e.g. flush cuts) or cavities created by branches tearing out from parent stems;
- Cankers in which cavities have developed;
- Other hollows or cavities;
- Double leaders forming compression forks with included bark and potential cavities;
- Gaps between overlapping stems or branches;
- Partially detached ivy with stem diameters in excess of 50mm; and
- Bat or bird boxes.

Signs of a bat roost (excluding the actual presence of bats), include:

- Bat droppings in, around or below a PRF;
- Odour emanating from a PRF;
- Audible squeaking at dusk or in warm weather; and
- Staining below the PRF.

It was acknowledged during surveying that bats or bat droppings are the only conclusive evidence of a roost and many roosts have no external signs.

5.2.4.4 Passive Automated Bat Surveys (PABS)

A bat activity survey report has been produced and can be found in **Appendix 5.1**, with relevant information from it presented here. Song Meter⁶ Full Spectrum bioacoustic recording units were deployed within the proposed development site for 14 nights from mid- to late April (**Figure 5.1** and **Table 5.2** for locations). Full Spectrum (FS) detectors continuously record all frequencies and retain details of the call structure. The units were programmed to begin recording half an hour before sunset each evening and to continue until half an hour after dawn the next morning. Post survey, the sound files were converted, using proprietary software⁷, to

⁶ Song Meter Mini Bat manufactured by Wildlife Acoustics Ltd.

⁷ Kaleidoscope Pro Software (Manufactured by Wildlife Acoustics Ltd.)

produce sonograms (graphs of the sound recorded). As each species has a unique audio signature, the sonograms, or graphs, can be used to distinguish between one species and another.

Table 5.2 Bat detector locations

Bat Detector ID	Location (ITM)	
	X	Y
1136	581712	573675
3683	581652	573471
1185	581959	573666
3977	581736	573254
2820	581216	573593



Plate 5.1 Bat detector deployed at the proposed development site.

5.2.4.5 Birds

Breeding bird surveys were conducted during the early and middle part of the 2022 bird breeding season. The aim of the survey was to capture a representative sample of breeding bird activity along transects within and adjacent to the proposed development site which were chosen to provide a quantifiable assessment of bird breeding within the area. A bird breeding season report has been produced and can be found in **Appendix 5.2**.

The breeding bird survey carried out was a scaled down version of the BTO Common Bird Census (CBC) methodology (Bibby et al., 2000 & Gilbert *et al.*, 1998) which aims to capture a representative sample of breeding bird activity within a survey area during the bird breeding season.

Three visits were made to the proposed development site by the ornithological surveyor, one preliminary to plan transect routes and two surveying visits during the breeding season on the 27th of January 2022, with surveying visits carried out early in the breeding season, on the 25th of March 2022 and on 27th of April 2022. The ornithological surveyor slowly walked the proposed routes and sites being considered, stopping at regular intervals to scan with binoculars and to listen for bird calls or song.

5.2.4.6 Aquatic ecology

Aquatic ecology (fish and macroinvertebrates and their habitats, flora and water quality) surveys were undertaken to assess the value of habitats and collect data on species resident in waterbodies within and downstream of the proposed development site. **Table 5.3** lists the aquatic survey site locations and surveys undertaken at each location. Site 9 could not be accessed but could be viewed from the bridge so the survey here was limited to habitat assessment.

Table 5.3 Aquatic survey site locations and surveys

Site	Location (ITM)		Survey		
	X	Y	Habitat assessment	Fish sampling	Macroinvertebrate sampling
Site 1	581416	573695	✓	✓	✓
Site 2	581606	573575	✓	✓	✓
Site 3	581529	573469	✓	✓	✓
Site 4	581976	573655	✓	✓	✓
Site 5	581816	573572	✓	✓	✓
Site 6	581569	573367	✓	✓	✓
Site 7	581601	573229	✓	✓	✓
Site 8	581524	573363	✓		✓
Site 9	581449	573034	✓		

5.2.4.6.1 Habitat assessment

The water features at proposed development site (PDS) were examined on the 28th January 2022. The entire length of the water features were assessed qualitatively using methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003). The waterbodies at the site were classified using the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000).

The results of the stream habitat surveys were used in conjunction with the leaflet '*The Evaluation of habitat for Salmon and Trout*' (DANI, 1995) to assess habitat suitability for salmonids. This leaflet (Advisory leaflet No. 1) was produced by the Department of Agriculture for Northern Ireland Fisheries Division and was designed for use in the EU salmonid enhancement programme. The aquatic habitat survey was carried out with reference to the 'Ecology of the Atlantic Salmon' (Hendry and Cragg-Hine, 2003) to assess habitat suitability for salmon. An evaluation of lamprey nursery habitat was also carried out based on the habitat requirements of juvenile lampreys as outlined in Maitland (2003).

Waterbodies were photographed at various locations throughout the study area. Anthropogenic influences on fluvial and riparian habitats were noted along the surveyed stretches.



Plate 5.2 Site 1 (left) and Site 2 (right).



Plate 5.3 Site 4 (left) and Site 5 (right) on the Woodstock Stream.



Plate 5.4 Site 6 (left) and Site 7 (right).



Plate 5.5 Site 8 (left) and Site 9 (right).

5.2.4.6.2 Fish survey

Searches for fish were carried out at various locations using a dip net and a standard kick net. Searches for juvenile lampreys were carried out using agitation sampling where suitable nursery habitat occurred. This method involves use of a dip net, where the net is rapidly swept over a disturbed area of fine substrate, and dislodged lampreys are captured. Captured fish were identified with reference to Maitland and Campbell (1992).

5.2.4.6.3 Benthic Macroinvertebrate Sampling

Semi-quantitative sampling of benthic macroinvertebrates, or aquatic insects, was undertaken at all drainage ditch and watercourse sites (except at Site 9) using kick-sampling (Toner *et al.*, 2005). Benthic (bottom dwelling) macroinvertebrates are small stream-inhabiting creatures that are large enough to be seen with the naked eye and spend all or part of their life cycle in or on the stream bottom. Three replicate, 3-minute, multi-habitat kick samples were taken within a 50m stretch using a 1mm mesh kick net. All samples of invertebrates were combined for each site and live sorted on location, fixed in ethanol and labelled for subsequent laboratory identification. The relative abundance and numbers of macroinvertebrates was recorded on-site at each site. Macroinvertebrate sampling was carried out in accordance with ISO 5667-3:2004: Water Quality – Sampling – Part 3: Guidance on the Preservation and Handling of Water Samples and ISO 7828: 'Water Quality – Methods of biological sampling – Guidance on Hand net sampling of aquatic benthic macro-invertebrates'. Macroinvertebrates were identified on site.

At Site 8 on Castlelake, macroinvertebrates were collected via sweeping submerged and floating aquatic vegetation, as well as gravel substrates, during which any invertebrates attached to submerged plant stems and leaves, exposed roots, logs or other soft surfaces were collected within a 3-minute period.

5.2.4.6.4 Biological water quality

The Quality Rating (Q) System devised by Toner *et al.* (2005) was used to obtain a water quality rating, or Q-value. As per S.I. No. 258 of 1998, 'biological quality rating' means a rating of water quality for any part of a river based principally on the composition of macroinvertebrate communities/faunal groups present and their general sensitivity to organic pollution. This method categorises invertebrates into one of five groups (A-E), depending on their sensitivity to pollution. Q values range from Q1-Q5 with Q1 being of the poorest quality and Q5 representing pristine/unpolluted conditions. The Q index system is used by the Environment Protection Agency (EPA) and is currently the standard biological assessment technique used in surveying rivers in Ireland under the Water Framework Directive (WFD).

Biological quality elements are classified into five WFD ecological status classes – High, Good, Moderate, Poor, and Bad. More information on the Q-scheme can be found in **Appendix 5.3**.

5.2.4.6.5 Biosecurity

In cognisance of the risk of spread of non-native invasive alien species, the Inland Fisheries Ireland (IFI) document ‘*Biosecurity Protocol for Field Survey Work*’ (IFI 2010) was followed at all stages of field work. All equipment (including waders etc.) was disinfected with spray bleach disinfectant after use, washed, dried out and put in storage.

5.2.5 Ecological value

The value of the ecological receptors was determined using the ecological evaluation guidance given in the National Roads Authority (NRA) Ecological Assessment Guidelines (NRA, 2009).

5.2.5.1 Assessing Effect Significance

Once the value of the identified ecological receptors (features and resources) is determined, the next step is to assess the potential effect or effect of the proposed development on the identified key ecological receptors. This was carried out with regard to the criteria outlined in various effect assessment guidelines (NRA, 2009; CIEEM, 2019). The effects were assessed under a number of parameters such as magnitude, extent, duration and reversibility. Once effects are defined, their significance was categorised using EPA Guidelines.

In line with the EPA Guidelines (EPA, 2022), the following terms are defined when quantifying duration:

- Temporary: up to 1 year;
- Short-term: from 1-7 years;
- Medium-term: 7-15 years;
- Long-term: 15-60 years; and
- Permanent: over 60 years.

Confidence levels of the effect predictions were also given based on the 4-point scale as given in both the CIEEM, (2019) and NRA (2009) guidelines. See **Table 5.4** below.

Table 5.4 Confidence levels of predictions of effects as outlined in NRA (2009) and CIEEM, (2019).

Confidence level category	
Near certain	>95% chance of occurring as predicted
Probably	50-95% chance of occurring as predicted
Unlikely	5-50% chance of occurring as predicted
Extremely unlikely	<5% chance of occurring as predicted

The criteria used to assess the potential significance follow EPA guidance (EPA, 2022) are presented in **Table 5.5** below.

Table 5.5 Significance of Effects (definitions) EPA (2022)

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable ⁸ changes in the character of the environment but without significant consequences
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effect	An effect which obliterates sensitive characteristics.

5.2.5.2 Selection of Key Faunal Ecological Receptors (Non-avian)

Key Ecological Receptor species are selected on the basis of their legal status, the types of habitat within and around the site and on the basis of current or previously recorded evidence of a species' presence within the site. Those non-avian fauna selected as key ecological receptors are:

- of at least local importance (Higher Value)
- potentially those recorded during the site surveys or
- species records retained by NPWS, BCI or at the NBDC and;
- for which suitable habitat is available.

5.2.5.3 Selection of Avifaunal Key Ecological Receptors

All avifauna identified during desktop or field surveys were evaluated as per below for their conservation importance. Those selected as key ecological receptors are:

- of at least local importance (Higher Value);
- which were recorded during the site surveys;
- which are species of Red or Amber Conservation Concern in Ireland⁹;
- for which records are retained by NPWS or at the NBDC and;
- for which suitable habitat is available.

In summary, Key Ecological Receptor avifaunal species are selected on the basis of their legal status, the types of habitat within and around the site and on the basis of current or previously recorded evidence of a species' presence within the site.

⁸ for the purposes of planning consent procedures

⁹ As per Gilbert *et al.* (2021)

5.2.6 Cumulative effects

The cumulative effects of the proposed development are also assessed in **Section 5.4.8** by discussing the likely significant effect of the proposal, in terms of other developments that have planning permission, that are under construction, or are in existence in the area.

5.2.7 Mitigation: rationale and design

Where potential effects are assessed to be significant, mitigation measures have been incorporated into the project design to remove or reduce these effects. These are outlined in **Section 5.5** below. The residual effects after mitigation are then assessed in section 5.6 below.

5.3 Existing environment

5.3.1 Designated sites

The proposed development site lies within the Tibbotstown_010 subbasin (EU Code IE_SW_19T250870), encompassing an area of 52 km². The designated sites chosen as potential receptors are those within or adjacent to the same surface hydrological unit containing the proposed development i.e. the Tibbotstown_010 subbasin.

5.3.1.1 Sites of International Importance

Natura 2000 sites are sites of international importance, protected under European legislation. Two types of sites are incorporated within the Natura 2000 network; Special Areas of Conservation (SACs) which are protected under the European Union (EU) Habitats Directive (92/43/EEC) and Special Protection Areas (SPAs) which were initially designated under Directive 79/409/EEC on the Conservation of Wild Birds, commonly known as the Birds Directive, and are now protected as Natura 2000 Sites under the EU Habitats Directive. The only Natura 2000 sites within or adjacent to the Tibbotstown_010 subbasin are the Great Island Channel SAC (001058) and the Cork Harbour SPA (004030). The subject site is hydrologically connected to the Great Channel SAC and Cork Harbour SPA via the Woodstock and Anngrove Streams which flow downstream to both these Natura 2000 sites. Great Island Channel SAC is selected for Tidal Mudflats and Sandflats [1140] and Atlantic Salt Meadows [1330]. The species of conservation interest (SCI) for which Cork Harbour SPA is designated are primarily estuarine in nature, relying on coastal habitats.

Table 5.6 lists the Natura 2000 sites within the zone of potential influence of the proposed development. These sites are illustrated in **Figure 5.2**. All other Natura 2000 sites are considered beyond the zone of influence taking account of their hydrological and/or geographical separation. For example, the Blackwater River (Cork/Waterford) SAC lies 12.1 km to the north of the proposed development site and is in a different river catchment.

Table 5.6 Natura 2000 sites within the zone of potential influence of the proposed development

Designated Site	Site Code	Qualifying features	Distance from the proposed development site
Great Island Channel SAC	001058	Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	The SAC is located 717 m south of the proposed works.
Cork Harbour SPA	004030	Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] Cormorant (<i>Phalacrocorax carbo</i>) [A017] Grey Heron (<i>Ardea cinerea</i>) [A028] Shelduck (<i>Tadorna tadorna</i>) [A048] Wigeon (<i>Anas penelope</i>) [A050] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Red-breasted Merganser (<i>Mergus serrator</i>) [A069] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] Common Tern (<i>Sterna hirundo</i>) [A193] Wetland and Waterbirds [A999]	The SPA is located 773m south of the proposed works.



Plate 5.6 Slatty Bridge, Fota Island transitional waterbody within Great Island Channel SAC and Cork Harbour SPA.



Plate 5.7 Lough Mahon (Harper's Island) transitional waterbody within Great Island Channel SAC and Cork Harbour SPA.

5.3.1.2 Sites of National Importance

The basic designation for wildlife in Ireland is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. In addition to 148 NHAs, there are 630 proposed Natural Heritage Areas (pNHA) which have not yet been statutorily proposed or designated. Prior to statutory designation, pNHAs are subject to limited protection including in the areas of Agri-environmental farm planning schemes, certain Forest Service requirements pertaining to payment of afforestation grants and recognition of the ecological value of pNHAs by Planning and Licensing Authorities. There is one pNHA and no NHA within the zone of potential influence of the proposed development; as listed in **Table 5.7** below and illustrated in **Figure 5.3**.



Figure 5.2 Natura 2000 sites

Table 5.7 Nationally designated sites within the zone of potential influence

Designated Site	Site Code	Distance from the proposed development site (km)
Great Island Channel pNHA	001058	717m south

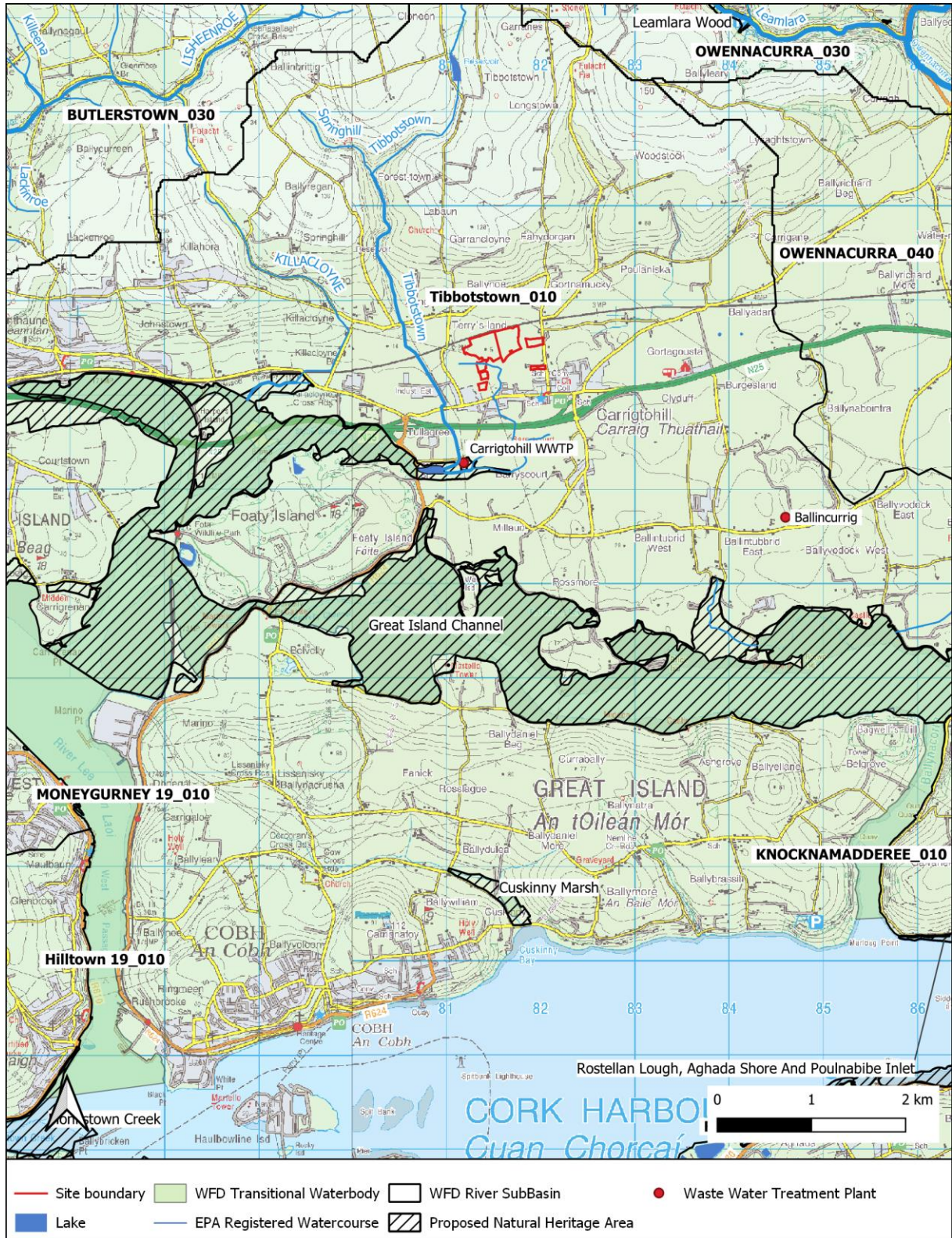


Figure 5.3 Sites of National Importance

5.3.2 Habitats

Habitats within the footprint of the proposed project were surveyed and classified according to Fossitt (2000). The proposed development site is comprised of both semi-natural habitats and artificial surfaces. There is potential for these habitats to support nesting birds, and protected mammal species. No protected habitats were recorded during the survey. The habitat map for the site is presented in **Figure 5.4**.

Surface drainage from the western part of the proposed development site is to the Anngrove Stream catchment in which the existing Castlelake housing development is located. It is noted that stormwater runoff collected from the existing Castlelake residential development currently discharges to the drainage network as laid for the existing development, and discharges attenuated flow to the Woodstock Stream. It is possible therefore that drainage from the western part of the proposed development site is also via this mechanism. Estuarine habitats connected to drainage from the proposed development site are therefore also considered in this section (See **Figure 5.5**). NBDC mapping was available for the habitats linked to the Anngrove Stream downstream of the proposed development site.

5.3.2.1 Amenity Grassland GA2

There are small areas of amenity grassland at the north-western corner of the development site. These are landscaped areas near adjacent housing. This is primarily comprised of perennial rye grass (*Lolium perenne*), common mouse-ear (*Cerastium fontanum*), daisy (*Bellis perennis*) and white clover (*Trifolium repens*).

5.3.2.2 Amenity Grassland x Ornamental/Non-Native Shrub GA2 x WS3

One area of amenity grassland is the remnant of a front garden and includes some ornamental shrubs. This area is located in the north-west of the site. It is comprised of perennial rye grass, common mouse-ear (*Cerastium fontanum*), daisy (*Bellis perennis*), white clover (*Trifolium repens*), and bird foot trefoil (*Lotus corniculatus*). There are a number of ornamental shrubs along the original periphery of this lawn, including a rose species *Rosa* sp., and dwarf cypress species.



Plate 5.8 Amenity Grassland x Ornamental/Non-Native Shrub (left) and Buildings and Artificial Surfaces (right)

5.3.2.3 Amenity Grassland x Scattered Trees and Parkland GA2 x WD5

Landscaped areas are comprised of amenity grassland and non-native species of sycamore and beech. This is most prominent in the west of the site. The amenity grassland is comprised of perennial rye grass, common mouse-ear (*Cerastium fontanum*), daisy, and white clover. Ornamental trees present are primarily maple species *Acer* sp.

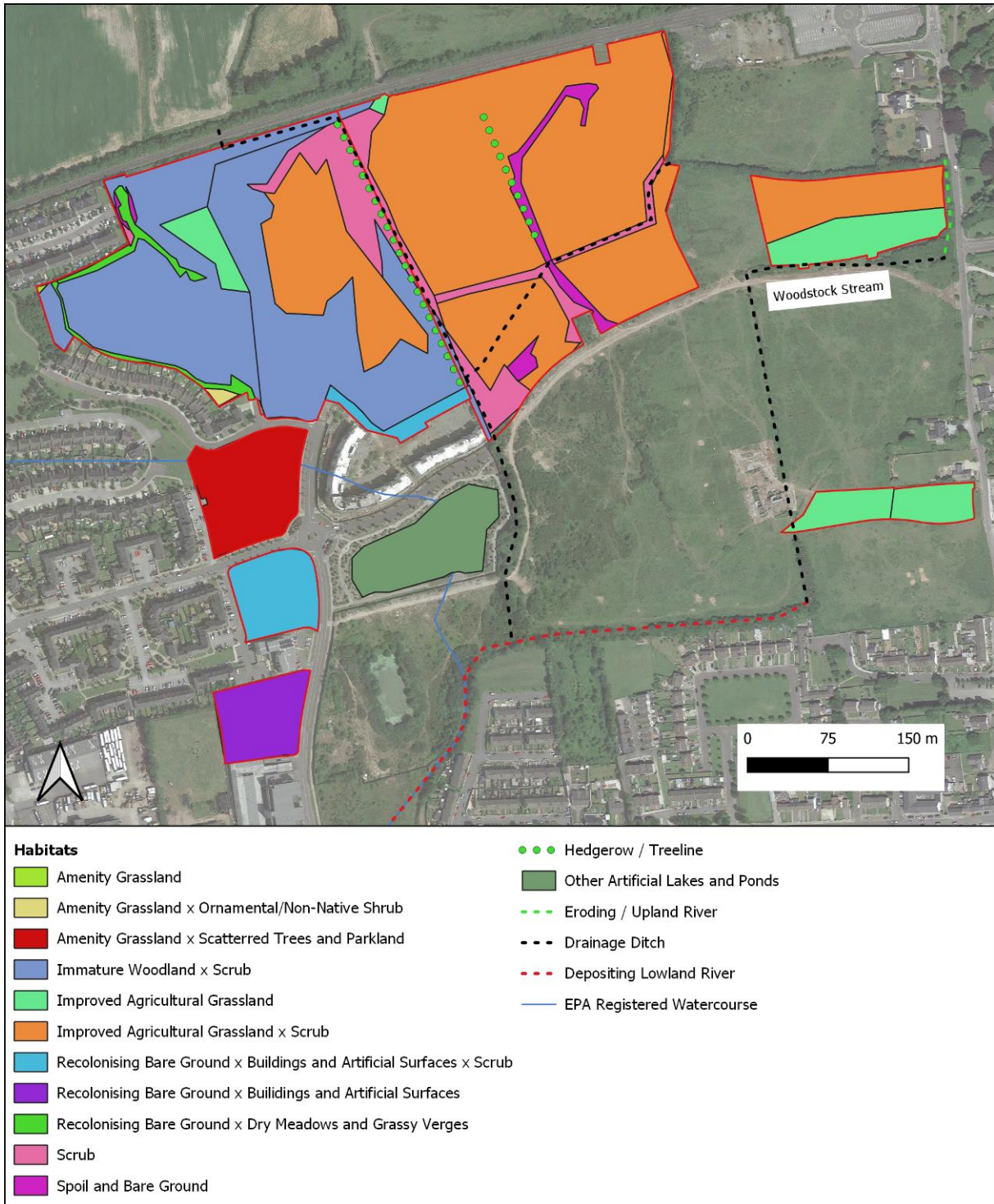


Figure 5.4 Habitat map

5.3.2.4 Buildings and Artificial Surfaces (BL3)

Roadways, kerbing, buildings and other infrastructure on site are comprised of artificial, man-made materials.

5.3.2.5 Immature Woodland x Scrub (WS5 x WS1)

The west and south west of the site is dominated by immature woodland and scrub. The dominant species here is goat willow (*Salix caprea*). Gorse (*Ulex europaeus*) and bramble (*Rubus fruticosus* agg) were also abundant in this area.



Plate 5.9 Immature Woodland x Scrub (left), Improved Agricultural Grassland (right)

5.3.2.6 Improved Agricultural Grassland (GA1)

The south east of the site is comprised of immature agricultural grassland. This is dominated by perennial rye grass, with abundant white clover, broad-leaved dock (*Rumex obtusifolius*), dandelion (*Taraxacum vulgaria*) and ribwort (*Plantago lanceolata*).

5.3.2.7 Improved Agricultural Grassland x Scrub (GA1 x WS1)

The majority of the site is comprised of a matrix of improved agricultural grassland and scrub. The grassland in this section has been un-grazed/un-cut for some time. Due to its proximity to the stream it is damp and has species indicative of damper habitats, such as meadowsweet (*Filipendula ulmaria*). However, the overall species composition is not consistent with that of Wet Grassland GS4.

The species present include perennial rye grass, with abundant white clover, broad-leaved dock, dandelion, ribwort and meadowsweet. The scrub is comprised of gorse, bramble and immature willow *Salix cinerea* saplings.

5.3.2.8 Recolonising Bare Ground (ED2)

There are large areas of disturbed ground throughout the site. Species present include pineappleweed (*Matricaria discoidea*), scarlet pimpernel (*Anagallis arvensis*), hawkweed (*Pilosella officinarum*), dandelion and white clover.

5.3.2.9 Recolonising Bare Ground x Buildings and Artificial Surfaces x Scrub (ED3 x BL3 x WS1)

An area within the south-west of the site is a matrix of bare ground and limestone rock. This area is being recolonised by pineappleweed, scarlet pimpernel, hawkweed (*Pilosella officinarum*), dandelion, white clover, gorse, bramble willow saplings, rosebay willowherb (*Chamaenerion angustifolium*), and annual meadow grass (*Poa annua*).

5.3.2.10 Recolonising Bare Ground x Buildings and Artificial Surfaces (ED3 x BL3)

The site compound at the south-west is on bare ground and limestone trunking. The bare ground is being recolonised by vegetation including pineappleweed, scarlet pimpernel, hawkweed, dandelion and white clover.

5.3.2.11 Recolonising Bare Ground x Dry Meadows and Grassy Verges (ED3 x GS2)

At the north-west, a path of cleared ground has been cleared and is being recolonised by species including pineappleweed, scarlet pimpernel, hawkweed, dandelion, white clover and creeping thistle (*Cirsium arvense*).



Plate 5.10 Dry Meadows and Grassy Verges, Scrub and Recolonising Bare Ground

5.3.2.12 Scrub (WS1)

There are areas of scrub within the site, dominated by gorse, immature gorse *Ulex europaeus*, bramble, rosebay willowherb and broad-leaved dock'



Plate 5.11 Scrub (left), Spoil and Bare Ground (right).

5.3.2.13 Hedgerow (WL1) / Treeline (WL2)

Some linear strips of shrubs and trees occur, with the composition of these features varying within this habitat mosaic. Typical species present were ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplanatus*), hazel (*Corylus avellana*), goat willow, gorse and bramble.



Plate 5.12 Hedgerow / treeline

5.3.2.14 Spoil and Bare Ground (ED2)

There are deposits of spoil throughout the site as a result of construction works. These habitats are classified as 'Spoil and Bare Ground'.

5.3.2.15 Drainage Ditches (FW4)

The linear waterbodies within the PDS are categorised as 'drainage ditches' (FW4). According to Fossitt (2000), this category includes linear water bodies or wet channels that are entirely artificial in origin, and some sections of natural watercourses that have been excavated or modified to enhance drainage and control the flow of water. These waterbodies are of low ecological value to their homogenous character (trapezoidal cross section, few substrate types), level of recent disturbance and degree of siltation. They are unsuitable for salmonids (both trout and salmon) and would not be used by these species for spawning, as a nursery for juvenile fish or as holding areas for adults. Parts of the Woodstock Stream that have been physically altered are classified within this category (See **Figure 5.4**). Plants recorded were fool's water cress (*Apium nodiflorum*), floating sweet-grass (*Glyceria fluitans*) and water crowfoot (*Ranunculus* sp.).



Plate 5.13 Drainage ditch (FW4) that flows south-west through site and exits the site via concrete pipes.



Plate 5.14 Siltation and poor hydromorphological condition implies low ecological value for drainage ditches. Aquatic survey site 3 (left), site 4 (right).



Plate 5.15 Woodstock Stream, an eroding upland river at the eastern boundary of the site (left). A re-sectioned reach of the same waterbody now enclosed by walls and disconnected from its floodplain - drainage ditch.

5.3.2.16 Eroding/Upland River (FW1) and Depositing/Lowland River (FW2)

Two streams that border/adjoin the PDS are classified as Lowland/Depositing Rivers (FW2) but also have some Eroding/Upland River (FW1) and drainage ditch characteristics. These are the Anngrove and Woodstock Streams. The Woodstock Stream is not mapped (registered) by the EPA but is a notable freshwater habitat that drains part of the proposed development site. The Woodstock Stream is fast flowing as it flows south along the eastern boundary of the site but slow upstream of the and slow flowing areas have characteristics of i.e. depositing areas but this could also be attributed to excessive silt in these streams. The Woodstock Stream is physically diverse, with a combination of rock, cobble, gravel and fine substrates as well as various flow features i.e. riffle-glide-pool sequences. These stream could potentially be used by trout for spawning and have adequate cover and flow to sustain juvenile trout.

The entire length of the Anngrove Stream is categorised by the NBDC as a depositing lowland river. This watercourse is shown to run through the Castlake housing estate to the west of the proposed development site so has been re-routed and / or culverted / or has been replaced by surface drainage associated with the housing development.

There is no WFD monitoring data for any of the linear waterbodies on or leaving the site.

5.3.2.17 Other artificial lakes and ponds (FL8)

The pond south of the existing Castl lake housing development is an artificial pond which is described here though it is outside of the proposed development area's boundaries. It was constructed presumably as an amenity as part of the Castl lake housing development and also serves to attenuate surface water runoff from the housing development. The pond has an overflow into the Woodstock Stream. This pond supports pondweed *Elodea* sp. and Curly waterweed, highly-invasive plant species which are problematic in that they outcompete other plants by shading. Other plants that occurred in Castl lake were yellow flag, water mint (*Mentha aquatica*), great pond sedge (*Carex riparia*), yellow water-lily (*Nuphar lutea*) and variegated reed sweet grass (*Glyceria maxima variegata*). The bed of the lake was anoxic near the surface due a layer of silt and water quality is considered unsatisfactory.

5.3.2.18 Lagoons (CW1)

The Anngrove Stream discharges to part of the Cork Harbour transitional waterbody known as Slatty Bridge, Fota Island. This waterbody is a transitional lagoon, classified as oligo or polyhaline, mesotidal and sheltered. It is bordered to the west by regional road R624 (Slatty Bridge). Based on NBDC mapping which provides Fossitt (2000) habitat coverage south of the proposed development, this waterbody is surrounded by 'upper salt marsh' (CM2) to the north and 'Reed and large sedge swamps' (FS1) to the south. There is no WFD monitoring data for Slatty Pond.

5.3.2.19 Muddy sand shores (LS3)

West of Slatty Bridge and connected to Slatty Bridge waterbody is Lough Mahon (Harper's Island), part of Cork Harbour transitional waterbody. This waterbody is classified as meso or polyhaline, strongly mesotidal, and sheltered. Based on NBDC mapping, this habitat is classified as muddy sandy shore. Data from the EPA's Water Framework Directive (WFD) monitoring describes Lough Mahon as having 'moderate' water quality (2013-2018). The EPA has classed the risk of Lough Mahon (Harpers Island) of failing to meet its WFD objectives as 'At risk'.



Plate 5.16 Artificial pond (left) and muddy sand shore at Lough Mahon (right).

5.3.2.20 Lower Salt Marsh CM1

This habitat occurs at Lough Mahon Lough Mahon (Harper's Island), at various locations along the shores between the upper limits of the neap and spring tides.

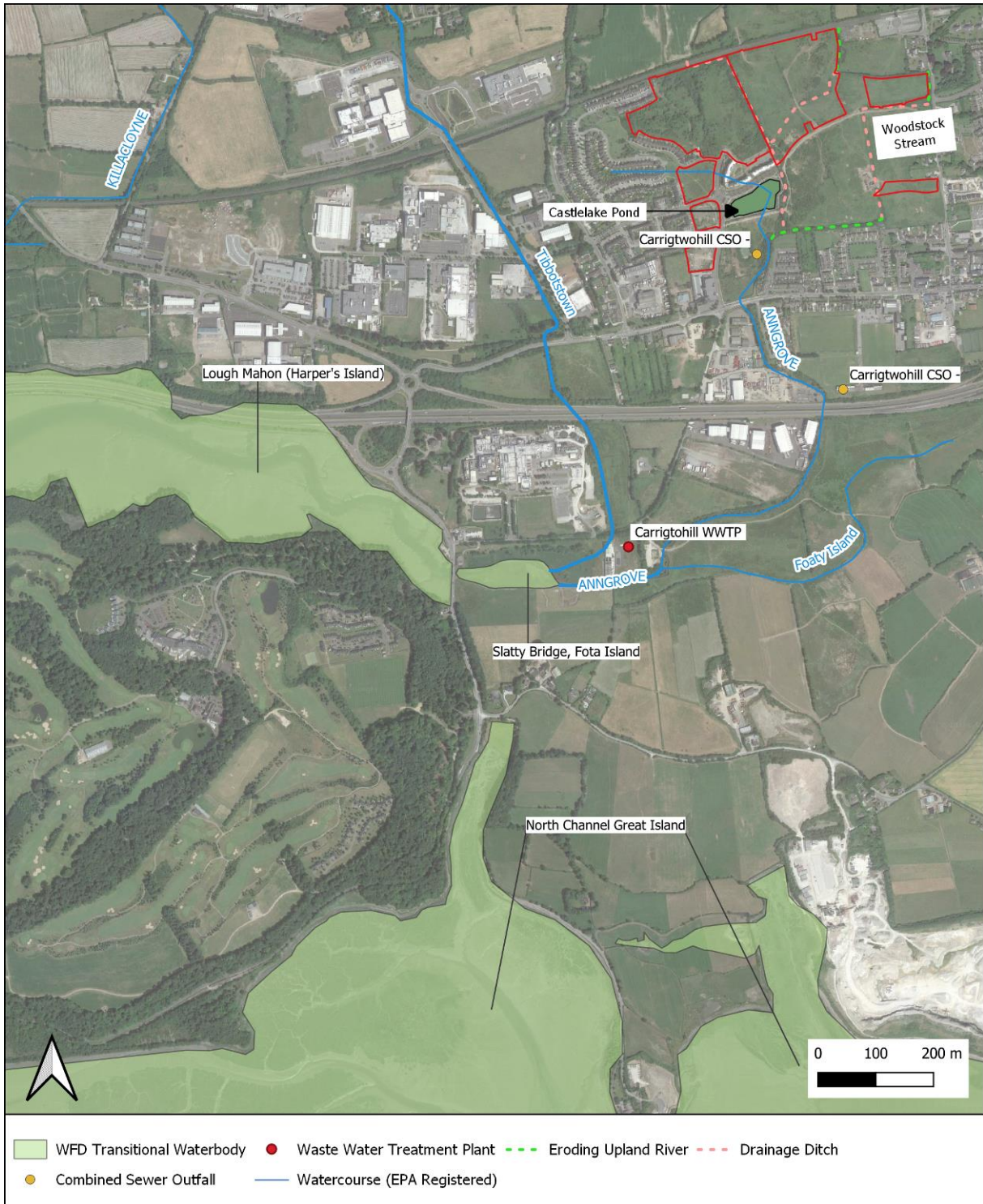


Figure 5.5 Water feature map

5.3.3 Invasive plants

The following invasive species occur within and adjacent to the proposed development site:

- Himalayan balsam (*Impatiens glandulifera*);
- Japanese Rose (*Rosa rugosa*);
- Curly Waterweed (*Lagarosiphon major*); and
- Pondweed (*Elodea* sp.)

The location of these species is presented in Figure 5.6. Himalayan balsam and Japanese rose occur within the proposed development boundary. Himalayan balsam is present throughout the site within the proposed development boundary. Japanese rose was recorded at only one location within the proposed development boundary.

Pondweed *Elodea* sp. and curly waterweed occur in Castl lake, outside of the proposed development boundary. Of these, Himalayan balsam, pondweed *Elodea* sp. and curly waterweed are listed under the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations 2011 (regulations 49 and 50). Regulation 49 prohibits the introduction and dispersal of these species.

The pondweed recorded was either Nuttall's *E. nuttallii* or Canadian (*E. canadensis*), which, due to its growth pattern in dense stands it creates anoxic conditions and traps sediments. This in turn reduces or removes completely the growth of primary producers such as alphytic algae and cyanobacteria (Millane & Caffrey, 2014). It is considered that this plant occurs throughout Castl lake and throughout the Anngrove Stream downstream of Castl lake. Curly waterweed is also known to occur in the lake[1]. Curly waterweed has similar effects on aquatic ecology to *Elodea* sp.. There was no evidence of non-native aquatic invasive plant within the proposed development site boundary.

An invasive species management plan (ISMP) has been prepared to manage, treat and prevent the spread of the invasive species identified within the proposed development site boundary. This plan is presented in **Appendix 5.4**.



Plate 5.17 Invasive plants at the proposed development site: Japanese rose (left) and Himalayan balsam (right)



Plate 5.18 *Elodea* sp. recorded at Castlelake.



Figure 5.6 Invasive plants recorded at the proposed development site and environs

5.3.4 Rare and protected flora

The list of rare and protected flora previously recorded in 10km grid square W87 is provided in **Table 5.8**.

No rare and/or protected flora were recorded within the study area. Round-leaved cranes-bill *Geranium rotundifolium* occurs in the tetrad (2 km X 2 km grid square, W87B) containing the proposed development site. This is a flowering plant species of dry walls, grassland, hedgebanks, roadsides, waste ground and urban areas¹⁰. Rare but increasing. In the online Atlas of Vascular Plants, it is listed as a ‘Threatened Species: Endangered’. There is no record of this plant in the monad (1 km X 1 km grid square, W8173) containing the proposed development site.

Dropwort (*Filipendula vulgaris*) prefers calcareous meadows and rocky, limestone heaths¹¹. Lesser striated feather-moss (*E. striatulum*) grows on calcareous rocks, stones and walls, rarely also on tree roots. The habitat is usually lightly to moderately shaded, and often in woodland. It is a southern species and favours warm, dry sites¹². The habitat of common extinguisher-moss (*Encalypta vulgaris*) is base-rich substrates generally, and tending to be a lowland species¹³. According to the online Geological Survey Ireland (GSI) online mapper, the proposed development site is underlain by Massive unbedded lime-mudstone from Walsortian Limestones formation at the southern end and Dark muddy limestone, shale of the Ballysteen Formation at the northern end. The proposed development site could potentially support these species. These plants were not recorded during the site surveys however.

Table 5.8 Rare and protected species within the 10km hectad (Source: NBDC website)

Species group	Species name	Record count	Date of last record	Title of dataset	Designation
Flowering plant	Dropwort (<i>Filipendula vulgaris</i>)	2	18/06/2020	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Threatened Species: Vulnerable
	Round-leaved Crane's-bill (<i>Geranium rotundifolium</i>)	3	17/05/2020	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Threatened Species: Endangered
Moss	Common Extinguisher-moss (<i>Encalypta vulgaris</i>)	1	27/03/2006	Bryophytes of Ireland	Threatened Species: Near threatened
	Lesser Striated Feather-moss (<i>Eurhynchium striatulum</i>)	1	27/03/2006	Bryophytes of Ireland	Threatened Species: Near threatened

¹⁰ <https://www.irishwildflowers.ie/pages/50a.html>

¹¹ http://www.wildflowersofireland.net/plant_detail.php?id_flower=511&wildflower=Dropwort

¹² <https://www.britishbryologicalsociety.org.uk/wp-content/uploads/2020/12/Eurhynchium-striatulum.pdf>

¹³ <https://www.britishbryologicalsociety.org.uk/wp-content/uploads/2020/12/Encalypta-vulgaris.pdf>

5.3.5 Fauna

Data on protected fauna within the 10km hectad within which the site is situated (W87) was accessed from NBDC. Records yielded within the past twenty years are presented in **Table 5.9** below (excluding marine fauna and birds), with the most recent record for each species listed.

Table 5.9 Rare and protected fauna records from 10km hectad W87 (Source: NBDC website)¹⁴

Species group	Species name	Date of last record	Designation
Terrestrial mammal	Brown Long-eared Bat (<i>Plecotus auritus</i>)	02/09/2006	EU Habitats Directive: Annex IV Wildlife Acts
	Daubenton's Bat (<i>Myotis daubentonii</i>)	09/08/2014	EU Habitats Directive: Annex IV Wildlife Acts
	Eurasian Badger (<i>Meles meles</i>)	27/07/2016	Wildlife Acts
	Eurasian Pygmy Shrew (<i>Sorex minutus</i>)	31/12/1983	Wildlife Acts
	Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	31/08/2018	Wildlife Acts
	European Otter (<i>Lutra lutra</i>)	23/11/2017	EU Habitats Directive: Annex II & IV Wildlife Acts
Amphibian	Common Frog (<i>Rana temporaria</i>)	06/10/2020	EU Habitats Directive: Annex V Wildlife Acts
Bony fish (Actinopterygii)	European Eel (<i>Anguilla anguilla</i>)	15/09/2005	OSPAR Convention Threatened Species: Critically Endangered
Insect - butterfly	Dark Green Fritillary (<i>Argynnis aglaja</i>)	31/12/1975	Threatened Species: Vulnerable
	Gatekeeper (<i>Pyronia tithonus</i>)	13/08/2012	Threatened Species: Near threatened
	Small Blue (<i>Cupido minimus</i>)	31/12/1974	Threatened Species: Endangered
	Small Heath (<i>Coenonympha pamphilus</i>)	30/06/1976	Threatened Species: Near threatened
	Wall (<i>Lasiommata megera</i>)	08/08/1976	Threatened Species: Endangered
Insect - hymenopteran	<i>Andrena (Andrena) fucata</i>	14/07/2011	Threatened Species: Near threatened
	<i>Andrena (Leucandrena) barbilabris</i>	19/05/2011	Threatened Species: Near threatened
	<i>Andrena (Oreomelissa) coitana</i>	08/08/2010	Threatened Species: Vulnerable
	Barbut's Cuckoo Bee (<i>Bombus (Psithyrus) barbutellus</i>)	31/08/1972	Threatened Species: Endangered
	Field Cuckoo Bee (<i>Bombus (Psithyrus) campestris</i>)	31/08/1972	Threatened Species: Vulnerable
	Gipsy Cuckoo Bee (<i>Bombus (Psithyrus) bohemicus</i>)	31/08/1972	Threatened Species: Near threatened
	Large Red Tailed Bumble Bee (<i>Bombus (Melanobombus) lapidarius</i>)	11/05/2021	Threatened Species: Near threatened
	Moss Carder-bee (<i>Bombus (Thoracomus) muscorum</i>)	11/09/1955	Threatened Species: Near threatened
	<i>Nomada panzeri</i>	11/04/2010	Threatened Species: Near threatened
Red-tailed Carder Bee (Bombus)	31/08/1972	Threatened Species: Vulnerable	

¹⁴ Marine fauna and avifauna excluded – marine fauna not in zone of influence, birds in next section

Species group	Species name	Date of last record	Designation
	<i>(Thoracombus) ruderarius</i>		
Mollusc	Common Whorl Snail (<i>Vertigo (Vertigo) pygmaea</i>)	31/12/1903	Threatened Species: Near threatened
	English Chrysalis Snail (<i>Leiostylia (Leiostylia) anglica</i>)	08/08/1971	Threatened Species: Vulnerable
	Lake Orb Mussel (<i>Musculium lacustre</i>)	31/12/1914	Threatened Species: Vulnerable
	Marsh Whorl Snail (<i>Vertigo (Vertigo) antivertigo</i>)	31/12/1914	Threatened Species: Vulnerable
	Moss Bladder Snail (<i>Aplexa hypnorum</i>)	31/12/1914	Threatened Species: Vulnerable
	Moss Chrysalis Snail (<i>Pupilla (Pupilla) muscorum</i>)	31/12/1903	Threatened Species: Endangered

5.3.5.1 Terrestrial mammals (excluding bats)

The entire study area was surveyed for mammals or signs indicating their use of the site. No observations or signs of protected mammal species were observed. Rabbit is common at the site, utilising scrub and earth banks for burrows. Trailcam records between 30th March and 7th April are shown **Table 5.10**. Badger was detected at the location of Trailcam 2 at the north-eastern boundary of the site. This badger only showed within a two-hour period on one night over an 8-day period. It is considered that this badger was foraging but no snuffles holes were detected in the area. There were no setts detected within the proposed development site. It is possible that hare occurs at the site but was not recorded during the current surveys. The trailcam footage indicated that the non-volant mammal activity at the site is mostly rabbits and rodents.

Table 5.10 Trailcam records between 30th March and 7th April

Trailcam ID	Location (ITM)		Species recorded
	x	y	
Trailcam 1	581838	573250	Grey heron, blackbird
Trailcam 2	581717	573739	Badger, fox, rabbit, rat, song thrush, blackbird,
Trailcam 3	581330	573597	Rat/mouse, dunnoek, wren
Trailcam 4	581327	573664	Rabbit, rat/mouse, cat, dunnoek, wren, blackbird, robin



Plate 5.19 Adult badger (left) and juvenile rabbit (right) at trailcam 2.



Plate 5.20 Brown rat (left) and fox (right) at trailcam 2.



Plate 5.21 and cat at trailcam 3.

5.3.5.2 Bats

5.3.5.2.1 Bat Habitat Suitability Index

Bat Conservation Ireland produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000-2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al.* (2011.)

The degree of favourability ranges from 0 – 100, with 0 being least favourable and 100 most favourable for bats. The values of the grid squares represent the range of habitat suitability values the bat species can tolerate within each individual square.

The bat habitat suitability index (BHSI) rating indicates that the habitats within the proposed development site and surrounding landscape is assessed as being of moderate value to bats in general with a rating of 35.56 out of 100 for the category ‘All bats’ (Table 5.11). The site is of high suitability for six species, namely brown long-eared bat, soprano pipistrelle, Leisler’s bat, common pipistrelle, whiskered bat, and Natterer’s bat. The site is considered to be of moderate value to Daubenton’s bat, and low suitability for Nathusius’ pipistrelle. It is of negligible value for lesser horseshoe bat with a rating of 0 for this species.

Table 5.11 Bat Habitat Suitability Index for the proposed development site and surrounding area (NBDC, 2021)

Species	Suitability
All Bats	33
Lesser Horseshoe bat <i>Rhinolophus hipposideros</i>	0
Nathusius’ pipistrelle <i>Pipistrellus nathusii</i>	7
Daubenton’s bat <i>Myotis daubentonii</i>	33
Natterer’s bat <i>Myotis nattereri</i>	34

Whiskered bat	<i>Myotis mystacinus</i>	33
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	45
Leisler's bat	<i>Nyctalus leisleri</i>	49
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	52
Brown long-eared bat	<i>Plecotus auritus</i>	44

In reality, however, the site is of low suitability to both roosting and foraging bat species. The surrounding landscape is predominantly of residential use, and while there are some treelines/hedgerows providing limited habitat connectivity, the intensity and extent of artificial lighting in the hinterland reduces the importance of the site for bats. As such, in addition to the data yielded from the activity survey, the site is considered unlikely to be a significant resource for bat species.

5.3.5.2.2 Roost Assessment

Some trees identified within the zone where felling would take place at construction stage were identified as potentially suitable bat roosts but with no definite potential. Some mature/semi-mature treelines occur on-site but the bulk of the vegetation present consists of scrub, grassland and hedgerow. Using the tree bat roost category classification system in Collins (2016), the trees impacted by the proposed development were rated either:

- 3 - trees have no obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some potential roost features which may have limited potential to support bats; or
- 4 - trees have no potential.

Buildings are high value habitat for bat roosting, as indicated in Marnell *et al.* (2022) but there is an absence of built structures within the proposed development site. There are no other features on the site considered suitable for bats e.g. caves or bridges. As such, the site is not rated as being a high value habitat for roosting bats.

5.3.5.2.3 PABS Survey

The following species, and bats to which a species or genus could not be attributed, were recorded within the proposed development site.

- Soprano pipistrelle (61.39 %)¹⁵ – 9,128 of 15,114 records;
- Common pipistrelle (33.36 %) – 5,042 of 15,114 records;
- Leisler's bat (5.96 %) – 901 of 15,114 records;
- Unidentified bat (0.23 %); – 35 of 15,114 records; and
- Species from the genus *Myotis* (0.05 %) – 8 of 15,114 records.

Soprano pipistrelle and common pipistrelle were the most frequently recorded species, with respective totals of 9,128 passes and 5,042 passes recorded. Leisler's bat (901 passes) was the next most frequently recorded species. While bats from the genus *Myotis* (8 passes) were also recorded, these occurrences were so infrequent that the individuals recorded are considered to be casual records of site usage by this genus. Calls generated by bats to which a species or genus could not be attributed comprise 0.23% of the total.

¹⁵ % of all calls recorded during survey period.

5.3.5.3 Avifauna

A long list of birds have been recorded in the 10 km grid square W87, which contains the proposed development. During the breeding bird survey, a total of thirty-three species were recorded along or in flight over the survey transect routes. The results are presented in **Table 5.12**.

Table 5.12 Breeding bird survey results

Common Name	Species Name	Number of Records		Breeding Status	Highest breeding evidence	Conservation status (BoCCI, Annex 1 of the Birds Directive)
		25/03/2022	27/04/2022			
Blackbird	<i>Turdus merula</i>	6	8	Confirmed	Eggshells found	
Blue Tit	<i>Cyanistes caeruleus</i>	2	3	Probable	Agitated behaviour	
Bullfinch	<i>Pyrrhula pyrrhula</i>	2	2	Probable	Pair of birds in suitable habitat	
Buzzard	<i>Buteo buteo</i>	2	2	Possible	Species in nesting habitat	
Chaffinch	<i>Fringilla coelebs</i>	4	2	Probable	Pair of birds in suitable habitat	
Chiffchaff	<i>Phylloscopus collybita</i>	2	4	Possible	Singing male	
Cormorant	<i>Phalacrocorax carbo</i>	1		Non-breeding	Flying over	
Dunnock	<i>Prunella modularis</i>	3	1	Possible	Singing male/species in nesting habitat	
Feral Pigeon	<i>Columba livia f. domestica</i>	7		Possible	Species in nesting habitat	
Goldcrest	<i>Regulus regulus</i>	1	2	Possible	Singing male	Amber list
Great Tit	<i>Parus major</i>		1	Possible	Singing male	
Greenfinch	<i>Carduelis chloris</i>	1		Possible	Singing male	Amber list
Grey Heron	<i>Ardea cinerea</i>	1	1	Possible	Species in nesting habitat	
Hooded Crow	<i>Corvus cornix</i>	5	3	Possible	Species in nesting habitat	
House Sparrow	<i>Passer domesticus</i>	1	1	Possible	Singing male	Amber list
Jackdaw	<i>Corvus monedula</i>	1		Possible	Species in nesting habitat	
Linnet	<i>Carduelis cannabina</i>	1		Possible	Singing male	Amber list
Little Egret	<i>Egretta garzetta</i>	2		Non-breeding	Flying over	Annex I of the Birds Directive
Magpie	<i>Pica pica</i>	2	2	Possible	Species in nesting habitat	
Mallard	<i>Anas platyrhynchos</i>	2	6	Non-breeding	Flying over	Amber list
Meadow Pipit	<i>Anthus pratensis</i>		1	Probable	Pair observed in suitable nesting habitat	Red list
Pheasant	<i>Phasianus colchicus</i>	1		Possible	Species in nesting habitat	
Pied Wagtail	<i>Motacilla alba yarrellii</i>	1		Possible	Species in nesting habitat	
Robin	<i>Erithacus rubecula</i>	3	4	Probable	Agitated behaviour	
Rook	<i>Corvus frugilegus</i>	15	3	Possible	Species in nesting habitat	
Song Thrush	<i>Turdus philomelos</i>		2	Possible	Singing male	

Common Name	Species Name	Number of Records		Breeding Status	Highest breeding evidence	Conservation status (BoCCI, Annex 1 of the Birds Directive)
		25/03/2022	27/04/2022			
Siskin	<i>Carduelis spinus</i>	1		Possible	Singing male	
Snipe	<i>Gallinago gallinago</i>	1	1	Possible	Species in suitable habitat	Red list
Starling	<i>Sturnus vulgaris</i>	5		Non-breeding	Flying over	Amber list
Stonechat	<i>Saxicola torquata</i>	4	2	Possible	Singing male	
Willow Warbler	<i>Phylloscopus trochilus</i>		1	Possible	Singing male	Amber list
Woodpigeon	<i>Columba palumbus</i>	11	13	Possible	Species in nesting habitat	
Wren	<i>Troglodytes troglodytes</i>	5	4	Probable	Agitated behaviour	

Just one of these, Blackbird (*Turdus merula*), was classified as confirmed breeding, on the basis of finding recent eggshells. Six species were classified as probable breeders. The remainder of the records were classified as possible or non-breeding species, twenty-two and four respectively. Seven species recorded using the site (not including overflying species, which were classified as non-breeding) are considered to be of conservation concern in Ireland according to the current BoCCI red and amber lists (Gilbert *et al.*, 2021). Of these, five were classified as possible breeders and two as probable breeders. Of the two red list species observed, one was recorded as a probable breeder, meadow pipit (*Anthus pratensis*) and one as a possible breeder, snipe (*Gallinago gallinago*). One species listed in Annex 1 of the Birds Directive was recorded in this survey, little egret (*Egretta garzetta*), though this species was non-breeding on site and recorded overflying it. During a separate site survey on 30th March, a snipe was flushed near the Woodstock Stream south east of, and adjacent to, Castelake. This bird was in a rough, wetter type grassland in area outside of the proposed development site.

One species of conservation interest (SCI) for Cork Harbour SPA was recorded adjacent to the proposed development (but outside the red-line boundary) - grey heron (*Ardea cinerea*). This species was recorded by trailcam on the Woodstock Stream. In addition, it was noted during fieldwork associated with the AA screening report that an individual of this species used the island at Castlelake (also outside of the proposed development area) as a day roost. There was no evidence of a heronry within the trees on the proposed development site or in the immediate vicinity.



Plate 5.22 Grey heron captured by Trailcam 1 (left) and song thrush at Trailcam 2 (right).

Based on the breeding bird surveys, it was concluded that mute swan (*Cygnus olor*, amber listed), moorhen (*Gallinula chloropus*), coot (*F. atra*, amber listed) and mallard (*A. platyrhynchos*, amber listed) could potentially

be breeding at Castlelake. It is noted that this waterbody is outside of the proposed development site but potentially within the zone of influence.

5.3.5.4 Terrestrial macroinvertebrates

A range of threatened macroinvertebrates including molluscs (e.g. whorl snails *Vertigo* sp.), butterflies (e.g. gatekeeper (*Pyronia tithonus*), wall (*Lasiommata megera*)) and bees (e.g. field cuckoo bee (*Bombus campestris*)) have been previously recorded in the hectad W87.

According to Moorkens & Killeen (2011), optimal habitat for whorl snails is where water level is at or slightly above ground level for much of the year, with a good cover of tall sedges and grasses. As such, there is no suitable habitat at the proposed development site.

During site surveys, speckled wood (*Pararge aegeria*), honey bee (*Apis* sp.), 14-spot ladybird (*Propylea quattuordecimpunctata*) and larvae of the cinnabar moth *Senecio jacobaea* were recorded, the latter feeding on common ragwort *Jacobaea vulgaris*. The habitats at the proposed development site have been impacted by ongoing and recent human disturbance. Habitats in such transitory states, such as bare and recolonising ground, have reduced value for macroinvertebrates due to the lack of plant cover and food. The proposed development site is of no particular value for terrestrial macroinvertebrates.



Plate 5.23 Speckled wood butterfly (left) and 14-spot ladybird and larvae of the cinnabar moth (right) recorded during site surveys.

5.3.5.5 Aquatic species

5.3.5.5.1 Fish

In McGinnity *et al.* (2003), which classifies Irish rivers in terms of salmonid habitats, all watercourses >1st order in the Tibbotstown_010 subbasin are 'Not considered a significant producer of Salmonids' (see **Figure 5.13**). The only watercourses indicated on mapping in McGinnity *et al.* (2003) are the Anngrove Stream (lower reach of ca. 300 m), the Tibbotstown Stream (3.6 km) and the lower 600 m of the Killacloyne Stream. The Tibbotstown_010 subbasin is not in the distribution or range of sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluvialilis*) or white-clawed crayfish (*Austropotamobius pallipes*), with reference to Article 17 (2013 - 2018) Assessments in NPWS (2019). The proposed development is in the range of both Atlantic salmon (*Salmo salar*) and brook lamprey (*L. planeri*).

Table 5.13 provides an evaluation of the salmonid habitat rating at the aquatic survey sites. It is noted that the watercourses at the site and downstream are unsuitable for salmon with respect to size and water quality.

Juvenile salmon require good water quality (see **Section 5.3.5.6**), an attribute that does not feature in the subject watercourses, so are highly unlikely to occur in the watercourses draining the site. The size of these watercourses is also a limiting factor for salmon and other fish, so if salmonids are present, only brown trout *Salmo trutta* can be expected.

Table 5.13 Salmonid habitat rating at the aquatic survey sites

Site	Spawning		Nursery		Holding	
	Habitat grade ¹	Fluvial cover ² (≈%)	Habitat grade ¹	Fluvial cover ² (≈%)	Habitat grade ¹	Fluvial cover ² (≈%)
1	3-4	5	3	10	4	5
2	3-4	5	3	20	3	10
3	n/a	-	4	5	3	5
4	2	10	1-2	40	3	20
5	n/a	-	3-4	50	3	50
6	n/a	-	4	5	4	5
7	3	10	2	30	2-3	20
8	n/a	-	n/a	-	n/a	-
9	4	5	4	10	4	5

Following DCAL's advisory leaflet 'The Evaluation of habitat for Salmon and Trout'

¹Grade 1 is optimal habitat and habitat quality reduces with increases in Grade (Grade 4 = poor)

²Fluvial cover relates to river substrate under water and available to fish

The drainage ditches at the site are largely unsuitable for salmonids. They are generally assessed as poor regarding spawning, nursery and holding due to their low gradient, small size, shallow depth, uniform character and degree of siltation. The Woodstock Stream at Site 4 is on a medium gradient reach, assessed as a good habitat for the early life stages of trout, having a mixed substrate, riffled water and some deeper pools, these combinations of features providing suitable spawning areas, refuges for young trout and adult fish. The Woodstock Stream at Site 7 is less suitable due to the degree of siltation. The Woodstock Stream at Site 5 is unsuitable for spawning as the bed comprises concrete rubble and the interstitial spaces largely filled with silt. The Woodstock Stream at Site 9 is poor in terms of spawning due to its low gradient and degree of substrate siltation.

The reach of the Woodstock Stream upstream of the Anngrove Stream confluence was found to have a significant amount of litter within the watercourse and along its banks. This foreign material included plastics of various form including barricades, balls, bottles as well as wooden refuse such as posts, pallets and hedge cuttings. These materials were found to be clogging the channel and were deemed a fish passage barrier at some locations.

Castlelake is a standing waterbody with no significant inflowing or outflowing stream, and poor water quality, and as such, is unsuitable for trout.

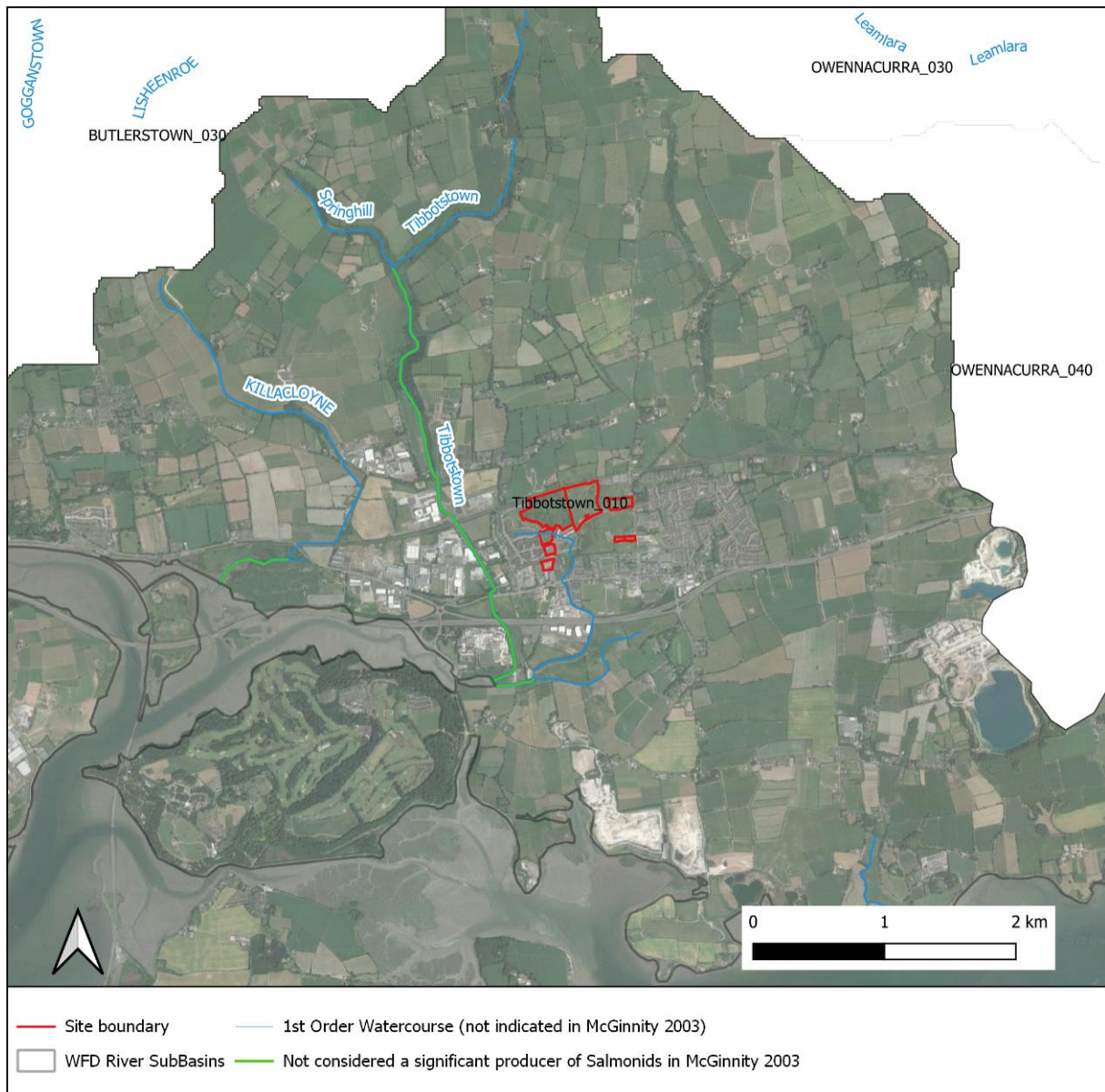


Figure 5.7 Designation of rivers as salmonid habitats in the study area (based on McGinnity *et al.* 2003)

Fish survey results are presented in **Table 5.14**. Three-spined stickleback were recorded in the drainage ditches at the site. Three-spined stickleback occur in a variety of habitats in freshwater from small streams to lakes. In the sea they are confined to coastal areas and are commonly found in upper reaches of estuaries and in tidal freshwater zone (King *et al.* 2011). Kelly *et al.* (2007) reported relatively high abundance of this species in waters with poor water quality.

Table 5.14 Fish survey results

Site	Three-spined stickleback	Brook/river lamprey
1	✓	
2	✓	
3	✓	

4	
5	✓
6	✓
7	✓

Trout were not captured during sampling at any site but are likely present in the Woodstock Stream. A brook/river lamprey *Lampetra* sp. was recorded in a silt bed at Site 7. This was most likely a brook lamprey *L. planeri*. It is noted that all lampreys are a listed species on Annex II of the Habitats Directive, with river lamprey also on Annex V of the same directive.

Minnow (*Phoxinus phoxinus*) also likely occurs in the Woodstock and Ann Grove Stream. Eel (*Anguilla anguilla*) and flounder (*Platyichthys flesus*) could also occur in the waterbodies at the site, especially considering the proximity to the sea.



Plate 5.24 Three spine stickleback (left) was found in drains within the site. Brook/river lamprey at Site 7 (right).

5.3.5.5.2 Macroinvertebrates

The damselflies (*Ischnura elegans*, *Coenagrion puella* and *Enallagma cyathigerum*) as well as the emperor dragonfly (*Anax imperator*) have been recorded in the 10km grid square W87 encompassing the proposed development site. A range of other aquatic invertebrates including beetles (Dytiscidae, Elmidae), caddisflies (Lepidostomatidae, Limnephilidae), mayflies (*Serratella ignita*, *Heptagenia sulphurea*) and stoneflies (*Chloroperla tripunctata*, *Protonemura meyeri*, *Leuctra* sp.) have also been recorded.

Appendix 5.5 lists the macroinvertebrates recorded during biological sampling on waterbodies draining the proposed development site during May 2022. The only pollution sensitive taxa recorded were larvae of the mayfly (*Rhithrogena semicolorata*) and (*Heptagenia* sp.) as well as the stonefly (*Isoperla grammica*). These species were recorded where stony substrates occurred. Other mayfly larvae recorded were *Serratella* sp., (*Baetis rhodani*) and (*Alainites muticus*).

Trichoptera were well represented with larvae of four caseless (*Hydropsyche* sp., Philopotamidae, *Rhyacophila* sp. and (*Polycentropus* sp.) and four families of cased caddisfly (Limnephilidae, Glossosomatidae, Odontoceridae) recorded. Pollution tolerant larva of true flies occurred at all locations and collectively included *Simulium* sp., (*Tipula* sp., *Dicranota* sp., *Rheotanytarus* sp. and green chironomids.

The macroinvertebrate community within Castl lake comprised a large proportion of pollution tolerant *Asellus aquaticus*, Pleidae, Chironomidae and water mites Hydracarina. The most sensitive macroinvertebrates were

larvae of Coenagriidae and Leptoceridae (both less sensitive, Group B). The molluscs (*Radix balthica*), (*Lymnaea stagnalis*) and (*Bithynia tentaculata*) were also recorded.

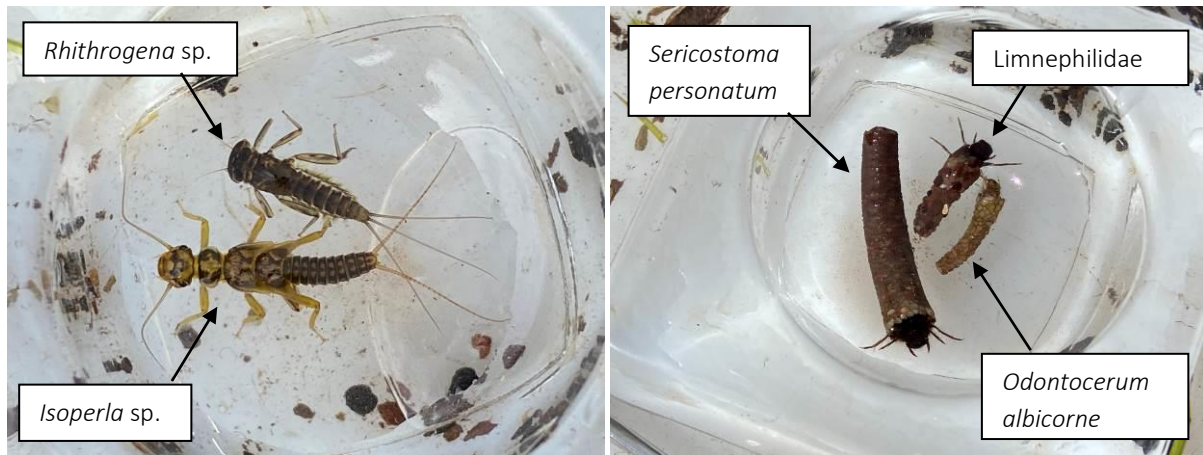


Plate 5.25 Larvae of pollution sensitive mayfly (left) and cased caddisfly larvae (right) found at Site 4.



Plate 5.26 Caseless caddisfly larvae found at Site 4 (left). Zygoptera at Site 8 (right).

5.3.5.6 Water quality

There is no WFD monitoring data for any of the linear waterbodies on or leaving the site. Data from the EPA's Water Framework Directive (WFD) monitoring describes Lough Mahon as having 'moderate' water quality (2013-2018). The EPA has classed the risk of Lough Mahon (Harpers Island) of failing to meet its WFD objectives as 'At risk'.

The macroinvertebrate diversity and biological water quality results for sites examined during May 2022 are presented in **Table 5.15**. Biological richness is an index for water quality, the greater the diversity the better the water quality. Based on macroinvertebrate richness, Sites 1, 4 and 7 were considered good. A reduced diversity was recorded at the other locations.

Biological water quality at Sites 1, 4 and 7 was rated 'Slightly polluted (Q3-4). Corresponding to WFD 'moderate status'. Biological water quality at Sites 2, 3, 5, 6 and 7 was rated 'Moderately polluted (Q3), corresponding to

WFD ‘poor status’. This is attributed to excessive siltation and a combination of silt and poor habitat at Site 5. It is noted that the Q-scheme is not used for pond/lake waterbodies so a rating was not assigned to Site 8.

It is considered that siltation was having a considerable impact on water quality in all waterbodies in the study area. It was apparent that water quality in Castlelake and the Woodstock Stream at Site 9 was compromised due to the degree of silt. It is noted that these waterbodies receive runoff from hard surfaces associated with urban areas which may be impacting water quality. Indeed, there was evidence in the form of dark silt at the location of a discharge from pipe observed at Site 9 which indicated significant urban inputs. Davis *et al.* (2018) concluded that sediment was the most pervasive stressor to the aquatic environment, particularly at high cover levels.

Table 5.15 Macroinvertebrate diversity and biological water quality results at sites examined during May 2022

	Site							
	1	2	3	4	5	6	7	8
No. of different families	18	13	12	16	5	5	19	12
Q-rating	3-4	3	3	3-4	3	3	3-4	n/a
Corresponding WFD Status	moderate	poor	poor	moderate	poor	poor	moderate	n/a

5.3.5.7 Reptiles & Amphibians

No reptiles or amphibians were recorded on site. There is no standing water at the site. Castlelake which is outside of the development boundary is not deemed a suitable habitat for frogs as it is too deep and supports aquatic species that would prey on frog spawn / froglets e.g. dragonfly larvae.

5.3.6 Evaluation of existing environment

5.3.6.1 Selection of Key Habitat Ecological Receptors

The habitat types within the proposed development site are evaluated in **Table 5.16** below, for their conservation importance, and those which are at least Local importance (Higher Value) are selected as Key Ecological Receptors.

Table 5.16 Evaluation of the Habitats within the Study Area

Fossitt Habitat Type	Evaluation	Key ecological receptor	Rationale
Amenity Grassland (GA2)			
Improved Agricultural Grassland (GA1) Dry Meadows and Grassy Verges (GS2) and mosaics of these habitats	Local importance (Lower Value)	No	Intrinsic ecological value in local context only.
Scattered Trees and Parkland (WS5)	Local importance (Lower Value)	No	Intrinsic ecological value in local context only.

Fossitt Habitat Type	Evaluation	Key ecological receptor	Rationale
Ornamental/Non-Native Shrub (WS3)			
Buildings and Artificial Surfaces (BL3)	Local importance (Lower Value)	No	No intrinsic ecological value.
Immature Woodland (WS1) and Scrub (WS5) and mosaics of these habitats	Local importance (Higher Value)	Yes	Intrinsic ecological value in local context.
Hedgerow (WL1) / treeline (WL2)	Local importance (Higher Value)	Yes	Intrinsic ecological value in local context.
Recolonising Bare Ground (ED3), Buildings and Artificial Surfaces (BL3), Spoil and Bare Ground (ED2) and mosaics of these habitats	Local importance (Lower Value)	No	No intrinsic ecological value.
Drainage Ditches (FW4)	Local importance (Lower Value)	No	Low intrinsic ecological value.
Eroding/Upland River (FW1)	Local importance (Higher Value)	Yes	Intrinsic ecological value in local context.
Depositing/Lowland River (FW2)	Upper – lower reaches: Local importance (Higher Value) Lower 360 m reach: International Importance (Higher Value)	Yes	Intrinsic ecological value in local context.
Other artificial lakes and ponds (FL8)	Local importance (Higher Value)	Yes	Intrinsic ecological value in local context only supports small numbers of waterbirds.
Lagoon (CW1)	International Importance (Higher Value)	Yes	The waters of Lough Mahon are largely designated under the Birds Directives and forms part of the larger Cork Harbour SPA. Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top five sites in the country. The site provides both feeding and roosting areas for the waterfowl species. Lough Mahon also supports otter, a species listed in Annex II of the Habitats Directive.
Muddy sand shores (LS3)	International Importance (Higher Value)	Yes	As per lagoon
Lower Salt marsh (CM1)	International Importance (Higher Value)	Yes	As per lagoon

5.3.6.2 Selection of Key Faunal Ecological Receptors (Non-avian)

All fauna identified during desktop or field surveys are evaluated below for their conservation importance as listed in **Table 5.17**.

Table 5.17 Evaluation of the Fauna within the Study Area

Species	Legislative Protection	Evaluation ¹⁶	Key Ecological Receptor	Rationale
Bat species	All bat species are listed in Annex IV ¹⁷ of EU Habitats Directive [92/43/EEC] and the lesser horseshoe bat is listed in Annex II ¹⁸ Wildlife Acts	National Importance/ International Importance Leisler's bat is Important internationally.	Yes	<p>Precautionary principle. Survey evidence indicates that the development site has little intrinsic ecological value to roosting or foraging bats.</p> <p>The survey established that while two trees within the site have moderate potential as roosting habitat, there is no evidence that any are currently occupied. In addition, the activity survey established that bat activity did not occur until well after sunset and the level of activity throughout the night was very low.</p> <p>However, the legal status and ecological sensitivity of these species and the precautionary principle merit their evaluation as Key Ecological Receptor.</p>
Rabbit (<i>O. cuniculus</i>)	None	Local Importance (Lower Value)	No	<p>While there is direct evidence of this species' residence within site, the population of this species is not considered to be under threat from anthropogenic pressures.</p> <p>The recorded evidence does not suggest that the study area is utilised by populations of higher than local significance.</p> <p>The main threats to rabbit populations are from predation from foxes, stoats, minks and badgers and from some larger predatory birds.</p>
Common Frog (<i>R. temporaria</i>)	Wildlife Acts, EU Habitats Directive [92/43/EEC] Annex V ¹⁹ , Berne Convention Appendix III.	Local Importance (Lower Value)	No	<p>Data base record rather than any direct evidence. Lack of suitable habitat within the site</p>
Red squirrel (<i>S. vulgaris</i>)	Wildlife Acts Bern Convention Appendix III	Local Importance (Lower Value)	No	<p>The species was not recorded on site. It is associated with woodland such as hazel, beech and Scots pine, which does not occur at the site.</p>
Badger (<i>M. meles</i>)	Wildlife Acts	Local Importance (Higher Value)	Yes	<p>The species was recorded once on the north eastern boundary of the proposed development site with a single trailcam record of an animal entering the site and leaving within a short period. There is a lack of suitable</p>

¹⁶ As per criteria outlined in Section 5.1.4.

¹⁷ Species in need of strict protection.

¹⁸ Species requiring designation of Special Areas of Conservation.

¹⁹ Species whose taking from the wild can be restricted by European law.

habitat within the site.				
Pygmy Shrew (<i>S. minutus</i>)	Wildlife Acts	Local Importance (Higher Value)	No	The species was not recorded on site.
European Otter (<i>L. lutra</i>)	Wildlife Acts, Annex II & IV of EU Habitats Directive	Local Importance (Higher Value)	Yes	The species was not recorded on site could potentially use the Anngrove and Woodstock Streams
Rodents	No protection	Local Importance (Lower Value)	No	Rat and field mouse detected at site but these species are widespread and common
Insect - butterflies	Various	Local Importance (Lower Value)	No	Site of no particular value for butterflies
Insect - hymenoptera	Various	Local Importance (Lower Value)	No	Site of no particular value for terrestrial insects
Molluscs (terrestrial and aquatic)	Various	Local Importance (Lower Value)	No	Site of no particular value for molluscs
Aquatic macroinvertebrates	Various	Local Importance (Lower Value)	Yes	Commonly occurring species present in the Anngrove and Woodstock Streams and in Castlelake
Brook lamprey (<i>L. planeri</i>)	Annex II of EU Habitats Directive	Local Importance (higher Value)	Yes	Species present in the Anngrove and Woodstock Streams
Brown trout (<i>S. trutta</i>)	None	Local Importance (higher Value)	Yes	Species present in the Anngrove and Woodstock Streams, prey item for otter and heron
Eel (<i>A. Anguilla</i>)	Red List Status: Critically Endangered	Local Importance (higher Value)	Yes	Species present in the Anngrove and Woodstock Streams
Other fish populations: minnow (<i>P. phoxinus</i>), 3-spine stickleback (<i>G. aculeatus</i>)	None	Local Importance (higher Value)	Yes	Species present in the Anngrove and Woodstock Streams, prey item for otter and heron
Birds	Red listed (meadow pipit, snipe) and amber listed (goldcrest, greenfinch, house sparrow, linnet, mallard, starling, willow warbler) species	Local Importance (higher Value)	Yes	Utilises the terrestrial habitats within and aquatic habitats downstream of the proposed development site
Birds	Green listed species	Local Importance (lower Value)	No	Lower conservation concern

5.4 Likely significant effects

The construction phase of the proposed development will require excavation and construction, which will bring about habitat loss. It will have a potential impact flora, fauna, water quality and fish. A potential impact during

construction is disturbance of breeding, sheltering or foraging species of fauna by the operation of machinery and other human activity.

The construction phase could potentially impact the Ann Grove and Woodstock Streams and downstream areas through surface run-off from existing surfaces, excavated surfaces and loose soils.

The primary source of potential operational phase impact could potentially be the completed development's water drainage system and the process effluent emission from the WWTP. This section will identify the impact of the construction and operational phases of the proposed development on the local natural environment.

5.4.1 Designated sites

5.4.1.1 Natura 2000 Sites

The proposed development does not lie within or adjacent to any Natura 2000 site. Two Natura 2000 sites are connected to the proposed development. The subject site is hydrologically connected to the Great Island Channel SAC and Cork Harbour SPA via the Woodstock Stream which flows through the site and downstream to both these Natura 2000 sites.

The conservation interests of Great Island Channel SAC are 'Mudflats and sandflats not covered by seawater at low tide' and 'Atlantic salt meadows'. These habitats are estuarine and at a remove from the proposed development site. It is considered that the Conservation Objectives for these habitats, primarily relating to the range and area of intertidal sediments are not likely to be affected.

The species of conservation interest (SCI) for which Cork Harbour SPA is designated are primarily estuarine in nature, relying on coastal habitats. While some species, particularly gulls, may occasionally use these habitats for foraging, they are of low ecological value to the SCI. One species of conservation interest (SCI) for Cork Harbour SPA was recorded adjacent to the proposed development (but outside the red-line boundary). Grey heron was recorded roosting on the island within Castl lake and recorded south of the site foraging downstream by Trailcam 1 (see location in **Section 5.2**). This habitat has potential to be used by nesting grey heron (though heronries are more commonly found in trees), and little egret (Annex I species). There is potential for construction noise to cause disturbance and/or displacement to nesting grey heron/little egret. However, the receiving environment is adjacent to an urban setting and is already subject to ongoing construction of similar developments nearby. As such, a significant impact on these species by virtue of disturbance/displacement is not considered likely.

An Appropriate Assessment screening report concluded there is potential for significant effects on two Natura 2000 sites due to the following reasons:

- There is potential for impacts to water quality of these sites;
- There is a potential for invasive species to be spread downstream and alter the habitats for which Cork Harbour SPA and Great Island Channel SAC are designated.

Consequently, a Natura Impact Statement has been prepared and is presented as a separate report as part of this planning application.

The NIS has objectively concluded, beyond reasonable scientific doubt, and with the implementation of the prescribed mitigation measures that the proposed development (construction and operational phases), will not result in any adverse effects on the Conservation Objectives of the relevant Natura 2000 sites and the integrity of these sites will not be adversely affected.

5.4.1.2 Sites of national importance

The proposed development is not within or adjacent to any nationally important site. The Great Island Channel pNHA overlaps the Great Island Channel SAC and Cork Harbour SPA, which are located downslope of the proposed development site so are deemed to be in the zone of influence. pNHAs do not have legal protection until the consultation process with landowners has been completed. However, the legal status of the Natura 2000 sites with which the Great Island Channel pNHA overlaps supersedes these. As such, the effect of the proposed developments on the pNHA has been assessed in the NIS. The NIS has concluded that the proposed developments (construction phase and operational phases), with mitigations in place, will not result in any adverse effects on the Conservation Objectives of the relevant Natura 2000 sites, and the integrity of these sites will not be adversely affected. Therefore, it is considered that the conclusions of the NIS that pertain to the Cork Harbour SPA and Great Island Channel SAC, apply by inference, to Great Island Channel pNHA.

The proposed development is considered **near certain** to result in an **imperceptible negative effect on the Natura 2000** network. The effects on the Natura 2000 network are not predicted to be significant given that the impacts on water quality are assessed as not significant.

5.4.2 Habitats loss/alteration

5.4.2.1 Construction phase

The majority of the habitats within the proposed development site are comprised of artificial habitats of negligible ecological value. The construction phase of the proposed project will include vegetation clearance, scrub removal and tree-felling. Each of these were assessed for their ecological value, including potential to support roosting bats and nesting birds. The habitats lost and / or altered within the footprint of the proposed redevelopment comprise largely grassland and transitional habitats of limited value to animal life. The loss of habitat resulting from the proposed development will have a negative impact on fauna within the local area, but the terrestrial habitats affected do not harbour, nor are they a vital food source for, any species of faunal importance. The direct habitat loss from the proposed development is considered a **permanent negative effect** on KERs, ranging from **imperceptible** where habitats will be retained (e.g. some linear tree-hedgerow features) to **significant** in the case of direct habitat loss.

There is potential for surface water run-off during the construction phase to enter the Woodstock Stream and the Anngrove Stream and subsequently the waters of Cork Harbour downstream. The construction phase could potentially impact water quality through surface run-off from existing and excavated surfaces. The most likely potential impact of the proposed development on receiving watercourses and aquatic habitats during the construction phase is the release of pollutants via the existing site drainage, runoff from the proposed development site. These indirect impacts could arise through excavations, spoil, hydrocarbon discharges or loss of concrete.

Any engineering works which cause runoff of sediments can also increase the levels of nutrients in receiving waters. This can potentially result in the enrichment or eutrophication of the affected areas downstream. Polluted water can be conveyed from the site to waterbodies through overland flow and drainage ditches. It can result in loss of aquatic life and damage to stream beds.

Air pollution can potentially result from dust and exhaust emissions from combustion engines (site dumpers, telescopic handlers, compressors, excavators, generators, rollers and plant machinery and vehicles). Stockpiles and vehicle movement off-site also have potential to produce dust. The potential for dust to be emitted

depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

Other indirect impacts include potential adverse effects on the fluvial habitats of downstream areas including siltation of salmonid and lamprey spawning gravels. Any water pollution event may potentially have indirect effects on aquatic fauna. Freshwater habitat alteration resulting from effects on water quality are considered **probable** and **short-term slight**. Estuarine habitat alteration resulting from effects on water quality are considered **probable** and **short-term imperceptible**. Construction stage potential effects on Key Ecological Receptor habitats without mitigation are provided in **Table 5.18**.

Table 5.18 Construction stage potential effects on Key Ecological Receptor habitats without mitigation

	Construction phase effect	Magnitude	Duration	Confidence Level	Reversibility	Mitigation required
Scattered Trees and Parkland (WS5)	Felling and clearance	Significant Negative	Permanent	Certain	Irreversible	No
Immature Woodland (WS1) and Scrub (WS5) and mosaics of these habitats	Felling and clearance	Significant Negative	Permanent	Certain	Irreversible	No
Eroding/Upland River (FW1)	Potential for habitat alteration effects during the construction phase due to surface water run-off containing polluting materials to enter water	Moderate Negative	Short term	Probably	Reversible	Yes
Depositing/Lowland River (FW2)	Potential for habitat alteration effects during the construction phase due to surface water run-off containing polluting materials to enter water	Moderate Negative	Short term	Probably	Reversible	Yes
Other artificial lakes and ponds (FL8)	Potential for habitat alteration effects during the construction phase due to surface water run-off containing polluting materials to enter water	Moderate Negative	Short term	Probably	Reversible	Yes
Lagoon (CW1)	Potential for habitat alteration effects during the construction phase due to surface water run-off containing polluting materials to enter water	Slight Negative	Short term	Unlikely	Reversible	Yes
Muddy sand shores (LS3)	Potential for habitat alteration effects during	Imperceptible Negative	Short term	Extremely unlikely	Reversible	Yes

	the construction phase due to surface water run-off containing polluting materials to enter water					
Lower Salt marsh (CM1)	Potential for habitat alteration effects during the construction phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Short term	Extremely unlikely	Reversible	Yes

5.4.2.2 Operational phase

No further habitat loss effects within the development area are proposed during operation of the proposed development. Operational stage potential effects on Key Ecological Receptor habitats without mitigation are provided in **Table 5.19**.

Table 5.19 Operation stage potential effects on Key Ecological Receptor habitats without mitigation

	Construction phase effect	Magnitude	Duration	Confidence Level	Reversibility	Mitigation required
Eroding/Upl and River (FW1)	Potential for habitat alteration effects during the operation phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Permanent	Probably	Reversible	Yes
Depositing/ Lowland River (FW2)	Potential for habitat alteration effects during the operation phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Permanent	Probably	Reversible	Yes
Other artificial lakes and ponds (FL8)	Potential for habitat alteration effects during the operation phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Permanent	Probably	Reversible	Yes
Lagoon (CW1)	Potential for habitat alteration effects during the operation phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Permanent	Unlikely	Reversible	Yes
Muddy sand shores (LS3)	Potential for habitat alteration effects during the operation phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Permanent	Extremely unlikely	Reversible	Yes

Lower Salt marsh (CM1)	Potential for habitat alteration effects during the operation phase due to surface water run-off containing polluting materials to enter water	Imperceptible Negative	Permanent	Extremely unlikely	Reversible	Yes
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Foul water from the proposed development will be treated in the Carrigtwohill Waste Water Treatment Plant (WWTP) which was upgraded in 2016 and has sufficient spare capacity to accept and treat additional flow from the proposed residential development. With regard to the proposed development having any potential indirect habitat alteration effects on habitats within Cork Harbour as a result of emissions to Lough Mahon (Harper's Island), all treated water discharged during the operational phase will be of a minimum standard in line with the Urban Waste Water Directive. Appropriate monitoring will continue to be undertaken and all elements associated with the development will continue to operate within the requirements of the existing IE licence.

The proposed development will include the construction of a new storm drainage system which will be tied into the existing system that feeds into Castlelake. The existing system has sufficient capacity to cater for the minor increase in catchment area due to the development.

The operational phase on aquatic habitats within freshwater ecosystems and the transitional waterbody 'Lough Mahon (Harper's Island)' within Cork Harbour relate to potential indirect habitat loss/alteration. The potential impacts on these are assessed as **permanent imperceptible negative**. The effects are not predicted to be significant given that the impacts on water quality are not assessed as significant.

5.4.3 Mammals (excluding bats)

5.4.3.1 Construction Phase

The potential impacts of the construction phase on fauna can be considered as:

- Loss of habitats / alteration of habitats;
- Disturbance and/or displacement of fauna; and
- Potential impairment of water quality due to construction works.

Badger was the only species of conservation interest recorded within the site so there is a possibility that the site is used for foraging by this species. While not recorded on site, there is potential for mammals such as Irish hare, pygmy shrew, or hedgehog to be present within the semi-natural habitats on site. These species are mobile and will largely disperse but hibernating hedgehog and the young of Irish hare, pygmy shrew or hedgehog are vulnerable during clearance of vegetation and suitable habitat within the proposed development site will be lost.

The effect on non-volant mammals is assessed as **permanent, significant negative irreversible** where buildings will occupy space at operation stage, and **short-term, moderate negative (probably) reversible** where there will be green spaces at operation stage. The effects on non-volant mammals could be significant in the absence of mitigation.

5.4.3.2 Operational Phase

No interference with habitats is required during the operational phase. As such, no impact on terrestrial non-volant mammals can be reasonably foreseen.

5.4.4 Bats

5.4.4.1 Construction Phase

As outlined in **Section 5.3.5.2**, the proposed development site is assessed as being of low suitability to bats, their level of use was considered low and there was limited connectivity to semi-natural habitat in the wider area. Due to the low level of foraging/commuting activity recorded on-site, the proposed development will not significantly affect foraging/commuting bat species. While there will be some tree-felling associated with the proposed development, these were surveyed and found to feature suboptimal roosting features for bats.

It is concluded that potential effects on bats during the construction phase will be **probably short-term significant negative** and **reversible**.

5.4.4.2 Operational Phase

Lighting has been found to impact on bat commuting (Stone *et al.*, 2009). Foraging areas that become lit at night may be abandoned, thus potentially increasing energetic costs for bats and reducing reproductive success at a population level (Schofield, 2008; Stone, 2013). Effects during the operational phase of the proposed development are **probably moderate negative** in the absence of mitigation. A **probable slight negative** effect is likely with mitigation.

5.4.5 Avifauna

5.4.5.1 Construction phase

There are no habitats within the proposed development site likely to be used by birds which are the species of conservation interest for Cork Harbour SPA. A range of passerine birds occur and utilise the habitats at the proposed development site for feeding and nesting. The noise associated with the construction phase will be greatest during site clearance. Disturbance as a result of noise during demolition will be temporary and localised to the proposed development site and immediate surrounds. The physical construction is unlikely to generate noise levels above existing background noise at the site and in the surrounding area. Noise will be largely restricted to daylight hours, with the exception of extended working hours during the concrete pour for foundations.

There will be unavoidable loss of bird foraging and nesting habitat within the proposed development. This loss is assessed as a **near certain short-term significant negative** impact on the red listed birds snipe and meadow pipit which were considered possibly and probably (respectively) nesting at the eastern extent of the proposed development site. The effects on red-listed species within the proposed development site will be near certain significant. Snipe and meadow pipit at the proposed development site may utilise similar habitat closer to the Woodstock Stream to the south of the proposed development.

Habitat loss is assessed as having a **near certain short-term significant negative** effect on other bird populations.

In the absence of mitigation, there is potential for a **short-term very significant negative** disturbance effect on avifauna at the proposed development site. It is expected that birds will disperse during construction, with some species returning to the site during the operation phase, as green areas mature.

5.4.5.2 Operation phase

Disturbance to birds during the operational phase of the proposed development could be a factor in their continued use of this site. Research has shown that human walkers (without dogs) can induce anti-predator responses in birds including vigilance and early flight, which may lead to a cascade of related responses that negatively affect birds (Blumstein & Daniel 2005).

Noise levels during the operational phase can be expected to coincide with those in the hinterland and do not represent a significant change from the existing background levels. As such, effects on birds are considered to be **probably permanent imperceptible negative**.

5.4.6 Water quality

Runoff/drainage from the site will be to the Castl lake and the Woodstock Stream which both discharge to the Anngrove Stream. The receiving waterbody for the Anngrove Stream is Cork Harbour located ca. 1.7 km downstream so this could also be affected by water quality deterioration. Possible effects include increased sedimentation of on-site watercourses and spillages of oils and other polluting materials, particularly during the construction phase. During the operational phase an increased rate of run-off due to an increase in impermeable areas may occur in the absence of mitigation. However, due to proposed construction phase measures which will be outlined in the outline Construction and Environmental Management Plan, and SuDs measures, once operational, no significant environmental effects are envisaged.

5.4.6.1 Construction phase

Water quality effects can occur as a result of silt and/or pollutants being released during construction activities. It is considered, in the absence of mitigation, the construction phase would **probably be short-term moderate negative** effect on water quality in the absence of mitigation. This significance level is based on the fact that water quality is already compromised. However, these aspects can be readily managed by the implementation of best practice construction measures. A project specific CEMP has been prepared for this development which will be adhered to throughout the construction phase. This sets out specific environmental management measures to reduce the potential for spillage and mitigate their consequences.

5.4.6.1.1 Operational Phase

Following completion of the construction phase, during operation, effluent from the site will be treated at the Carrigtwohill WWTP. As such, effects are considered to be **permanent imperceptible negative**. Runoff from the site during operation stage will be to Castl lake, the Woodstock Stream and the Anngrove Stream.

5.4.7 Decommissioning effects

It is considered the potential effects identified during the construction phases of the above proposed developments apply to the decommissioning phases also.

5.4.8 Cumulative effects

A cumulative effect arises from incremental changes caused by other past, present, or reasonably foreseeable actions together with the proposal.

A search of Cork County Council’s on-line planning enquiry system was carried to identify any plans or projects that could potentially interact with the proposed works to result in cumulative impacts. The proposed development is located within Carrigtwohill, which is subject to ongoing retail, commercial and residential development the most significant of which, in the immediate vicinity, are outlined in **Table 5.20** below.

Table 5.20 Planning applications in the vicinity of the proposed development

Ref	Applicant	Description	Status
18/5707	Dept. of Edu-cation	Station Road Schools Campus Permission granted for construction of three no. new school buildings and the construction of a main link road with roundabout from Castlake Housing Estate to Station Road and an additional link from the roundabout to Station Road. This campus comprises of two primary schools and one post-primary school.	Granted. Link Road currently under construction. Construction of schools due to start Q2/Q3 2022 with completion date of September 2023.
19/5836	IDA	Internal road upgrades, IDA Business Park.	Complete
N/A	Cork County Council	Burys bridge Cycleway. Part 8 consent for strategic cycleway scheme connecting Bury’s Bridge at Dunkettle with Carrigtwohill. The cycleway enters the west side of Carrigtwohill to the north of Cobh Cross (N25 Junction 3) and runs parallel to Carrigtwohill Main Street before turning north and running along the Castlake Access Road where it then joins the link roads associated with the new schools campus permitted under 19/5707.	Approved
N/A		Carrigtwohill–Middleton Inter-Urban Cycleway Phase 1 Part 8 strategic cycleway scheme proposal extending from Wisers Road, north of the Cork to Middleton railway line at the western end of Carrigtwohill to the east of the Carrigane Road bridge at the eastern end of Carrigtwohill. The scheme will pass through the Carrigtwohill UEA, cross Wisers Road, Station Road, Leamlara Road and Carrigane Road. It will connect to the Carrigtwohill Train Station and the new school campus on Station Road. The scheme will provide connectivity between the existing IDA Business Park to the west of Wisers Road and the industrial zoned lands to the south of the Carrigane Road.	Approved April
N/A	Cork County Council	Carrigtwohill URDF – Public Realm Infrastructure Bundle: Part 8 proposal for Main Street and Station Road Public Realm Works including footpath widening, road re-alignment, resurfacing, signalisation, traffic calming measures, street lighting, demolition of buildings at the junction of Main Street and Station Road along with other small scale demolition works, and provision of new public spaces, upgrade of Wisers Road junction, additional capacity measures at N25Junction 3 (Cobh Cross) including widening and realignment of approach roads to the roundabout. It is expected that the proposed development will be advertised before year end 2021.	Lodged and pending decision

The listed developments have been granted permission in most cases with conditions relating to sustainable development by the consenting authority in compliance with the relevant Local Authority Development Plan and in compliance with the consenting authority requirement with regard to the Habitats Directive. The developments will not have received planning permission without having met the consenting authority requirement in this regard.

Given the inclusion of strict Best Practice Construction Measures to be included and enforced through a Construction Environmental & Management Plan, the proposed SHD development will have no predicted in-combination effects on local ecology and biodiversity or on hydrologically linked European sites and or in-combination effects, between these activities and the proposal, are not reasonably foreseeable.

5.5 Mitigation

5.5.1 Mitigation by avoidance and design

Site design was also carried out with cognisance to ecological features to avoid impacts insofar as possible to higher-value habitats on site (see landscape plan). Hedgerow habitat bordering the proposed development boundary will not be interfered with.

Castlelake is an artificial waterbody which will be used to receive surface water runoff from the proposed development at operation stage. This water quality of this waterbody is impaired and as such is not a sensitive receptor.

5.5.2 Construction phase mitigation

5.5.2.1 Environmental Manager/Ecological Clerk of Works

An Environmental Manager/Ecological Clerk of Works (ECoW) will be appointed by the Developer or Contractor and will be responsible for overseeing the correct implementation of ecological mitigation measures throughout construction works, as required.

An ecologist will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present (e.g. Irish hare, pygmy shrew or hedgehog) on site will be reconfirmed prior to commencement of works so as to allow appropriate mitigation measures to be put in place.

In the event that an issue arises, the NPWS will be updated, consulted with and the relevant guidelines will be implemented as appropriate (e.g. *'NRA guidelines for the treatment of badgers prior to the construction of national road schemes'*; NRA, 2005).

Construction operations will take place during daylight hours to minimise disturbances to faunal species at night.

5.5.2.2 Environmental Management Plan (EMP)

An Environmental Management Plan has been prepared by the developer. It will be updated prior to construction and will be implemented for the duration of the works. The following sets out the features of the EMP.

5.5.2.2.1 Environmental assessment and management controls

The management controls, which have been put in place, are appropriate to the nature, duration and scale of the activity on this project and the particular sensitivity of the local environment. They will be revised in the event of any significant changes to the scope of the activity during this Project, especially when there is additional works, or a change in the method of works.

Additional management controls will be adopted when there are changes to client requirements, stakeholder interests to a particular local environmental sensitivity. The significant risks which are highlighted in the risk assessment and the management controls are communicated to the workforce by site inductions and toolbox talks.

5.5.2.2.2 Method statements

The significant environmental aspects and the actions to apply the required controls are described in the method statement.

Method statements are produced in accordance with the contract requirements by the Site Management Team and reviewed by the Project Managers/Site Agents prior to submission for approval. When developing method statements, the EMP, Site Maps and any other relevant environmental management documents will be reviewed to assess the potential impacts of the particular activity.

All method statements will include a section entitled *Environmental and Waste Management*. For activities that have significant potential to cause adverse environmental impacts reference will be made in this section of the method statement to the control measures in Section 8 of the EMP. Additional control measures may be included where those in Section 8 prove inadequate to suit the local conditions at the site of the activity, and/or where specific measures are required by any of the authorities. The method statement must include:

- The proposed method of construction and how impacts will be mitigated
- Waste (storage, removal, end disposal sites where known)
- Hazardous substances (storage, removal and end disposal sites where known)
- Works close to waterways (sediment controls if needed)
- Dust
- Noise and vibrations
- Refuelling
- Fuel storage
- Drip trays/spill kits and other precautionary measures.

Prior to the commencement of the works, all Method statements will be reviewed by the ECoW. Following the review, improvements will be made to the method statements as required.

The following sections describe mitigations that will be in place to prevent significant impacts to nearby designated sites and local wildlife.

5.5.2.3 Habitats

5.5.2.3.1 Trees and scrub

The proposed development site boundaries will be marked. The vegetation (trees and shrubs) to be retained as part of the landscaping plan will be marked out by secure posts and robust high visibility tape, with reference to design drawings, under supervision of the project engineer/manager and the site ecologist and these areas will be avoided insofar as possible. Machinery will not be permitted breach these boundaries during the work.

Landscaping planting will incorporate native species in any hedgerow planting or shrub stands, and native trees in woodland settings, to provide links and connectivity with existing landscape features in the surrounding environment.

Given that the construction phase of the proposed project will adversely impact the habitat available for birds, and other fauna, mitigation will include transplanting scrub vegetation removed during construction stage, in line with the landscaping plan. Existing young trees occurring within the site include quality immature oak and willow. These trees are a valuable natural asset of local provenance and will be used as part of the planting regime. They will be transplanted into their final position or retained until required and then planted.

Soil that has not been subject to compaction or desiccation at the proposed development site harbours a valuable seed bank with regard to local flora. Topsoil will be retained and reused on site through landscaping. The use of any wildflower areas in the landscaping plan will utilise such soil.



Plate 5.27 Examples of oak trees within the site suitable for transplanting.

5.5.2.3.2 Water features

With regard to other surface water features at the site, namely existing drainage ditches, physical variation/heterogeneity will be a key influence in biodiversity richness as water features develop at operation stage. Therefore, sinuosity in waterbody outline/plan is preferable to linearity, so borders/banks will be of varied shape/angle. The planting regime should aim to create a dappled shading effect i.e. partial shade where the sunlight filters through the branches and foliage. This will involve the strategic use of waterside plants and native deciduous trees. Suitable examples of riparian and instream emergent plants used will be common rush (*Juncus effusus*), yellow iris (*Iris pseudacorus*), fool's water cress, floating sweet-grass, hemlock water dropwort (*Oenanthe crocata*), water mint (*Mentha aquatica*), lesser water parsnip (*Berula erecta*), meadowsweet, water horsetail (*Equisetum fluviatile*), brooklime (*Veronica beccabunga*), marsh pennywort angelica (*Angelica sylvestris*), marsh marigold (*Caltha palustris*), water crowfoot and lesser spearwort (*Ranunculus flammula*). Some of these plants, especially the broadleaved herbs already occur at the site and should be used in water

feature landscaping. For example, where a section of a drainage ditch is to be culverted, the vegetation will be transplanted to a reach of a channel that will no longer be modified.



Plate 5.28 Aquatic plants in parts of drainage ditches to be culverted will be transplanted to other suitable permanent water features.



Plate 5.29 Reach of the Woodstock Stream where instream and riparian enhancement is proposed (WS R2).

5.5.2.4 Disturbance to fauna (general measures)

No night-time construction works will take place. All works will be scheduled to be completed within the 07:00–19:00 period Monday to Friday and 8.00 – 13.00 on Saturdays. Scrub clearance and tree felling will take place outside of the bird nesting season, which is from 1st March - 30th August inclusive. Where 36 months or more has elapsed between obtaining statutory approval for the proposed development and initiation of the construction phase, an appropriate level of mammal resurvey will be required because the baseline data may be altered during this time. This will allow adjustments to be made to the mitigation strategy specified in the CEMP.

Noise reduction measures will include:

- Locate plant known to emit noise strongly in one direction so that noise is directed away from sensitive receivers;
- Ensure that plant and equipment are maintained and lubricated as per the manufacturer’s instructions to avoid malfunction and possible subsequent leaks and excessive emissions;

- Efficient silencing devices to be used on all tools, plant and motors and should be in accordance with BS5228 “Noise Control on Construction and Demolition Sites”;
- Ensure that no engines or items of machinery are left running for long periods when not required to be used;
- Ensure that all entrances to sites are at points where the noise from vehicles entering and leaving the site will cause the least nuisance or disturbance;
- Start-up plant and vehicles sequentially rather than all together;
- Plan the working hours and duration of work with consideration for the effects of noise/vibration on any noise sensitive receiver;
- Ensure the use of the least noisiest plant suitable for the activity; and
- Avoid simultaneous use of noisy equipment where reasonably practicable.

5.5.2.5 Bats

The mitigation measures for bats will follow:

- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (NRA, 2005a);
- *Guidelines for the treatment of bats during the construction of National Road Schemes* (NRA, 2005b); and
- *NPWS Irish Wildlife Manuals, No. 28: Bat Mitigation Guidelines for Ireland – V2* (Marnell *et al.*, 2022).

If felling of trees with bat roosting potential (i.e. mature trees with voids, cracks, loose bark and/or ivy cover) is required, a bat survey will be required by a suitably qualified bat ecologist prior to felling; as such works have the potential to cause disturbance and/or damage to roosting bats. Should any tree roosts be identified, a derogation licence from the NPWS will be required to fell or undertake works in close proximity these trees.

If felling of such mature trees is required, the following NRA (2005a) guidance will be followed:

- Immediately prior to felling, trees should be inspected for the presence of bats and/or other bat activity by a suitably qualified bat ecologist during daylight hours and night-time using a bat detector. This survey should be carried out from dusk through the night until dawn to ensure bats do not re-enter the tree;
- Where examination of the tree has shown that bats have not emerged or returned to tree, felling may proceed the following day. Should a delay in felling be encountered, resurveying is required;
- In areas where bat activity has been recorded, tree-felling must not be conducted in June to early August; and
- As noted in **Section 5.3.5.2.1**, there are no trees that would be considered as obviously of value as roost habitat. As such, any vegetation and tree removal should be carried out during winter (December to February) to avoid impacts on bats, corresponding to a time when even best bat roost habitat recorded on site would be highly unlikely to be used as winter roosts. Winter hibernation roosts are generally restricted to places that are sheltered from extremes of temperature (Marnell *et al.*, 2022) and trees present on site are deemed unlikely to be mature enough to provide appropriate winter roosting habitat on the basis of the habitat suitability survey carried out on-site.

- It is recommended that any trees on site with ivy should be dropped to the ground as gently as possible and left on the ground for a period of 24hrs post felling under the supervision of the ECoW. This soft felling approach will give any bats, if present, the opportunity to vacate.

5.5.2.6 Birds

Trees, scrub and hedgerows in the site and adjacent have been shown to be suitable habitat for a number of species potentially breeding on-site, including for certain species of conservation concern. For this reason, avoidance of works likely to impact birds must be implemented in terms of phasing works to avoid unnecessary disturbance to any breeding birds that may be using the site during construction. This is particularly important for phasing of works noted as being used by meadow pipit and snipe, both of which were noted in the northeast of the proposed development site.

Pre-construction site clearance and removal of vegetation should be minimised and, where required, only be timed to occur outside the bird breeding season (1st of March to 31st of August inclusive) to avoid undue deleterious impacts on breeding birds.

Should construction works other than vegetation clearance be required during the breeding season it is recommended that the ECoW be consulted to monitor such works and minimise resulting disturbance or displacement of sensitive species.

Regarding the nearby Castl lake, the main issue to mitigate against will be disturbance to species there during the construction and operational phases of the proposed project. Given the location of Castl lake within a public amenity area that birds using it will already be used to a significant degree of human disturbance.

5.5.2.7 Dust management

Dust and fine particulate emissions arising during the construction phase will be reduced and controlled via the following measures:

- Offsite roads and footpaths will be regularly monitored and maintained and cleaned if required;
- Water tanks will be used to keep down dust on site;
- A wheel wash will be used at the site entrance to clean vehicles as they leave the site;
- The internal access roads shall be sprayed during dry windy weather conditions to control fugitive dust emissions from the road surface.
- Regular maintenance of the road surface near the site entrance will be undertaken to prevent fugitive dust and PM emissions generated by passing vehicles. A mechanical vacuum road sweeper shall be used if necessary.
- Loose, fine aggregates and other similar sized building materials that can be easily re-suspended by the wind will be stored in temporary covered stockpiles in designated areas of the site.
- Maximum vehicle speeds shall be controlled to 15 km/h within the construction site areas to prevent high levels of dust being re-suspended from the internal road surfaces;
- Dampening of exposed earthwork activities and site haul roads during dry weather;
- Protective hoarding screens shall be erected around construction activities to reduce dust-blow from the site;

- Ensure there is access to a water source in close proximity to each area on site where dust is deemed most likely to occur;
- Periodic maintenance of the public road surface near the entrance will be undertaken. This will include the removal of any spillages so as to prevent the dispersion of dust along the road, which is likely to be re-suspended by passing vehicles. A mechanical vacuum road sweeper will be used if necessary;
- Any spillage of material from vehicles departing the site will be removed to prevent re-suspension of silt from the road surface by passing vehicles;
- Dust control measures will be active on equipment used for drilling or pavement cutting, grinding of block surfaces and similar types of stone finishing is taking place as significant fine particulate emissions can be generated which may cause a local nuisance;
- Stockpiles will be located away from drainage systems and soil retaining measures (silt fence/ silt curtain or other suitable materials) to reduce risk of silt run-off;
- Vehicles and plant machinery operating on-site will be properly maintained to prevent excessive emissions of particulates and other pollutants from the exhaust pipes;

5.5.2.8 Other air quality control measures

- Exhaust emissions where practical will be minimised by ensuring that all plant, equipment and vehicles are in good working order and regularly serviced to ensure efficient running, by using the smallest engine-sized plant and equipment suitable for the task and by ensuring that engines are not left idling unnecessarily.
- Burning of materials on site will not be permitted.

5.5.2.9 Management of Invasive species

The following measures will be taken to avoid the spread of invasive plants both within and outside of the site:

- The infested areas will be demarcated prior to construction commencing (i.e. exclusion zone)
- Toolbox talks will be carried out to communicate measures to all personnel involved; and
- The ISMP prepared to manage, treat and prevent the spread of invasive species (see **Appendix 5.4**) will be implemented in full.

Measures avoid the spread of invasive alien species will follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010). The following measures address potential effects associated with the construction phase of the project:

- Prior to being brought onto the site, all plant and equipment will need to be clean and free of soil/mud/debris or any attached plant or animal material;
- Prior to entering the site, all plant/equipment will be visually inspected to ensure all adherent material and debris has been removed;
- Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Himalayan balsam, Japanese knotweed etc.) by thoroughly washing vehicles prior to leaving any site;

- All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species;
- All washing must be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement;
- Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present; and
- All planting and landscaping associated with the proposed development shall avoid the use on invasive shrubs.

All footwear/waders and all equipment that will be placed within the water should be treated to prevent foreign flora/fauna entering the water and after use to prevent the spread to other catchments.

Non-native species control will be practised according to the following IFI documents:

- 'IFI Biosecurity Protocol for Field Survey Work' (IFI, 2010);
- 'Disinfection of scuba diving equipment' (IFI, 2011)²⁰; and
- 'Invasive species biosecurity guidelines for boaters' (IFI, 2013)²¹.

An invasive species survey shall be undertaken prior to commencement of construction. Should newly established invasive species be identified within the site, an updated ISMP will be prepared.

5.5.2.10 Management of Water Quality

An Environmental Management Plan has been developed for the project to ensure that the construction works will not negatively impact the water quality and will safeguard existing water. The key to avoid impacts to water during the construction works is good site management practices, tight controls, regular inspections and ongoing vigilance with staff and employees on site.

Construction best practice measures (of relevance in respect of any potential ecological impacts) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:

- Murphy, D. (2004) *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites*. Eastern Regional Fisheries Board, Dublin.
- IFI (2016) *Guidelines on protection of fisheries during construction Works in and adjacent to waters* (IFI, 2016)
- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532)*. CIRIA.
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects. Technical guidance (C648)*. CIRIA.
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects. Site guide (C649)*. CIRIA.

²⁰<https://www.fisheriesireland.ie/biosecurity-guidelines-for-scuba-diving.html>

²¹<https://www.fisheriesireland.ie/extranet/invasive-species-1/360-invasive-species-biosecurity-guidelines-for-boaters-leaflet-1.html>

In addition, the following construction surface water management measures will be implemented and monitored for the duration of the works. The potential for the construction works to have an impact on the quality of the local watercourses will be minimised through the implementation of the following control measures as outlined in the EMP:

- Contact will be maintained with the relevant authority such as the Inland Fisheries Ireland when required.
- Special attention will be paid to minimising the opportunities for wash-off of inert solids (usually from exposed soil mounds, embankments or excavated trenches etc.) from entering watercourses. Silt traps will be used where necessary around the open streams and watercourses.
- A seditat will be utilised for the protection of streams from sedimentation damage during in stream construction activities for the installation of culverts,
- Care will be taken to avoid interference with the supply or quality of any groundwater resource.
- Waste products associated with the works will not be permitted to enter watercourses adjacent to the works through the use of French drains, petrol interceptors or other agreed methods.
- Water that is high in solids or contaminated with cement or oil, will not be pumped from excavations directly to watercourses without pre-treatment (e.g. sedimentation/ filtration and oil separation).
- All site run-off associated with the construction will be directed to storm control areas or tanks to prevent direct discharge into drains and watercourses.
- All operational machinery used in-stream will be kept to an absolute minimum.
- Spill kits will be provided at all river locations identified.
- Fuels, oils, greases and hydraulic fluids will be stored in bunded compounds well away from watercourses. Refueling of machinery, etc. must be carried out in bunded areas. Fuels will be stored during the construction phase in bunded fuel storage tanks with a 110% holding capacity. Where it is necessary to dispense fuels on site, this will be undertaken in areas covered with an impermeable surface to protect surface water and ground water;
- Construction works, especially ones involving the pouring of concrete, will be conducted in the dry. Precast concrete will be used in preference to uncured concrete, which kills aquatic fauna through alteration of stream pH. When cast-in-place concrete is required, all work will be done in the dry and allowed cure for 48 hours before re-flooding.
- To help prevent the contamination of the ground and groundwater, contaminated materials (oils, fuels, chemicals etc.) will be used and stored in an appropriate manner as outlined in the relevant guidance, i.e. CIRIA (2001) and DMRB Volume 11 (1994).

Should any monitoring or inspection indicate that pollution of the Castl lake Roads Infrastructure or adjacent watercourses has occurred then the Site Management Team will immediately inspect all work activities to ascertain whether they are operating effectively. All works may be stopped and/or additional control measures installed to prevent further pollution or discharge to the watercourse. Appropriate action will be taken in consultation with the Site Agent. Water samples will be taken at the watercourse if required.

5.5.2.10.1 Silt Fencing

As an additional measure where the construction works are adjacent to water courses, silt fencing will be installed. The purpose of the silt fence is to retain any soil and silt disturbed during construction and prevent it from entering watercourses.

5.5.2.10.2 Inspection and Maintenance

The construction drainage system for the proposed development must be managed and monitored at all times and particularly after heavy rainfall events during the construction phase. The construction drainage system will be regularly inspected and maintained to ensure that any failures are quickly identified and repaired so as to limit/prevent water pollution.

5.5.2.10.3 Management of Concrete

To reduce the potential for cementitious material entering surface waters, concrete pours will be supervised by the Construction Manager, a suitably qualified Engineer and the Environmental Manager.

Management Measures will include the following:

- The Construction Manager will ensure that the area of the pour is completely drained of water before a pour commences.
- Pours will not take place during forecasted heavy rainfall;
- Incidental rainfall from light showers during the period of a pour is typically absorbed into the concrete matrix but heavier showers can result in some run off from the top surface of the concrete pour. If run-off is encountered the Environmental Manager will block the outflow from the drains to retain or treat the run-off until the pH is neutral before discharge to the drainage network;
- In the event of a spillage on site, the Environmental Manager will temporarily block the dirty water drains in the immediate area and monitor the pH levels of the water in the open drainage channel and if necessary, will adjust the pH levels using CO₂ entrainment. Any spillage will be cleared immediately and deposited in the Chute wash down area;
- To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site at the source quarry. Only Concrete truck chutes will be allowed to be cleaned on site at a central concrete wash out area.

5.5.2.11 Fuel and Oils Management

Fuel Management Measures that will be employed during the Construction phase include:

- The potential for hydrocarbons getting into watercourses will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed re-fuelling procedure;
- Refuelling will be carried out using 110% capacity double bunded mobile bowser. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using;
- To reduce the potential for oil leaks, only mechanically sound vehicles and machinery will be allowed onto the site. An up to date service record will be required from the main contractor;

- Mobile bowzers, tanks and drums should be stored in secure, impermeable storage area, away from drains and open water.
- Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements.
- Potential leaks from delivery vehicles will be reduced by visually inspecting all delivery vehicles for major leaks. Contractors supplying concrete and crushed stone to the site will be contractually required to supply their products using roadworthy vehicles;
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits. This contaminated material will be properly disposed of in a licensed waste facility;
- The Environmental Manager will be immediately informed of the oil leak/spill, and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil, and initiate the clean-up if necessary;
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery;
- Corrective action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction;
- In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider.

5.5.3 Recycling/waste management

All waste will be managed in accordance with the relevant statutory provisions and the waste hierarchy. The waste management strategy for the Project will follow the waste hierarchy: Prevention > Preparing for reuse > Recycling > Energy recovery > Disposal.

Waste management goals will include:

- Whenever possible materials for construction activities will be ordered as to prevent the minimum storage time and kept in the storage area before release to site for use;
- Materials will be ordered, where possible, in sizes to prevent wastage e.g. in form of offcuts and waste to be able to be returned to the original supplier (e.g. plastic pipe);
- Materials delivered to the project will be received and controlled by the Stores Manager (or similar). Materials will be stored to minimise the potential of damage or wastage. Measures will include off-ground storage (e.g. on pallets), remaining in original packaging, protection from rain damage or collision by plant or vehicles;
- The materials storage area will be secured during out of hours to prevent unauthorised access;
- A waste management compound will be set up to handle incoming waste from construction activities. This will be designed to facilitate the segregation of key waste streams to maximise the opportunity to re-use, recycle and return wastes generated on site;

- The segregated waste will be placed in skip containers. Waste will be placed in the skips in such a way to minimise 'empty' void space;
- Skips will be labelled to clearly highlight waste stream for each skip. As a minimum skips and containers will be provided for segregating of the key waste streams (mixed metal, timber, general/mixed C&D, packaging (plastic & cardboard), hazardous)
- Hazardous waste will be kept in a secure area away from other wastes to ensure no contamination takes place; and
- Separate areas within the waste compound will also be allocated for the storage of plastic piping awaiting return to supplier, waste tyres and WEEE (where applicable).

5.5.4 Operational phase mitigation

Any maintenance of the drainage system, such as petrol/oil interceptors will be in accordance with the design specifications.

There may be a requirement to continue work on the ISMP at operation stage.

No other impediments to the effective implementation of these measures have been identified. No negative impacts are envisaged during the operational phase. As such, no further mitigation measures are required for the operational phase. Based on the assessment above, the prescribed measures below are for the construction phase of the proposed development.

5.5.4.1 Bats

5.5.4.1.1 Lighting

In general, artificial light creates a barrier to commuting bats so lighting should be minimised during the active bat season from March to the end of September as it deters some bat species (Marnell *et al.*, 2022). Where lighting is required, directional lighting (i.e. lighting which only shines on access roads and not nearby habitats) should be used to prevent overspill. This can be achieved by the design of the luminaire, the height of the lamp and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only. Modern LED lighting has also been shown to deter bats but it is available in a range of colours other than white which may be used to avoid or lessen impacts. Warmer colour wavelengths between 2700 and 3000 Kelvin seem to have less impact on bats.

5.5.4.1.2 Bat boxes

As foraging habitat and potential tree roost sites will be removed to facilitate the project, it is proposed that bat boxes will be erected at suitable locations in the study area (e.g., in standing trees). A minimum of twenty bat boxes will be installed, more may be required if trees felled during construction stage support some potential roost features, in which case three boxes will be installed per felled tree, on remaining trees.

Woodcrete (cement and sawdust) bat boxes, such as those manufactured by Schwegler (available from NHBS at www.nhbs.com) are proposed. These have the advantage of being far more durable and thus needing less maintenance. Bat boxes will be installed and maintained (if required) by an Ecologist according to manufacturer's instructions. Any boxes installed should be robust and cater for a range of species. Guidance for installation of bat boxes will follow:

- Bat Conservation Ireland (BCI) Guidance Notes for Agri-environmental Schemes (2015); and

- Bat Mitigation Guidelines for Ireland (Marnell *et al.*, 2022).

5.5.4.2 Birds

As the proposed development will result in habitat loss to breeding birds on this site it is proposed that thirty bird nest boxes will be provided on retained trees in order to help offset habitat loss. Nest boxes will incorporate a range of dimensions that have been specifically chosen and sited, based on their suitability for the BoCCI listed species recorded on site. It is recommended that a minimum of twenty-five nest boxes be installed throughout the site.

In addition, provision will be made for for nesting swifts. Specially designed concrete composite swift nest boxes will be installed in new buildings to accommodate twenty breeding pairs (single or multiple cavity nest boxes are available). The nest boxes will be installed using Birdwatch Ireland guidance²² as follows:

- Swifts are colonial birds which prefer the company of other Swifts. With this in mind, always try to install a nest box with multiple nest cavities or attach several single-cavity nest boxes to a building
- Place the nest box or brick on a side of the building that gets some shade during the day;
- If possible, install it under an overhang or under the eaves, to give it protection from the weather and the heat of the sun;
- It should be sited at least five metres above ground, with clear, adjacent air space so the swifts can access it in high-speed direct flight;
- Make sure that predators such as cats, crows, squirrels and rats do not have easy access to the nest, for example by being able to climb up creepers or flying in from nearby trees. Where possible place boxes up close under fascia/soffit or gutter to stop predators perching on top;
- Avoid positioning nest boxes above obstacles where possible, swifts drop from entrance holes before taking flight meaning they could accidentally collide with structures below the nest. Outdoor lights, flag poles and pipes are some examples; and
- Always avoid placing boxes near to spotlights as birds can become dazzled by bright light whilst trying to enter nest sites in the late evening.
- Use strong, corrosion-resistant fixings suitable for the wall surface.

5.5.5 Mitigation during decommissioning

The same mitigation measures will apply for the decommissioning phase as for the construction phase.

5.6 Biodiversity enhancement measures

5.6.1 Woodstock Stream

Some reaches of the Woodstock Stream within the study area have been modified in the past and/or degraded due to adjacent land practices and/or re-sectioning (straightened and realigned). The physical character of the Woodstock Stream will be diversified by using guidance in '*Channels and Challenges - the Enhancement of Salmonid Rivers* (O'Grady, 2006) as well as O'Grady *et al.*, (2017). This will increase the quality and quantity of

²² https://birdwatchireland.ie/app/uploads/2019/10/Saving-Swifts-Guide_pdf.pdf

salmonid spawning, nursery and holding habitat. This will offset past degradation and compensate for any impacts that may occur during construction stage on these reaches of the Woodstock Stream. The reaches where enhancement is proposed correspond to the drainage ditch reach are as follows:

- a 180 m stretch flowing east to west bordered by concrete walls to the north of the existing road (code WS R1, see **Plates 5.3** and **5.14**). The bed of this reach is of construction rubble;
- a 300 m stretch flowing north to south, to the south of the existing road (code WS R2, see **Plate 5.26**). This reach has been over-widened and the resulting slow flow has allowed accumulation of excessive silt. In the do-nothing scenario, this reach may be maintained by deepening/widening.

The following is proposed regarding enhancement of the Woodstock Stream:

- Instream enhancement at WS R1, instream and riparian enhancement at WS R2:
- Removal of most of the concrete rubble from WS R1. Some of this rubble can be used in conjunction with imported pitted washed gravel to create instream riffle-glide-pool features on both WS R1 and WS R2;
- Creation of riffle²³, glide²⁴ and pool²⁵ sequences along both reaches by installation of rock pools. This will involve installing a series of stone weirs (notched and vortex) at gradient breaks and higher gradient stretches along the channel. Weir construction would be at least seven channel widths in distance apart;
- Introduction of instream random boulders;
- The works will commence at the top of the reach and progress downstream;
- The works would be undertaken outside the salmonid spawning season, so would have to be carried out between June (or July) – September inclusive; and
- Riparian enhancement will involve the sporadic planting of native trees and shrubs along both side of WS R2. Such planting will also be carried out along the north side of WS R1.

These works would be overseen by the EcoW who will be familiar with rivers work and have a good knowledge of salmonid habitat requirements. To this end, the ECoW will have a general knowledge of content outlined in publications such as *'Ecology of the Atlantic Salmon'* (Hendry and Cragg-Hine, 2003) and *'Trout and Salmon - Ecology, Conservation and Rehabilitation'* (Crisp, 2000). Duties will include the delivery of toolbox talks and monitoring of construction phase to ensure all environmental controls with reference to IFI (2016) are implemented in full. The ECoW would consult/liaise with the IFI during the works. These enhancement measures will need to be incorporated into the CEMP.

Under the Fisheries (Consolidation) Act, 1959, and as revised (2010), it is an offence to disturb the bed of a river; therefore it will be necessary to get written permission from Inland Fisheries Ireland to proceed with the works in any areas where disturbance to the spawning and nursery areas of salmonids will occur as a result of the proposed development.

²³ described in EA (2003) as shallow, fast-flowing, water with a distinctly disturbed surface over unconsolidated gravel-pebble, or cobble, substrate

²⁴ Laminar flow where water movement did not produce a disturbed surface

²⁵ Little/no observable flow

5.6.2 Dead wood piles

Felled trees and shrubs at the proposed development site will be used to create log piles at various locations. Deadwood provides important habitat within woodland ecosystems, supporting a diversity of organisms. It provides habitat for many species of bryophytes, lichens, fungi, invertebrates, fish, amphibians, reptiles, birds and mammals. It also provides nursery sites for germination of plants, protection from grazing, shelter and mobility for herptiles, birds and mammals, a store of carbon and a nutrient resource that can be cycled through the ecosystem²⁶. These features will be located next to hedgerows and treelines and be incorporated into the landscape through the CEMP.

5.6.3 Third party responsibility

The reach of the Woodstock Stream upstream of the Anngrove Stream confluence was found to have a significant amount of litter within the watercourse and along its banks (see **Section 5.3.5.5.1**). Whether washed from upstream or otherwise, the presence of this material in the Woodstock Stream contravenes the Fisheries Act (See **Section 5.1.1**), so should be removed from the watercourse and associated corridor by the relevant authority.



Plate 5.30 Examples of foreign material in reach of the Woodstock Stream upstream of the Anngrove Stream confluence.

5.7 Residual effects

There will be loss of habitats at the proposed development site where buildings and hard surface exist at operation stage. This unavoidable loss is independently assessed as a **permanent significant negative** effect. Elsewhere, habitats will be preserved and/or altered, with plans to increase their biodiversity value, leading to an effect independently assessed as **probably moderate positive effect**. The overall effect on habitats is assessed as **probably moderate negative** taking account of the greater proportion of habitat converted to building and artificial surfaces.

There will be an increased human presence in the locality with an expected associated increased in noise and disturbance during construction and operation stages. The effect on red-listed birds will be probably significant negative. For other fauna, it is considered that the residual effects will be **probably imperceptible negative**

²⁶ <https://cieem.net/wp-content/uploads/2019/01/INPRACTICE73web.pdf>

provided the appropriate mitigation measures and best practice methodologies recommended and provided in the CEMP are implemented, and possibly trend towards **probably neutral**, depending on the biodiversity value of green areas and efficacy of installed features such as log piles, nest and bat boxes. The effect on aquatic features will be **near certain moderate positive** taking account of the current degraded state of drainage ditches and proposed improvements to these habitats.

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6. Land and Soils

6.1 Introduction

This chapter considers the potential effects on the existing land and soils environment arising from the Proposed Development. A full description of the Proposed Development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on the existing land and soils environment arising from the overall project has been assessed. The assessment comprises:

- A review of the existing receiving environment.
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

6.1.1 Competency of Assessor

The Assessor, Jasmin Spoerri (BSc, MSc), is an Engineering Geologist with MWP. She holds a BSc in International Field Geoscience (2019) and an MSc in Applied Environmental Geoscience (2020) from University College Cork. Jasmin has been involved in geological investigation/interpretation, geotechnical investigation/interpretation, hydrogeological assessment and investigation, and environmental assessment. She has worked on Environmental Impact Assessment Reports (EIARs) for several projects such as wind farms, substations, grid connections and pharmaceutical developments including LEO Pharma, Little Island, Co. Cork.

6.1.2 Legislation

This document is written under the following European and Irish legislation and guidelines:

- The Environmental Impact Assessment (EIA) Directive (Council Directive 85/337/EEC of 27th June 1985 as amended by Directive 97/11/EC of 3rd March 1997, Directive 2003/35/EC of 26th May 2003 and Directive 2009/31/EC of 23rd April 2009).
- European Communities (Environmental Impact Assessment) [S.I. 349 of 1989 as amended by S.I. 84 of 1994 as amended by S.I. 93 of 1999].
- Planning and Development Act, 2000. Planning and Development (Amendment) Act 2010.
- Planning and Development Regulations, 2001 - 2022.

6.2 Methodology

The assessment methodology included a desk-based studies, a site visit, and a qualitative assessment of the potential impacts. The assessment criteria for geology, land and soils are based on the guidelines from the following reports:

- Glossary of Impacts included in *Guidelines on Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

- *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements* (Institute of Geologists of Ireland, 2013).
- *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (National Roads Authority (NRA), 2009).
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Dept. of Housing, Local Government and Heritage, August 2018)

6.2.1 Desktop Study

The methodology used for this study included desk-based research of published information and site visits to assemble information on the local receiving environment. The desk study included the following activities:

- Review of Ordnance Survey Mapping and aerial photography to establish existing land use and settlement patterns within the study area.
- Examination of the Geological Survey of Ireland (GSI) datasets pertaining to geological (bedrock, heritage, subsoil, ETC.) and extractive industry data.
- Examination of EPA / Geohive / Teagasc online soil and subsoil maps.
- Review of local and regional development plans and planning policy in order to identify future development and identify any planning allocations within the study area.
- Review of Cork County Council's Planning Register to identify relevant development proposals currently under consideration by the Council.

Following the desk top study and field surveys, a set of geological and soils maps were generated in GIS and are included as figures in this chapter.

6.2.2 Scope of Assessment

Land and soil are considered both in geological terms and in current, historical, and planned land use. The subject matter of hydrogeology is addressed in Chapter 7 Water of this EIAR.

Accordingly, the scope of this assessment is made with respect to these topic areas and considers the effects of the construction and operation of the proposed development in terms of how the proposal could affect the local land and soils environment.

6.2.2.1 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022) as set out in Table 1-3 in Chapter 1 Introduction.

6.3 Baseline Environment

6.3.1 Site Location and Description

The site location is outlined in **Figure 6-1**. The project description is outlined in Chapter 2 Project Description. The existing environment as it pertains to Land and Soils is outlined below.



Figure 6-1 Site Location

6.3.2 Existing Land Use

The land use at the site has been mapped as shown in **Figure 6-2**. The land cover mapping was created using information from CORINE Land Cover 2018 available on the EPA online mapping system.

The following land uses have been identified within and around the site:

- 112 – Discontinuous urban fabric
- 121 – Industrial or commercial units
- 122 – Road and rail networks
- 211 – Non – irrigated land
- 231 – Pastures

The proposed development is situated on land which is mapped as *Discontinuous urban fabric* within the western portion, and a small section on the eastern boundary, of the site, and *Pastures* within the centre and eastern portions of the site.

The proposed development site is currently surrounded by housing developments to the west and east, pastures to the north and non-irrigated land to the south. The north boundary of the proposed site aligns with a rail line on the Irish Rail network.

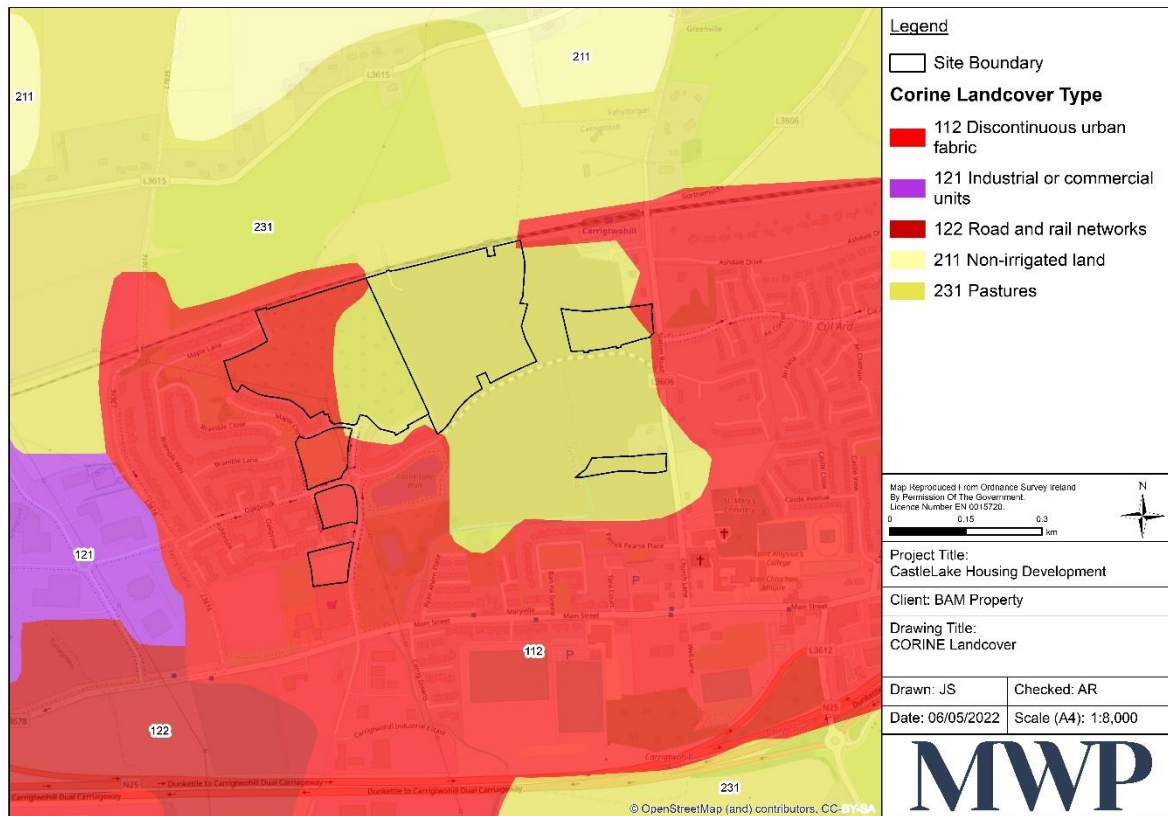


Figure 6-2 CORINE Land Use map

6.3.3 Topography

The site is situated in a low-lying area and is generally very flat with a slight gradient downwards towards the south-southwest. This is evident in the 10m contours shown on the OSI/Geohive Mapping (**Figure 6-3**) where contours are no more than 10 metres Above Ordnance Datum (mAOD). The area is situated within the Belvelly channel / Ballynacorra river estuary which flows to the south and south-west into Lough Mahon. To the north the proposed development is flanked by steep hills with a maximum height of 120m AOD. There is a low-lying hill to the southeast of the site, across the N25, with a height of 30mAOD.

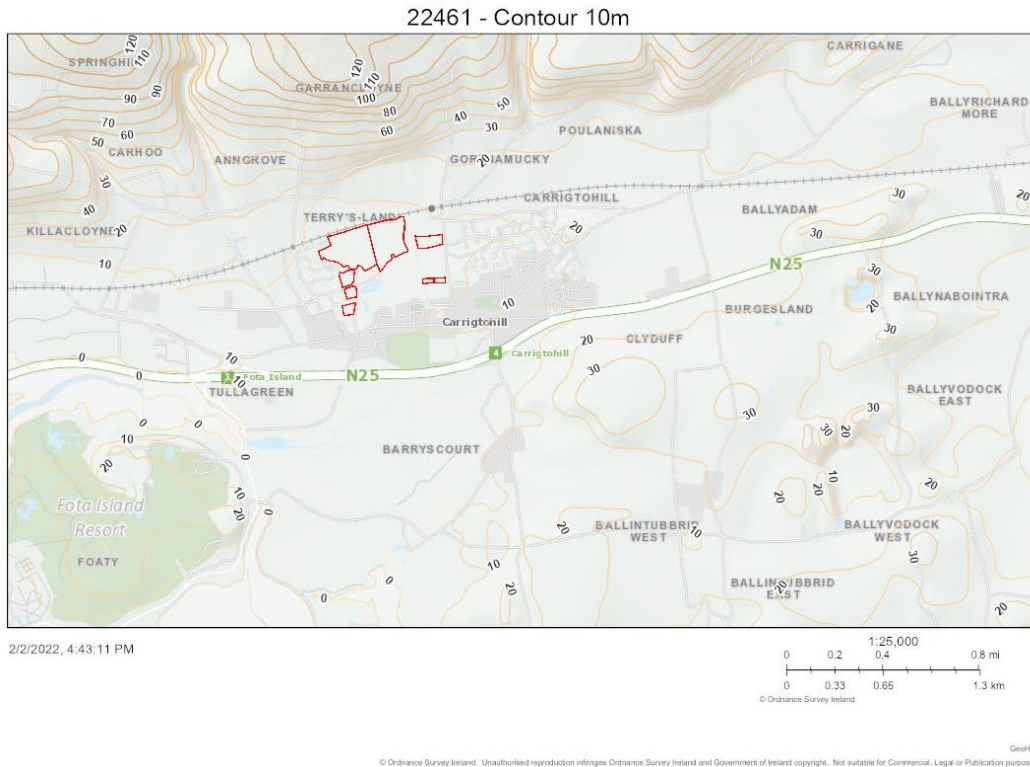


Figure 6-3 Topographical Map of Little Island (source: Geohive digital maps)

6.3.4 Regional Geology

The rocks in the south Cork region (**Figure 6-4**) are mostly sedimentary in nature, dominated by sandstone and limestone. There is an igneous intrusion west of Cork city, close to the town of Bandon. The Cork City area is underlain by a combination of the Devonian Old Red Sandstones and the Dinantian (Carboniferous) Pure Unbedded Limestone and Dinantian Mudstones and Sandstones Group (GSI). In the greater area, the oldest rocks are the Devonian Old Red Sandstones (DORS). These sediments were deposited from rivers into the Munster Basin, an ancient large trough, forming the sandstones, siltstones and mudstones of the facies. The uppermost Devonian Old Head Sandstone Formation (the Cork Group) succeeded the DORS and is in turn succeeded by the Carboniferous sediments, such as the limestones and lower limestone shales. All sedimentary rocks in the region were deposited during the late Devonian and Carboniferous geological periods, approximately 370 to 310 million years ago.

Cork Harbour is geologically influenced from the Veriscan Orogeny and extensively folded resulting in many anticlines and synclines, producing its hill-and-trough topography. The axis for the folding runs approximately east to west (Sleeman, and Pracht, 1994). The site area is located just north of the “Cork Syncline” flanked by two sandstone anticlines either side of it.

In the Quaternary period, or 1.6mya to the present day, Ireland was heavily influenced by glaciation. The subsequent deglaciation triggered ice melt and meltwater flow leading to the movement of sediments. These sand and gravel sediments filled many of the valleys, some as much as 100m thick. Much of this sediment, known as glacial till, makes up the majority of soil and subsoil in Cork and the main deposited material in Cork’s surrounding waters.

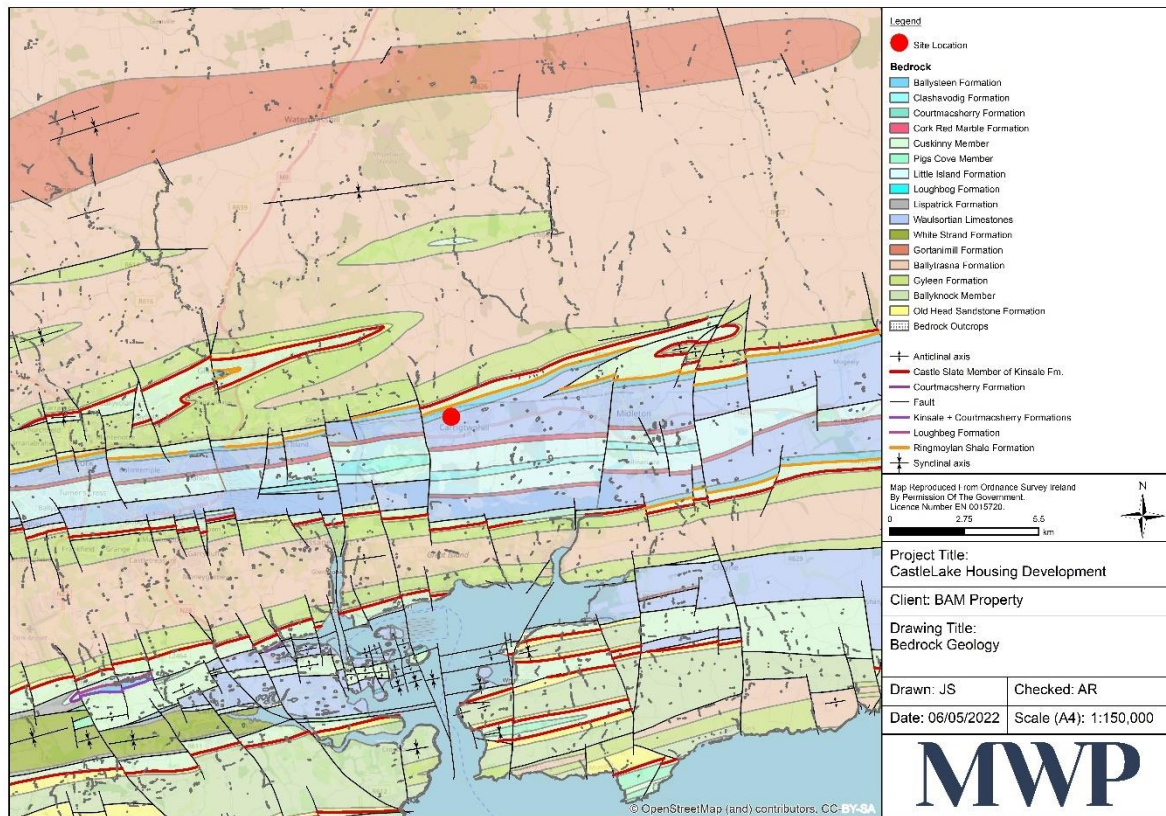


Figure 6-4: Regional geology of south Cork

6.3.5 Local Geology

The bedrock in the northern portion of the development area is predominantly composed of Ballysteen Formation, a dark, fossiliferous, muddy limestone and shale. The bedrock in the southern portion of the development area is predominantly composed of Waulsortian Limestones, a massive, unbedded mud-limestone. These units are often fractured and easily weatherable due to its carbonate chemical composition. The sediments are fine-grained limestones which originally developed as mud-mounds or ‘banks’ on the sea floor. In the Cork area, the mounds joined together over time to form a continuous mass of limestone. This limestone was subsequently folded and faulted overtime (**Figure 6-5**).

The bedrock geology of the site is primarily composed of Carboniferous Limestones. Bedding on either side of the Cork Syncline is steeply dipping at an average of 30-50° to the south on the northern limb, and 50° to the north on the southern limb. The Cork Syncline axis runs along through the southern boundary of the site. Bedrock outcrop has been noted on the site.

There are two sets of cross-cutting faults that have been identified by GSI mapping: the first strikes east to west which appears to follow strike of bedding, the second strikes north to south. The main contact between formations appear to be these faults.

The rocks found within and immediately adjacent to the site are described from literature below with the symbol for each formation given in brackets for cross-reference purposes with the GSI 1:100,000 scale bedrock geology map.

- Ballysteen Formation (CDBALL): Described as Carboniferous fossiliferous dark-grey muddy limestone. Irregularly bedded and nodular bedded argillaceous bioclastic limestones (wackestones and packstones),

interbedded with fossiliferous calcareous shales. It represents a widespread development throughout Westmeath and Longford. Typical thickness of 100-200m.

- Waulsortian Limestones (CDWAUL). Described as Carboniferous massive, unbedded limes mudstones. Sometimes informally called "reef" limestones, although inaccurate. Dominantly pale grey, crudely bedded or massive limestone. Known to be moderately to intensely karstified. Typically 300 - 500 m thick.
- Ringmoylean Shale Formation (RM): Described as Carboniferous dark-grey calcareous shales with thin shelly and usually crinoidal limestones. The formation is dominated by dark grey to black calcareous shales with thin bands of shelly and usually crinoidal limestone. The limestones form about 20-30% of the formation. The formation is 30.8m thick in the type section.
- Cuskinny Member (CDKINS2): Described as Carboniferous flaser-bedded sandstones and lenticular-bedded mudstones; sand dominant. The member is sand dominant and characterised by alternations of flaser-bedded sandstones, lenticular-bedded (linsen) mudstones, massive sandstones and nodular mudstones. Thin quartz-pebbly sandstones and conglomerates also occur throughout the member. Type section estimated to be between 199-235m thick.
- Castle Slate Member of Kinsale Formation (KNcs): Described as Carboniferous uniform well-cleaved dark-grey slaty mudstones. The member consists of uniform dark-grey, well cleaved massive mudstones. Comminuted crinoidal debris is common in some beds as are phosphatic nodules and disseminated pyrite. Rhythmic upward grading from sediment of medium silt size to fine silt and mud.
- Old Head Sandstone Formation (DUOHSF): Described as Devonian sandstone, & heterolithic lithologies. Grey flaser-bedded sandstones, fine grained sandstones and minor mudstones and lenticular bedded mudstones. The formation is dominated by lithologies belonging to the Heterolithic Facies (mainly flaser-bedded sandstones), wavy bedded fine-grained sandstones and minor mudstones. Type section estimated to be between 899-1098m thick.
- Cork Red Marble Formation (CDCRED). Described as Carboniferous cream, pink and red calcilutite limestones and pseudo-breccias in a red mudstone matrix. The formation is characterised by cream, pink, and red calcilutite limestones and packstones with pseudo-breccias and a penecontemporaneous red mudstone matrix. Grey cherty calcilutites both above and below the reddened pseudo-breccias are also included. Typically 80 m thick sections.

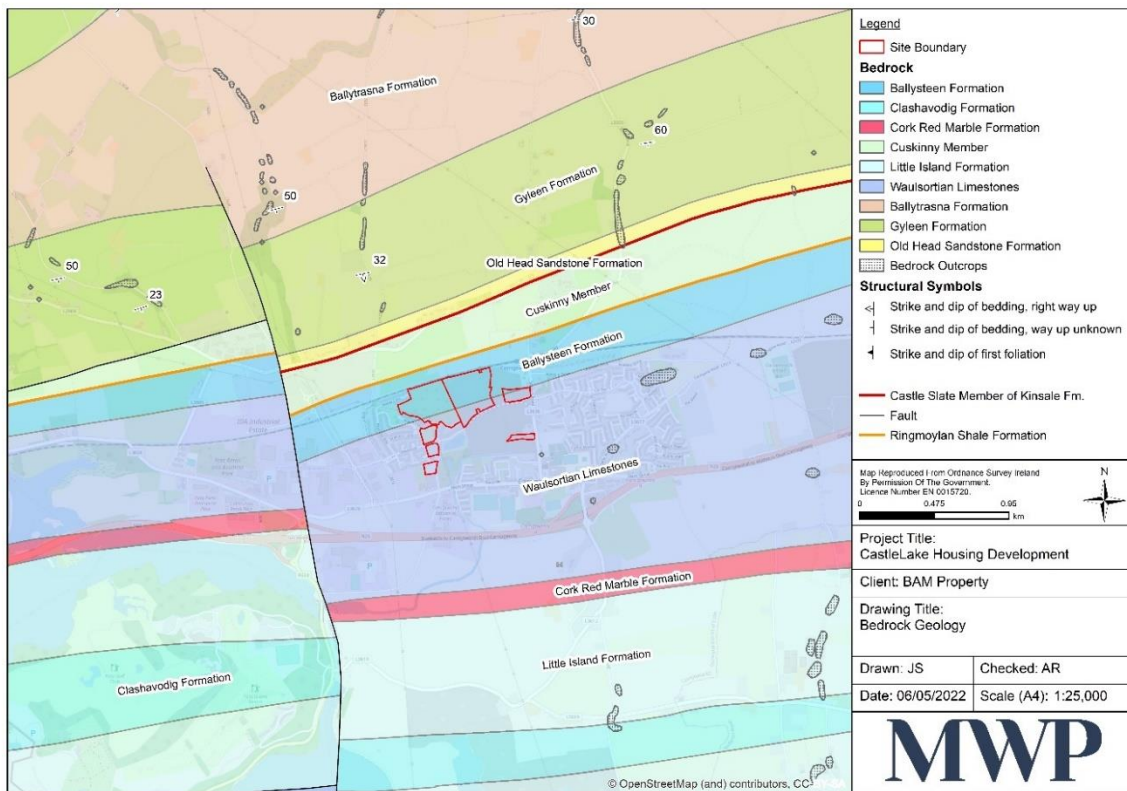


Figure 6-5 Local geology of Little Island and the site location

6.3.6 Soil and Subsoil

Soil includes the topsoil (soil) and subsoil, which together provide for the following important functions;

- Facilitate the hydrological cycle in the filtration/recharge, storage and discharge of rainwater
- Support all terrestrial ecology, including all flora and fauna (and all food crops)
- Protect and enhance biodiversity
- Holding or preserving archaeological remains
- Provision of raw materials and a base on which to build

Soil (topsoil) and subsoil may derive from parent geological material and organic matter under the influence of processes including weathering and erosion.

The predominant soil type at the majority of the site is “ AminDW - Deep well drained mineral (Mainly acidic)” according to the Teagasc/EPA Soil Maps available on the Geological Survey of Ireland online mapping system (Figure 6-6). The characteristics of the above soil type based on data from Teagasc are a high level of organic matter and very high moisture content. To the west of the site is in an area mapped as having “ AminPD - Mineral poorly drained (Mainly acidic)”.

The Quaternary Sediments at the site shown on the Geological Survey of Ireland online mapping system include “ TDSs, Till derived from Devonian sandstones” and “ GDSs, Gravels derived from Devonian sandstones” to the south-west (Figure 6-7). The GDSs gravels make up part of the Glaciofluvial Terrace of the River Lee system. This glacial feature is primarily composed of gravel to cobble sized rock within a matrix of fine sand and is characteristic for its well-draining soils and access to a high yield gravel aquifer.

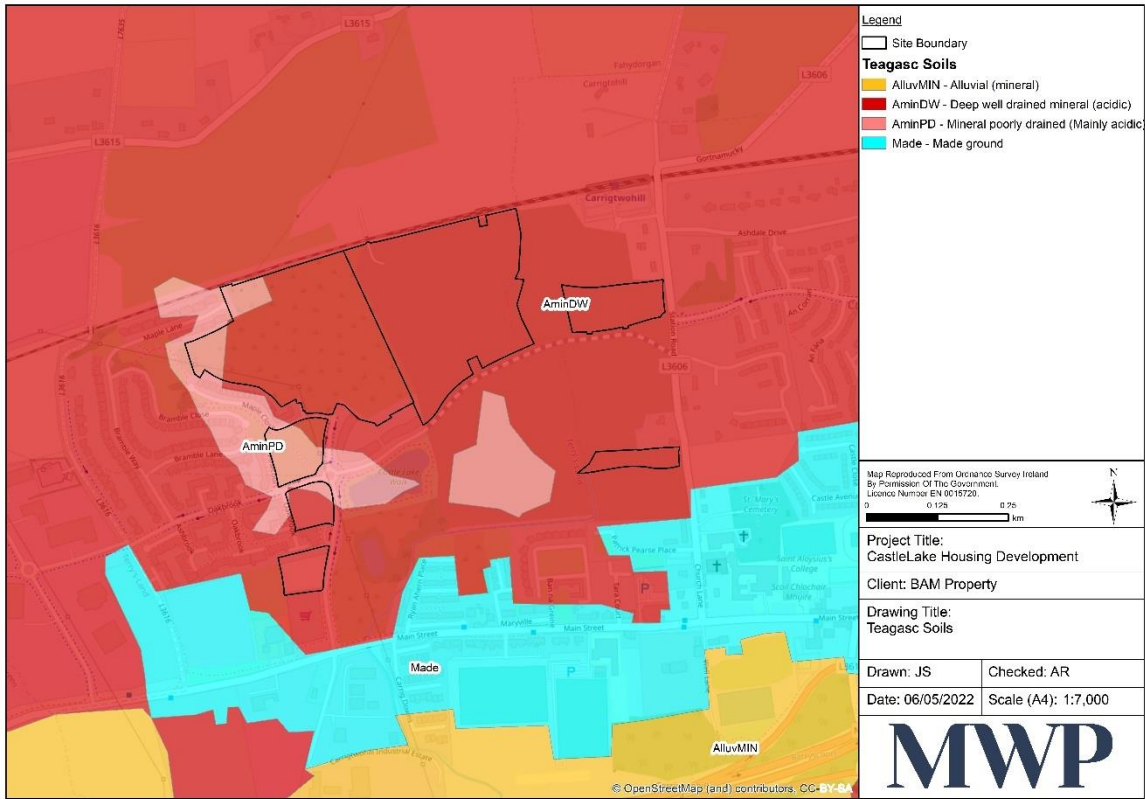


Figure 6-6 Teagasc Soils

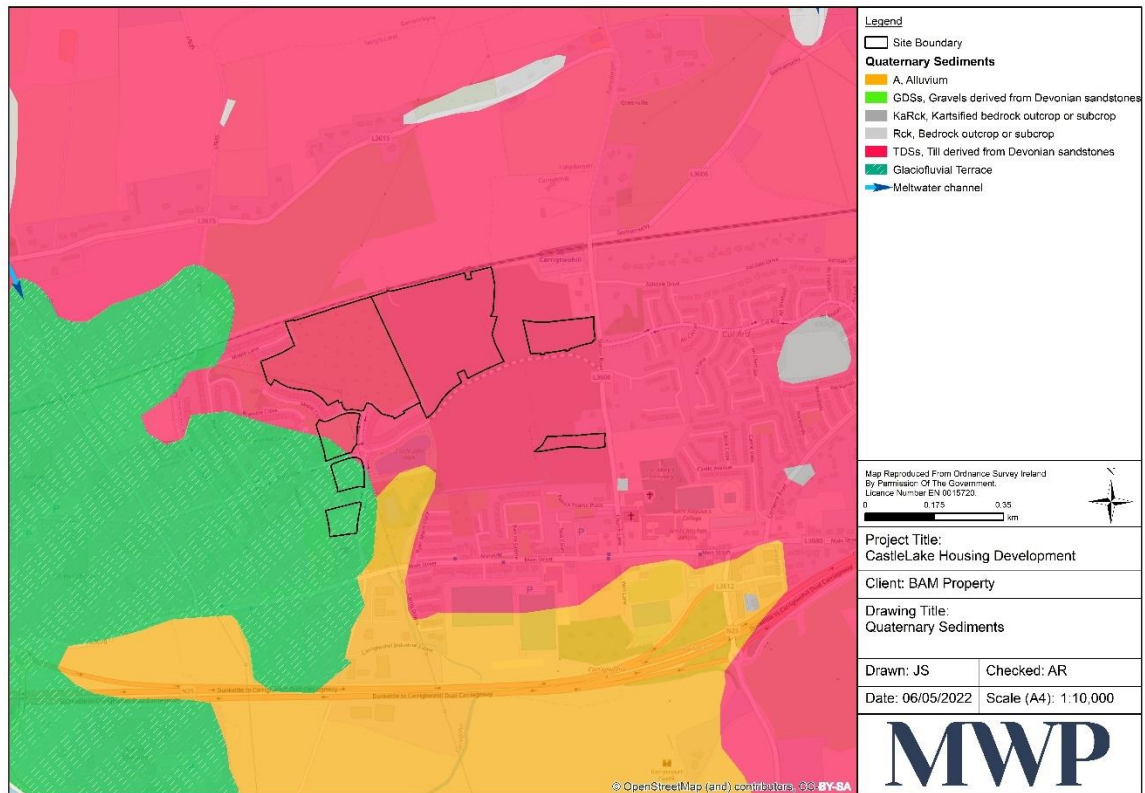


Figure 6-7 Quaternary Sediment and Geomorphology

6.3.7 Geological Heritage

The Irish Geological Heritage (IGH) Programme identifies and selects a complete range of sites that represent Ireland’s geological heritage under a variety of themes ranging from Karst features to Hydrogeology. The IGH Programme is a partnership between the GSI and the National Parks and Wildlife Service (NPWS) and sites identified as important for conservation are conserved as Natural Heritage Areas (NHA). Review of the GSI Geological Heritage Database available on the GSI online mapping system indicates that there are no Geological Heritage Sites within the site (**Figure 6-8**). The nearest mapped Geological Heritage Sites are listed below in **Table 6-1**.

Table 6-1 Geological Heritage Sites in Proximity to Site (GSI online database)

Feature Number	Feature Description	Distance from Site Boundary
Rock Farm Quarry, Little Island	A series of limestone quarries in which the limestone is divided into three distinctive zones of the Visean (Lower Carboniferous). Provides the type section for the Cork Red Marble Fm on its western shore & forms the type section for the Little Island Fm.	6.12km W
Little Island	Little Island provides the type section for the Cork Red Marble Formation	6.12km W
Midleton Distillery Springs	Karst springs. Underground stream through college	5.35km E
Baneshane Quarry	Quarry in red brecciated limestone with strings and bands of red chert. Known as the Midleton Red Marble, used for interior decoration in Westminster R.C. Cathedral in 1910.	7.11km E
Cloyne	Mid Jurassic spores. Site contains ball clay & lignite. Depression which is partially water-filled. Area is very highly vegetated. Site may be bigger than the depression itself.	11.2km E
Cloyne Clay Pits	Mid Jurassic spores. The site represents the only / one of the few non-marine outcrops of Mid Jurassic age within Southern Ireland, and this, together with the unique clays appear good justification for its designation as an Natural Heritage Area	11.8km E

The Geological Heritage of Co. Cork GSI publications have not been audited at the time of writing of this report.

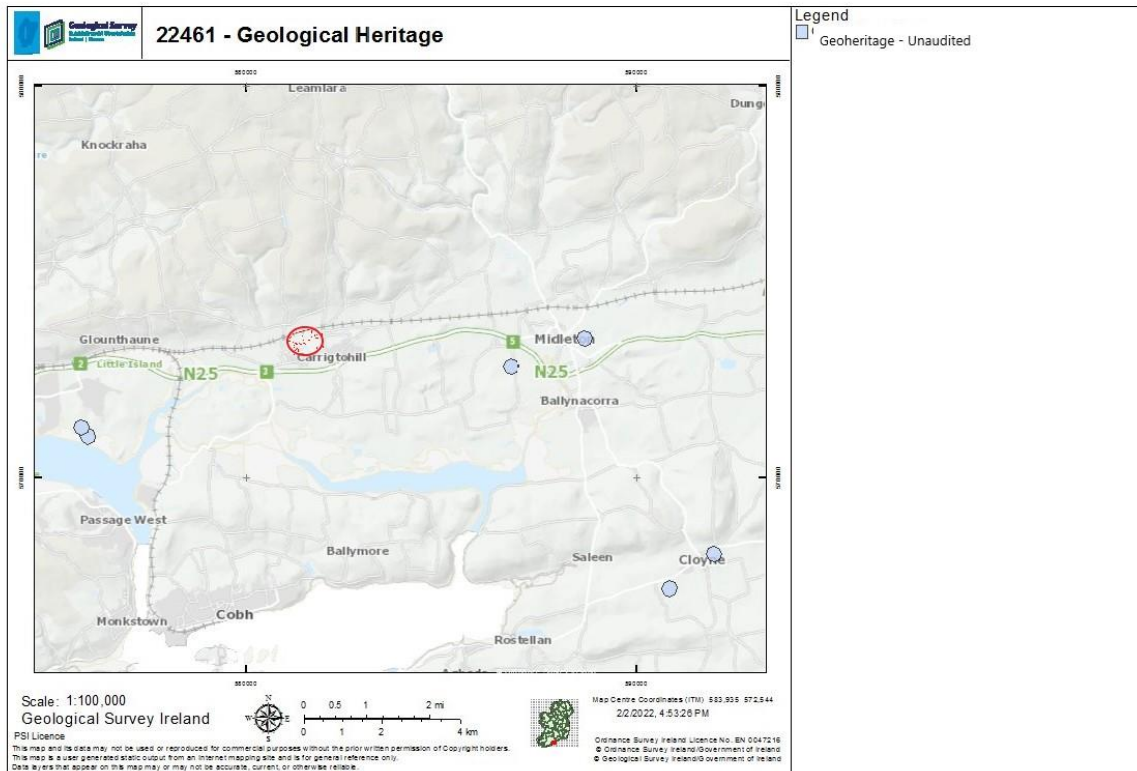


Figure 6-8 Geological Heritage areas (source: GSI Digital Map Viewer)

6.3.8 Economic Geology

There are a number of quarries operating in proximity to the proposed site in Co. Cork including:

- Carrigtwohill Quarry, Ballyvodock West, Carrigtwohill, Co. Cork (GSI Quarry Number: C024)
- Ballyvodock Pit, Ballyvodock, Middleton, Co. Cork (GSI Quarry Number: C006)
- Ballygarvan Sandstone Quarry, Killanully, Ballygarvan, Co. Cork (GSI Quarry Number: C025)
- Ballygarvan Limestone Quarry, Killanully, Ballygarvan, Co. Cork (GSI Quarry Number: C022)
- Middleton Quarry, Carrigshane, Middleton, Co. Cork (GSI Quarry Number: C021)

The location of the quarries in the area is shown in . The closest quarry to the site is Carrigtwohill Quarry which is located approximately 2.7 km from the nearest point of the site.

Recorded mineral locations have the potential to be used for future mineral extraction. According to the GSI, there are a number of recorded metallic and non-metallic mineral locations in the area. None of these locations are within the site. The closest is O'Mahony Sand & Gravel, a non-metallic, limestone and gravel quarry, approximately 0.45 km south of the site. The current operational status of the quarry is not known at this time. However, this mineral extraction location should not impact on the development of this site (Figure 6-9).

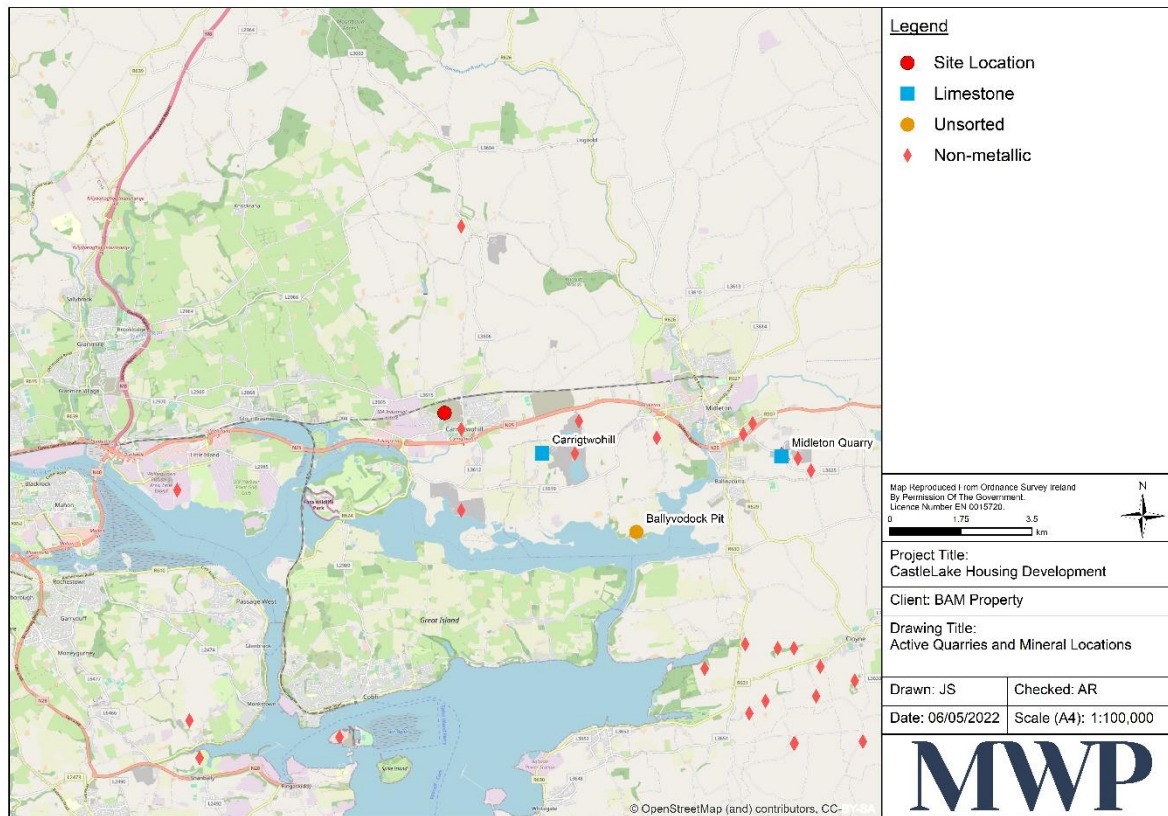


Figure 6-9 Economic geological sites in south Cork

6.3.9 Existing Geotechnical Conditions

GSI Online Mapping found three external geotechnical sites within the vicinity of the proposed development site. Bedrock was not met at these three sites (**Figure 6-10**). The closest site where bedrock was met is located 2.1km south of the site and hit rock at ~80m bgl.

Historical Borehole Data can be seen below in **Table 6-2**.

Report ID 4974 contains the site investigation for the Carrigtwohill Industrial Estate, January 2002. It describes the area as being composed of top layer soft sandy gravels and sandy silts, followed by denser granular and cobble-like deposits. The report noted that “soft material can be the product of subterranean water flow in limestone areas where karstic erosion has occurred ... It would be advisable, therefore, to avoid water percolation close to structures or pavements”.

Report ID 1530 contains the site investigation for the Bord Gais Pipeline, September 1976. It describes the area as being composed of compacted clayey gravels or gravelly clays to a depth of 6m bgl before encountering large broken limestone cobbles. Standing water was recorded to be 5.5m bgl.

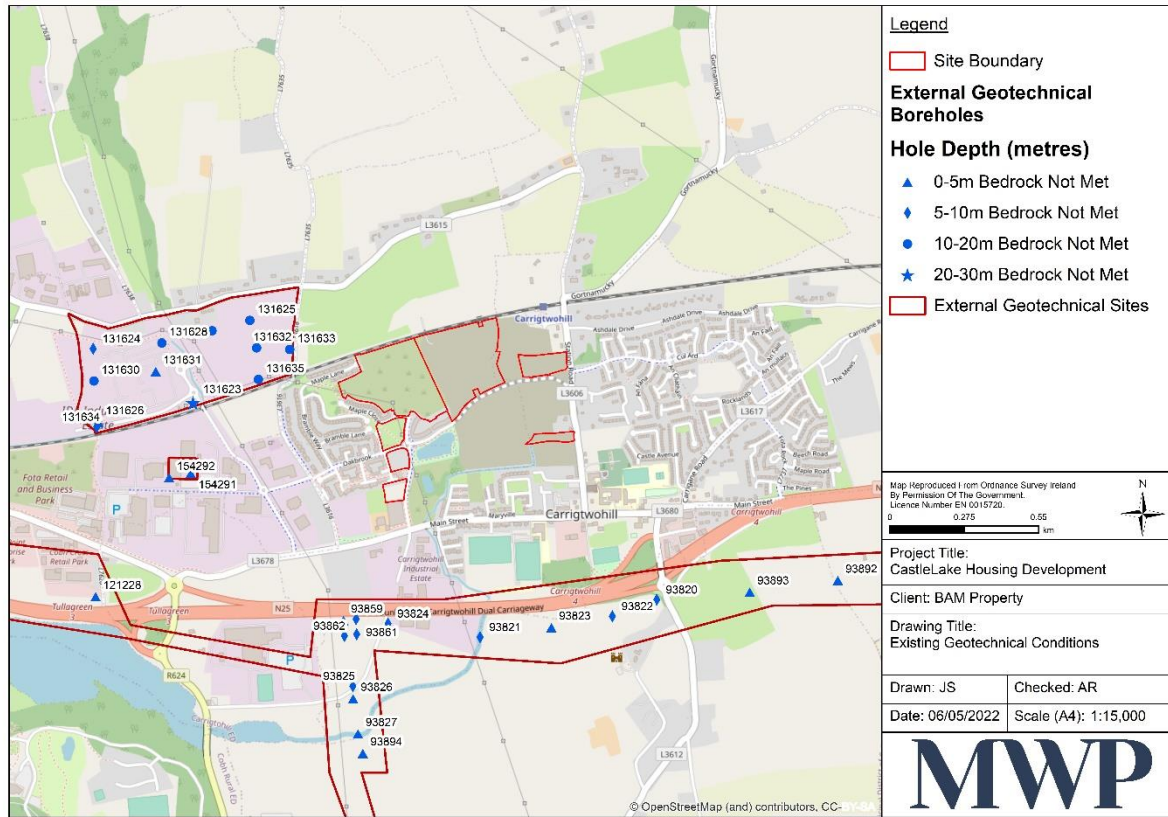


Figure 6-10 Existing Geotechnical Conditions

Table 6-2 Geotechnical Borehole information obtained from GSI online mapping

Report ID	Location ID	Total depth of borehole (m)	Bedrock met?
1530	93820	6.5	N
	93821	7	N
	93822	5.5	N
	93823	5	N
	93824	6	N
	93825	5.5	N
	93826	5	N
	93827	5	N
	93859	5	N
	93860	6	N
	93861	8	N
	93862	5.5	N

Report ID	Location ID	Total depth of borehole (m)	Bedrock met?
	93892	3.6	
	93893	3.6	
	93894	5	N
	121228	5	N
3486	131623	27.5	N
	131624	6.2	N
	131625	12.5	N
	131626	3	N
	131628	14	N
	131629	12	N
	131630	17	N
	131631	4	N
	131632	16	N
	131633	17	N
	131634	6	N
	131635	14.5	N
4974	154290	3.6	N
	154291	3.6	N
	154291	2.9	N

6.3.10 Existing Access Roads

There are no existing roads within the proposed development side. The main access to the site from the south is via the access road from the junction with the Cork Road/Main St. The main access road to the site boundary from the west is Castlake Avenue, Hazelcourt and Maple Lane. The main access road to the site boundary from the east is via Station Road. Two new access roads associated with the new schools campus are currently under construction.

6.4 Assessment of Impacts and Effects

This section details the potential impacts on the land and soils environment from the Castllake Strategic Housing Development. The changes proposed on-site comprise a number of elements including excavation for and construction of the housing development and construction of a new road system. The relevant works are further discussed in the following sections. This section considers all the relevant phases of construction and operation of the site of the project elements relevant to soil and geology.

6.4.1 Construction Phase

The predicted impacts on soils and land for the proposed development are discussed in the following sections. The activities that can cause damage to the existing geological environment include:

- Land-use
- Roads and drainage;
- Excavation Works and Related Activities;
- Storage and Management of Excavated Materials;
- Climate Change
- Vehicular Movement
- Accidental Spills / Contaminated Run-off;
- Waste Generation and Management.

6.4.1.1 Land Use

The land area within and surrounding the footprint of the proposed infrastructure associated with the housing development will be sterilised from its existing land use for the duration of the structures' operational life. This includes new access roads, underground services and utilities.

The proposed development is located on land which is mapped as pastures and discontinuous urban fabric. The proposed development will become permanent structures in the area. The area of land required to construct, operate, and maintain the proposed development has been kept to the minimum reasonably practicable area as part of the design process. During the construction phase of the works, large amounts of material will be excavated, moved, altered, or compacted and will have a **moderate permanent impact** on land use which is consistent with emerging baseline trends.

6.4.1.2 Roads and Drainage

A new drainage network will be installed on impermeable areas within the site. This network and design approach is outlined in the in **Chapter 7 Water** and **Chapter 9 Material Assets** of this EIAR.

The construction of the road and drainage network will involve both excavation and importation of soil and crushed rock respectively. The impacts of the construction of roads and drainage are the same as for excavations discussed in 6.4.1.3 Excavations and related activities. The construction of roads and drainage represent as **slight adverse permanent impact** on the land and soils environment.

Mitigation measures for roads, amenity trail and drainage construction are discussed in 6.6.1.1.1.

6.4.1.3 Excavations and related activities

The construction of the proposed development will result in the removal of soil and subsoil in parts of the site in order to facilitate the construction of the proposed development. The volume of material to be excavated will be managed, reused and stored locally on site. Topsoil and subsoil will be reused for landscaping. In order to minimise the movement of excavated material within a site, a balance must be achieved in terms of how excavated material is managed and deposited on site.

Stone required for the construction of new roads, construction compound and drainage will be imported from local quarries, where feasible.

The estimated quantities of excavated material for the proposed development are outlined in

Table 6-3 below..

Excavation, material alterations and construction will alter the site and have a *slight adverse permanent impact* on the land and soils environment.

Mitigation measures for excavations for this scheme are discussed in 0

Table 6-3. Quantities of excavation and construction materials

Item	Unit	Quantity
Length of new entrance roads	m	560
Excavation of topsoil for site	m3	22,850
Volume of subsoil to be excavated	m3	50,910
Volume of topsoil to be excavated	m3	22,850
Total volume of excavated material	m3	73,750
Volume of subsoil/topsoil from excavations to be re-used	m3	60,000
Imported stone for entrance road	m3	2000
Imported stone for site	m3	9800
Total volume of imported stone required	m3	11,800
Concrete for site	m3	27,200

6.4.1.4 Storage and Management of Excavated Materials

The handling, storage, and re-use of excavated materials are of importance during the construction phase of the project. Sediment mobilisation can occur during construction, when excavated materials are stockpiled on site and sediment is then carried in run-off during periods of heavy rainfall. Good site practice in the management of stockpiles and the protection of water can prevent mobilised sediments entering water and drainage features.

Soil erosion can occur where soil which is exposed during or after excavation works is impacted by weather or machinery causing a further breakdown in the soil resource. Rain and wind can erode exposed soil and subsoil while the movement of vehicles across exposed ground can further cause erosion. These activities will not occur at a scale and duration to cause significant impacts. Furthermore, excavation and stockpiling activities will be managed during construction.

In the absence of mitigation, sediment run-off and soil erosion would have a *significant adverse temporary impact* on the soil and geological environment due to sediment mobilisation and soil erosion.

Mitigation measures for storage and stockpiling of material for this scheme are discussed in 6.6.1.1.3. Excavated material will be reused onsite where possible.

6.4.1.5 Vehicular movement

The main vehicular movements relate to the following phases of development;

- Site mobilisation and temporary compound set up;
- Installation of the drainage network on new internal site service road and integration with the existing network;
- Delivery of construction materials;
- Vehicular traffic for employees;
- Excavation and formation of the roads network;
- Construction of the proposed development

Heavy machinery and vehicles with large tyre threads have the potential to erode topsoil and cause soil settlement and compaction. It is envisaged that vehicular activity could have a *likely slight adverse short-term impact* effect on the existing soil regime on site.

Mitigation measures for vehicular movement are discussed in 6.6.1.1.4. An outline Traffic Management Plan has been developed and can be found in Chapter 13 Traffic and Transportation.

6.4.1.6 Accidental spills / contaminated runoff

All construction materials required, including any hazardous substances such as fuel and oil, have the potential to impact on the soil and geological environment should a spill occur.

Construction plant and machinery will be run on hydrocarbon fuel and oil and activities relating to hydrocarbons (storage, bunding, refuelling) must be managed during the works. Any impact from a hydrocarbon spill to soil may indirectly impact on the hydrological environment.

Cement / concrete will be transported to, stored, and used across the site. Without proper management, cement spills and other construction materials pose a threat to the land and soils environment (soil matrix) and may indirectly impact on the hydrological environment (water courses) as pH would likely be altered.

There is the potential for water (rainfall) to become contaminated with pollutants associated with construction activity. Contaminated runoff, e.g. suspended solids from muddy water, arising from construction sites can pose a significant risk to the geological environment if allowed to percolate into the soil matrix and water course. Wastewater from construction processes or leakage from poor welfare facilities can alter the nutrient and microbial balance of the land and soils environment. Therefore, mitigation measures must be followed.

Contamination from accidental spills of hydrocarbons, cement or contaminated waters into the land and soils environment would be considered a *likely significant adverse short-term impact*.

Mitigation measures to reduce these impacts are outlined in section 6.6.1.1.5.

6.4.1.7 Waste Generation and Management

During the construction phase, waste will be generated from the following activities:

- Soil, rock and stone;
- Any sediment removed to enable new access construction;
- Mixed organic waste from the canteen and staff facilities; and
- Mixed dry recyclables from the staff facilities

The level of waste generated on site will be minimal. It is considered an *adverse imperceptible short-term impact* during the short term construction phase of the works.

Mitigation measures and recommendations are included below to ensure best practice in relation to the management of site-generated wastes. Mitigation measures for waste generation and management are discussed in 6.6.1.1.6.

6.4.2 Operational Phase

6.4.2.1 Land and Soils

Following the construction phase, the proposed development will enter the operational phase when residents are living in the completed development. The development will not require any further use of the land and soil resources during operation.

The potential impact on the land and soils of the site due to excavations will be lower during operation and maintenance, as the majority of excavations will have been reinstated. Some erosion of soil will continue into the operational phase, however as vegetation becomes established and equilibrium is achieved, erosion rates will reduce to pre-construction levels.

The effects of the operation and maintenance of the proposed development represent *neutral long-term impacts* on the land and soil environment.

The mitigation measures appropriate to the operation and maintenance of the proposed development are presented in 6.6.1.2.2.

6.4.3 Do-Nothing

Under the do-nothing scenario, no development would take place on this site, the land and soils environment would remain unchanged, with the exception of future agricultural change.

If the proposed development were not carried out, there would be no direct or indirect significant effects on soils, land and geology.

6.4.4 Cumulative Impacts and Effects

The cumulative impacts from the interaction with other nearby developments and activities have been considered. The land and soils environment within the site and surrounding area has been highly modified over a significant period of time for agricultural purposes and previous housing development projects. Given the highly modified nature of the site and surrounding area, the potential for significant cumulative impacts on land and

soils arising from the proposed development and developments on adjacent sites is considered to have a *slight medium-to-long- term negative impact*.

Mitigation measures for the cumulative impacts and effects are discussed in Section 6.6.1.3.

6.5 Risk of Major Accidents and Disasters

Major accidents can relate to any incident, technological or otherwise, which has the potential to have a significant impact on the facility or on the receiving environment. Examples of major accidents which have such potential are fire, explosion, traffic collisions, contamination and pollution.

A natural disaster is an all-encompassing term which describes any severe natural event which has the potential to cause disturbance to an individual, development or population. The severity depends on the receptor and the type of disaster. Examples of natural disasters are earthquakes, flooding, tsunamis, lightning strikes, hurricanes or any other extreme natural event. This section has considered the potential increased risk of such events occurring as a result of climate change, such as sea-level rise and increased frequency in the occurrence of extreme weather events.

The principle risk associated with the proposed development relates to increased flood risk due to the increase in impermeable hard standing across the site. A Flood Risk Assessment (FRA) has been undertaken and is included in **Appendix 7.1** of the EIA. The reports concluded that the site is not at risk of flooding nor will the proposal have an adverse impact on flooding.

It is considered that there is no potential for the proposed SHD development to cause a major accident or disaster. Furthermore, there is no increased risk to the development from a major accident or disaster.

6.6 Mitigation and Monitoring Measures

This section highlights the recommended mitigation measures to address potential impacts and residual effects to ensure there are no environmental impacts on the soils and geological environment as a result of the construction or operation of the proposed development.

6.6.1 Mitigation Measures

6.6.1.1 Construction Phase

6.6.1.1.1 Roads and Drainage

The permanent road works will require a drainage network to be in place for the construction and operation phases of the proposed development. Fundamental to any construction phase is the need to keep water (i.e. runoff from adjacent ground upslope of the permitted development footprint) clean and manage all other run off and water from construction in an appropriate manner. Wheel wash facilities will be available onsite for the duration of the construction phase. These and other measures are outlined in the Construction Environmental Management Plan (CEMP) (**Appendix 2.1**). The proposed surface water drainage is summarised in Chapter 7 Water and Chapter 9 Material Assets.

6.6.1.1.2 Excavations and related activities

Excavated material will be managed in line with the approved CEMP which can be found in **Appendix 2.1**.

The soil excavated from the construction of the proposed development will be reused beneficially on site where feasible to reduce waste, and used in the development such as for landscaping and general fill.

Within excavations and around excavations, pore water pressure will be kept low by avoiding loading the soil/subsoil and giving careful attention to the existing drainage.

All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Where appropriate and necessary, cuts and excavations will be protected against ingress of water or erosion by the use of cut off drains around the excavation works. Temporary works will be such that they do not adversely interfere with existing drainage channels/regimes.

A Landscape Design Rationale Plan has been developed which outlines the measures to be taken to prepare soils for planting following construction.

6.6.1.1.3 Storage and Management of Excavated Materials

The handling, storage and management of excavated spoil will be carried out in line with an approved CEMP. Storage of excessive material will be avoided. Site management should include the checking of equipment, materials storage and transfer areas, drainage structures and their attenuation ability on a regular basis during the construction phase of the project. The purpose of this management control is to ensure that the measures in place are operating effectively, prevent accidental leakages, and identify potential breaches in the protective retention and attenuation network during earthworks operations.

Materials required for construction should be handled and stored in a manner which reduces unnecessary wasting. Stone and any other quarry materials should be imported from local quarries where possible and stored neatly in segregated areas.

No permanent waste or stockpiles will be left on site, other than those materials required for designed landscaping and construction generally. Excavated material that is not reused on site for landscaping will be removed from site by the appropriate permitted contractors and taken to an authorised facility.

6.6.1.1.4 Vehicular movement

A traffic management plan has been developed as part of the CEMP. This is to manage and control vehicular movement onsite. Measures include the scheduling of HGVs during the construction phase to reduce the number of vehicles move in, through and off site. This in turn will reduce the impact of soil compaction and erosion. Unscheduled vehicles will not have access to the site.

Machinery should not operate directly on excavated/stockpiled soils.

6.6.1.1.5 Accidental spills / contaminated runoff

Good site practice is applied to ensure no fuels, oils, other substances or contaminated runoff are stored in a manner on site in which they may spill and enter the ground, particularly when the initial top layer of made ground is excavated. Dedicated, bunded storage areas should be used for all fuels or hazardous substances. Spill kits should be maintained on site.

6.6.1.1.6 Waste Generation and Management

A waste management plan (WMP) has been developed as part of the CEMP. This can be found in **Appendix 2.1**. The CEMP includes provisions for handling waste in full accordance with statutory legislation and associated guidance. All waste handling contractors and waste disposal facilities used by the contractor must be fully authorised.

Construction phase waste management measures are in place to tightly control all site generated construction waste and the storage and disposal of same. All waste will be managed, collected, stored and segregated in separate areas and removed off site by a licensed waste management contractor at regular intervals during the works.

6.6.1.2 Operational Phase

6.6.1.2.1 Land and Soils

The potential impact on the land and soils of the site due to excavations will be lower during operation and maintenance, as the majority of excavations will have been reinstated. Some erosion of soil may continue into the operation phase, however as vegetation becomes established and equilibrium is achieved, erosion rates will reduce to normal levels. No additional mitigation measures are recommended in relation to the soil and geological environment during the operation of the proposed development.

6.6.1.2.2 Operation and Management

The Landscape Design Plan contains detailed plans for the maintenance, care and management of the soils and plants during the lifetime of the development.

The risks associated with sedimentation and contamination of the water course and aquifers due to erosion and runoff will be reduced to minimal levels as areas are re-vegetated and construction traffic ceases.

6.6.1.3 Mitigation Measures for Cumulative Impacts and Effects

Based on the finding that the potential for significant cumulative impacts on land and soils arising from the proposed development is considered to be negligible, no specific measures to mitigate against cumulative impacts are considered necessary.

6.7 Residual Impacts and Effects

The residual effects on land and soil, i.e., the degree of environmental change that will occur after the proposed mitigation measures have been implemented, are outlined in Table 6-4 below.

Table 6-4: Residual Impacts, Mitigation Measures and Residual Effects during the Construction Phase

Element of Work	Receptor	Effect (Pre-Mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
Land-Use	Land	<i>Moderate long-term impact</i>	None	<i>Moderate long-term impact</i>
Roads and Drainage	Land	<i>Moderate adverse permanent impact</i>	Refer to Section 6.5	<i>Slight adverse long-term impact</i>
	Soils	<i>Moderate adverse permanent impact</i>		<i>Slight adverse long-term impact</i>
Excavations and related activities	Land	<i>Slight adverse permanent impact</i>	Refer to Section 6.5	<i>Slight Imperceptible permanent impact</i>
	Soils	<i>Slight adverse permanent impact</i>		<i>Not significant adverse permanent impact</i>
	Geology	<i>Slight adverse permanent impact</i>		<i>Not significant adverse long-term impact</i>
Storage and Management of Excavated Materials	Land	<i>Significant adverse temporary impact</i>	Refer to Section 6.5	<i>Not significant adverse temporary impact</i>
	Soils	<i>Significant adverse temporary impact</i>		<i>Not significant neutral temporary impact</i>
Vehicular Movement	Land	<i>Likely slight adverse short-term impact</i>	Refer to Section 6.5	<i>Likely Imperceptible neutral short-term impact</i>
	Soils	<i>Likely slight adverse short-term impact</i>		<i>Likely not-significant adverse short-term impact</i>
Accidental Spills / Contaminated Run-off	Land	<i>Likely significant adverse short-term impact</i>	Refer to Section 6.5	<i>Unlikely not-significant adverse short-term impact</i>
	Soils	<i>Likely significant adverse short-term impact</i>		<i>Unlikely not-significant adverse short-term impact</i>
	Geology	<i>Likely significant adverse short-term impact</i>		<i>Unlikely not significant adverse short-term impact</i>
Waste Generation and Management	Land	<i>Adverse imperceptible short-term impact</i>	Refer to Section 6.5	<i>Likely Imperceptible neutral short-term impact</i>
	Soils	<i>Adverse imperceptible short-term impact</i>		<i>Likely Imperceptible neutral short-term impact</i>

Table 6-5: Residual Impacts, Mitigation Measures and Residual Effects during the Operational Phase

Receptor	Effect (Pre-Mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
Land and Soils	<i>Neutral long-term impacts</i>	Refer to Section 6.5	<i>No change</i>

6.8 References

- EPA, 2017. Guidelines on Information to be contained in Environmental Impact Assessment Reports.
- Institute of Geologists of Ireland, 2013. Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.
- National Roads Authority (NRA), 2009. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- JBA Consulting, 2020. Schools Rapid Build Programme, Carrigtohill, Co. Cork Flood Risk Assessment
- JBA Consulting, 2021. Castlelake SHD, Carrigtwohill Co. Cork Flood Risk Assessment
- Sleeman, A.G., Daly, E.P. and Pracht, M., 1994. Geology of South Cork: A Geological Description of South Cork and Ajoining Parts of Waterford to Accompany the Bedrock Geology 1: 100,000 Scale Map Series, Sheet 25, South Cork. Geological Survey of Ireland.
- GSI Online Maps, Accessed 02/02/2022
- Geohive Online Maps, Accessed 02/02/2022.
- EPA Online Maps, Accessed 02/02/2022.

7. Water - Hydrology and Hydrogeology

7.1 Introduction

This chapter considers the potential effects on the existing water environment arising from the Proposed Development. A full description of the Proposed Development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on the existing water environment arising from the overall project has been assessed. The assessment comprises:

- A review of the existing receiving environment.
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

7.1.1 Competency of Assessor

The assessment was completed by Fergus Doyle and Jasmin Spoerri, Environmental Scientists with MWP. Fergus holds an MSc in Environmental Protection and Management and is a member of the Institute of Environmental Scientists. Fergus has authored Environmental Impact Assessment Reports, Detailed Site Assessments, Remediation Plans, Appropriate Assessments, Environmental Reports and Construction and Environmental Management Plans for a wide range of projects.

Jasmin Spoerri (BSc, MSc), is an Engineering Geologist with MWP. She holds a BSc in International Field Geoscience and an MSc in Applied Environmental Geoscience from University College Cork. Jasmin has been involved in geological investigation/interpretation, geotechnical investigation/interpretation, hydrogeological assessment and investigation, and environmental assessment. She has worked on Environmental Impact Assessment Reports (EIARs) for several projects such as wind farms, substations, grid connections and pharmaceutical developments.

7.1.1 Legislative context

The following section sets out the legislative context of the assessment in relation to surface and groundwater quality.

7.1.1.1 Water Framework Directive (WFD) (2000/60/EC)

The Water Framework Directive (WFD) (2000/60/EC) establishes an integrated and coordinated framework for the sustainable management of water. Under the WFD¹, the island of Ireland has been divided into a number of River Basin Districts (RBD) in order to facilitate the effective implementation of the WFD objectives. The proposed development site is located within the Irish River Basin District (IRBD) in Hydrometric Area No. 19.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations, since its inception in the year 2000.

The WFD (1st Cycle) was transposed into national legislation in 2003, with the aims to:

¹ Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.

- Prevent deterioration of status for surface and groundwaters and the protection, enhancement and restoration of all water bodies;
- Achieve good ecological status and good chemical status for surface waters and good chemical and good quantitative status for groundwaters;
- Progressively reduce pollution of priority substances and phase-out of priority hazardous substances in surface waters and prevention and limitation of input of pollutants in groundwaters;
- Reverse any significant, upward trend of pollutants in groundwaters; and
- Achieve standards and objectives set for protected areas in Community legislation.

The objective for each surface water and groundwater body is to prevent deterioration, maintain high and good status waters, restore waters to at least good status where necessary, and ensure that the requirements of associated protected areas are met.

The River Basin Management Plan for Ireland 2018 – 2021 (RBMP), the second-cycle of river basin management planning under the WFD, provides for the targeted implementation of the two principle objectives of the WFD, namely;

1. To prevent the deterioration of water bodies and to protect, enhance and restore them with the aim of achieving at least good status; and
2. To achieve compliance with the requirements for designated protected areas.

Five key ‘evidence-based’ priorities form the pillar of this iteration of the RBMP are outlined as follows:

1. Ensure full compliance with relevant EU legislation;
2. Prevent deterioration;
3. Meet the objectives for designated protected areas;
4. Protect high-status waters
5. Implement targeted actions and pilot schemes in focused sub-catchments aimed at:
 - a) targeting water bodies close to meeting their objective and
 - b) addressing more complex issues that will build knowledge for the third cycle

The assessment will determine the impact in accordance with the following regulations which give effect to the WFD:

- S.I. No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended);
- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Water Regulations) 2009 (as amended);
- S.I. No. 296 of 2009 European Communities Environmental Objectives (Pearl Mussel Regulations) 2009 (as amended);
- Urban Waste Water Treatment Regulations (SI No. 254 of 2001 as amended) (UWW Regulations).

These Regulations have been devised to implement the requirements of the WFD and establish Environmental Quality Standards for the purpose of assessing the status of surface waters and groundwaters. The Surface Waters Regulations apply to all surface waters including lakes, rivers, canals, transitional waters, and coastal waters and supersede all previous water quality regulations

7.1.1.2 Water Framework Directive - Protected Areas

The Water Framework Directive requires a register of protected areas. These are protected for their use (such as fisheries or drinking water) or because they have important habitat and/or species that directly depend on water. The register includes areas identified by the WFD itself or other European Directives. These may include the following:

- Areas used for water abstraction - European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018)
- Areas designated for the protection of economically significant aquatic species (Freshwater Fish Directive 78/659/EEC; Shellfish Directive 79/923/EEC)
- Recreational waters (Bathing Waters Directive 76/160/EEC)
- Nutrient Sensitive Areas (Nitrates Directive 91/676/EEC; Wastewater Treatment Directive 91/271/EEC)
- Areas of protected species or habitats where water quality is an important factor in their protection (Natura 2000 sites under Birds Directive 79/409/EEC and Habitats Directive 72/43/EEC)
- Surface waters (The European Communities Environmental Objectives (Surface Waters) Regulations [S.I. No 272 of 2009], and amendment regulations 2012 [S.I. 327 of 2012])

Lough Mahon is located within the Cork Harbour Special Protection Area (Site Code 004030). Potential impacts of the proposed development on the SPA are addressed in **Chapter 5 Biodiversity** and in the **Natura Impact Statement** submitted with the planning application package. .

7.2 Scope of Assessment

The scope of the impact assessment and methodology pertaining to hydrology and hydrogeology is as follows:

1. Establish the baseline hydrological and hydrogeological conditions relevant to the development site;
2. Identify the potential impacts of the proposed development on the receiving hydrological and hydrogeological environment;
3. Determine the significance of any identified effect;
4. Develop mitigation measures to reduce or eliminate the impacts; and
5. Identify any residual impacts after mitigation measures are implemented.

7.3 Methodology

The assessment methodology included desk-based studies, a site visit, and a qualitative assessment of the potential impacts.

Relevant guidelines have been used to inform the preparation and assessment of impacts from the proposed development on surface water and groundwater, including:

- National Roads Authority (NRA) (2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydro-geology for National Road Schemes and EPA Guidelines – Advice Notes on Current Practice (in the preparation of Environment Impact Statement);
- Department of Housing, Planning and Local Government (DHPLG) (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;

- EPA (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR); and
- Institute of Geologists of Ireland (2013) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.
- Relevant water quality standards have been consulted and used to inform the assessment where relevant, including:
 - European Communities (Drinking Water) Regulations 2014 (S.I. No. 350 of 2014);
 - European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010), as amended in S.I. No. 389 of 2011, S.I. No. 149 of 2012 and S.I. No. 366 of 2016 and;
 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009) as amended by S.I. No. 327 of 2012, SI No. 386 of 2015 and S.I. No. 77 of 2019.

7.3.1 Desktop Study

The methodology used for this study included desk-based research of published information and site visits to assemble information on the local receiving environment. The desk study included the following activities:

- Review of Ordnance Survey Mapping and aerial photography to establish existing land use and settlement patterns within the study area.
- Review of local and regional development plans and planning policy in order to identify future development and identify any planning allocations within the study area.
- Review of Cork County Council’s Planning Register to identify relevant development proposals currently under consideration by the Council.

Information on geology and soils is provided in **Chapter 6 Land and Soils**. The desk study involved a review of all available information, datasets and documentation sources pertaining to the hydrology and hydrogeology of the area surrounding the application site. Publicly available information sources have been used to inform and supplement the site-specific information gathered to complete this assessment.

7.3.2 Site Visit

A site visit was made in February 2022 to determine the existing site conditions. The survey was used to inform the assessment of potential effects on the local water environment.

7.3.3 Assessment criteria

The method of impact assessment and prediction follows the EPA (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)*.

7.4 Existing Environment

7.4.1 Site Location and Description

The proposed development site is located in Carrigtwohill 16km east of Cork city and 9km east of the Jack Lynch tunnel, on the northern side of the N25 Cork to Waterford road. The proposed development is located circa 500m west of Carrigtwohill village. The site is bounded by agricultural lands to the north, the existing Castlelake housing estate to the west and the Cork Road L3680 to the south. The site can be directly accessed from the Cork Road L3680 and from the west via the existing Castlelake housing estate. The N25 is easily accessible at junctions to the west and east of the site. The proposed development lands bound the Cork-Midleton Railway line to the north. Carrigtwohill train station is located circa 160m to the north east of the site boundary. The train station serves Midleton and Cobh to the east and south and Cork to the west, with onward links to Dublin and the rest of the country. The site location is shown in **Figure 7-1**.

The existing site currently comprises mainly improved agricultural grassland in the eastern portion of the site and scrub and immature woodland in the western portion. There are some treelined hedgerows in the centre of the site and along the boundary with Station Road.

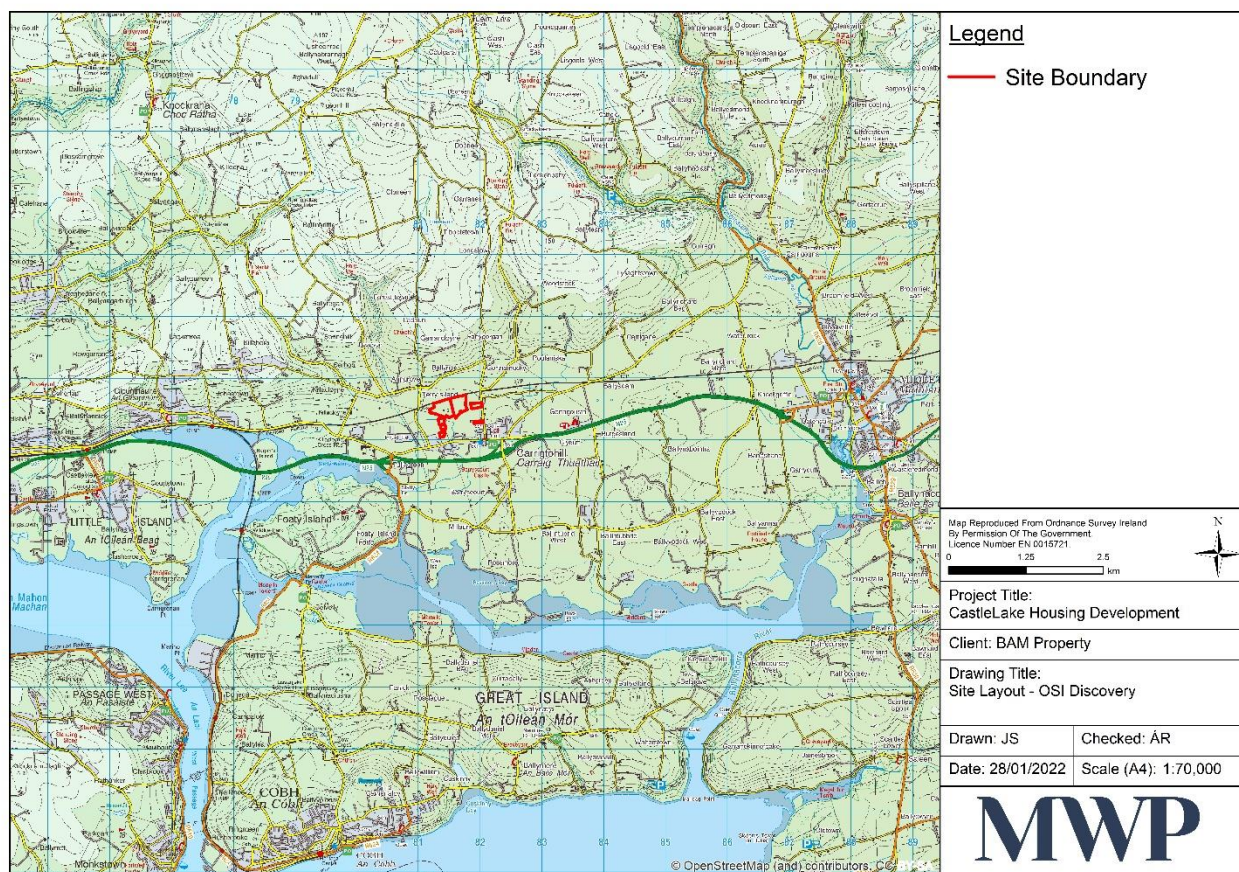


Figure 7-1 Site location

7.4.2 Local Hydrology

The subject site is located within Hydrometric Area No. 19, also known as the Lee, Cork Harbour and Youghal Bay catchment, within the sub catchment 19_2 (Tibbotstown_SC_010). Refer to **Figure 7-2** for overview of the sub-catchment extents.

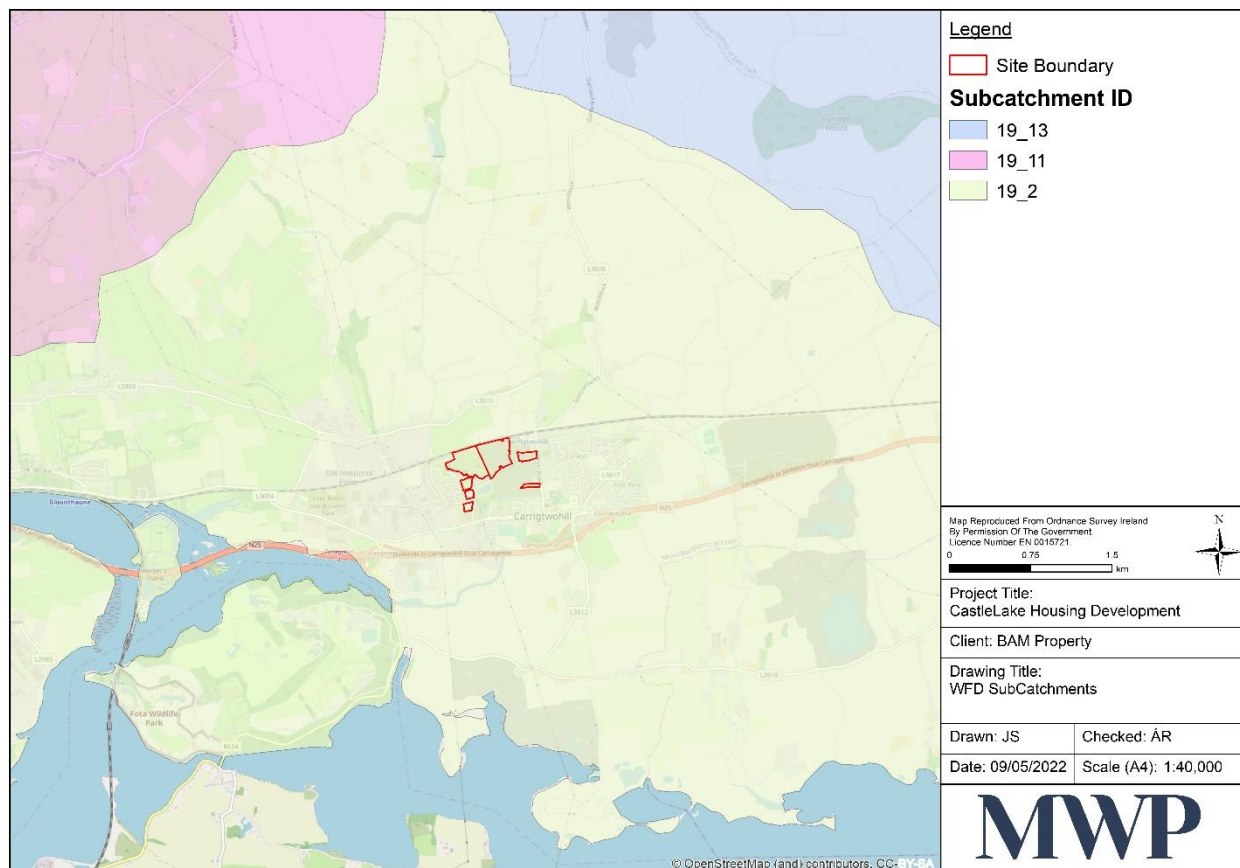


Figure 7-2 Sub-catchment locations

The transitional waterbody of Lough Mahon (Harper’s Island) (IE_SW_060_0700), into which the site ultimately drains is located approximately 1.3 km to the south west. This is hydrologically connected to the Lough Mahon waterbody which in turn feeds into the Cork Harbour coastal waterbody and the Western Celtic Sea. The EPA Water Framework Directive transitional water quality status of Lough Mahon (Harper’s Island) is considered ‘Moderate’ for the period 2013 - 2018. The WFD Risk Score for this transitional waterbody is ‘At Risk’.

Figure 7-3 shows the location of transitional waterbodies in relation to the development site.

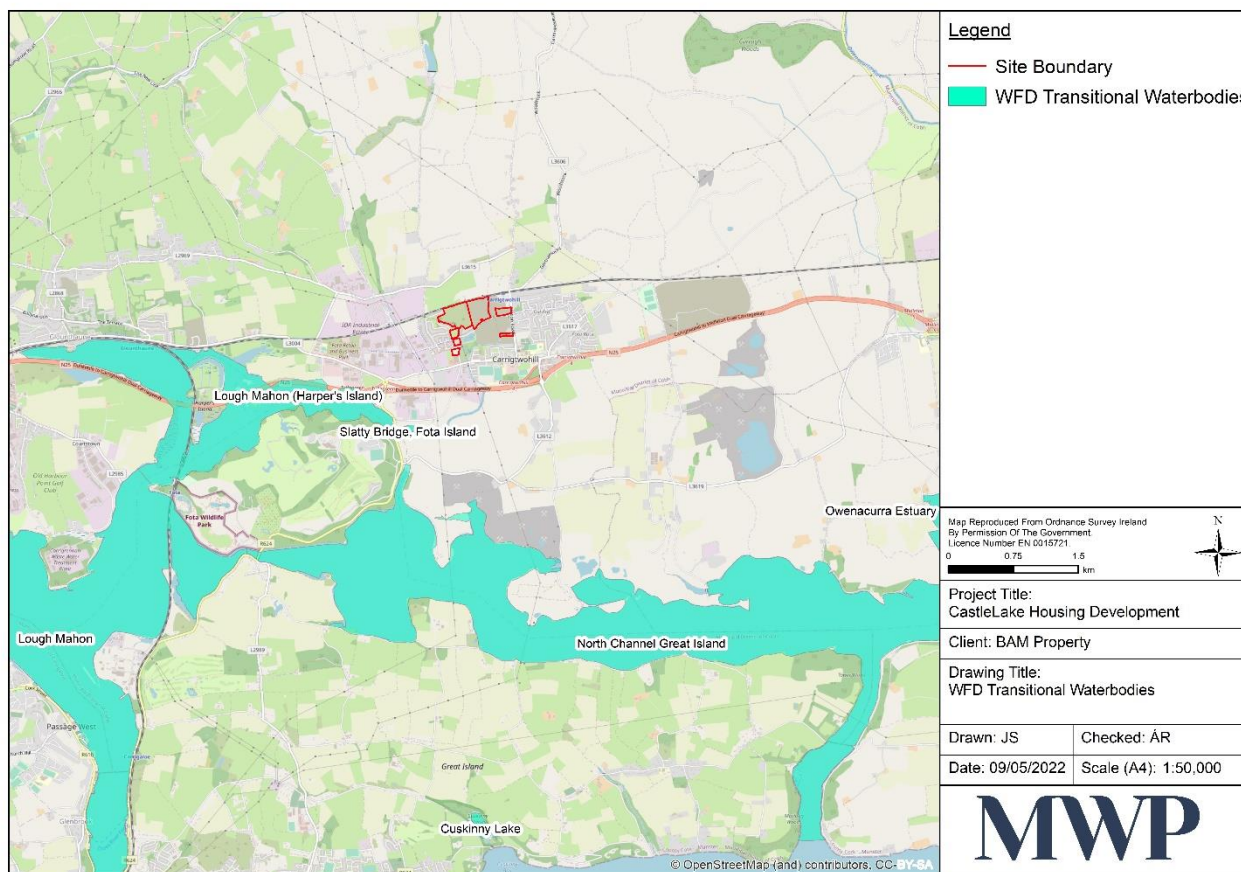


Figure 7-3 Location of transitional waterbody of Lough Mahon (Harper's Island) relative to subject site

There are two designated Natura 2000 sites which are hydrologically connected to the subject site. The two sites in question are Cork Harbour Special Protection Area (SPA) (Site code 004030), and the Great Island Channel Special Area of Conservation (SAC) (Site code 001058). Cork Harbour SPA is designated for 23 species of water birds and the Great Island SAC is designated for the protection of Annex I habitats, mudflats, sandflats, and Atlantic salt meadows. Refer to **Chapter 5 Biodiversity** and the **Natura Impact Statement** submitted with the planning application package for further details.

7.4.3 Site Specific Hydrology

There are several surface waterbodies located both within and adjacent to the proposed development site, the most significant of which is the Woodstock Stream. Refer to **Figure 7-4** for locations of water courses on site.

The course of the Woodstock Stream flows in a south westerly direction along a third class road, under the rail line, through private residential land, into a long culvert at the junction near the railway station and the Bog Road. From here the stream flows in a southerly direction on the western side of Station Road and along the eastern boundary of the proposed development. It then flows westwards in a short open culverted section before flowing south through the adjacent proposed schools campus. The Woodstock Stream then flows east to join the Anngrove stream which flows southwards and under the N25 road embankment, discharging into the Slatty Pond which flows into Lough Mahon.

The Anngrove stream flows in an easterly direction from the existing Castlake housing development where it is culverted before flowing into the existing attenuation pond known as Castlake. The stream outfalls from the attenuation pond and flows south where it joins with the Woodstock stream.

There are also two main open field drains, or drainage ditches, located on site, one flowing in an east to west and one flowing north to south direction through the site.

East to West: An existing open field drain enters the proposed site on its eastern boundary with Irish Rail lands. This waterbody flows under the railway in an existing culvert, prior to entering the site and flows in a westerly direction to connect to the waterbody traveling south through the site. This drainage ditch is subject to a level of disturbance and siltation and is to be culverted locally to allow the proposed development of the site to take place

North to South: An existing culvert crosses the railway line, at the northern boundary of the Castlake development. The culvert connects to an existing 750mm diameter culvert at the southern side of the railway line, which flows in an easterly direction for approximately 230m. From here, this tree-lined drainage ditch, which is steeply sloping and very deep at the northern boundary of the site, turns to flow in a southerly direction through the site before discharging to the Woodstock Stream. This waterbody is to be preserved and will not be culverted for the proposed development. Embankments will be appropriately graded and flow will not be affected during the operational phase of the development.

Plate 7-1 and **Plate 7-2** below show the north-south drainage ditch which is to be retained.



Plate 7-1 View of north-south stream facing south from the northern end of the site



Plate 7-2 View of north-south stream facing north from the southern end of the site

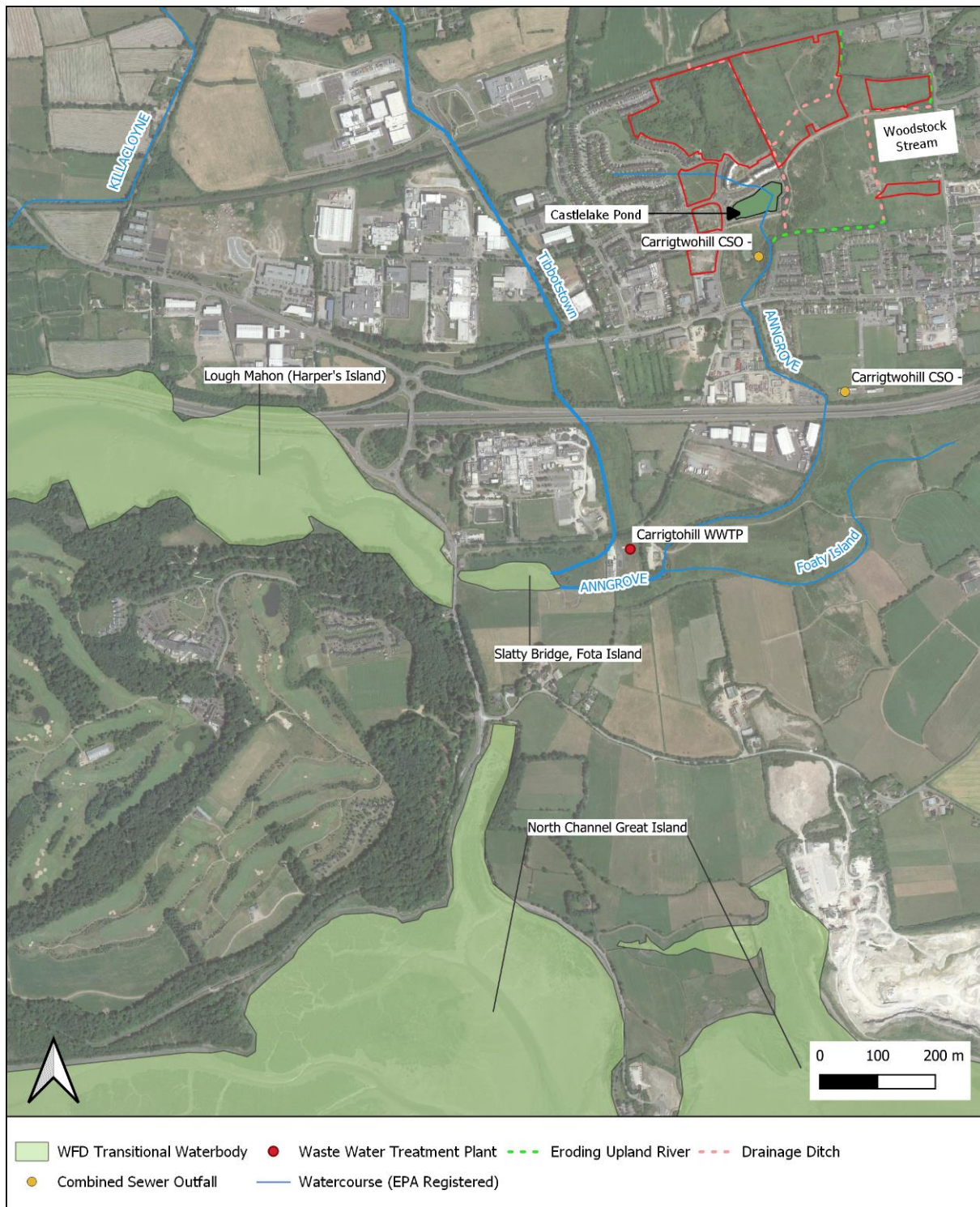


Figure 7-4 Location of surface waterbodies around subject site

7.4.4 Site Drainage

The existing stormwater drainage for the primarily northern section of the existing development is collected via an underground gravity sewer networks and discharges to the feature amenity attenuation lagoon located centrally to the development lands (discussed further below). It is proposed that the section of the proposed development to the northern extents of the site, which is at an elevated level, is also to discharge to the feature amenity attenuation lagoon. The location of the lagoon is shown on **Figure 7-5** below.

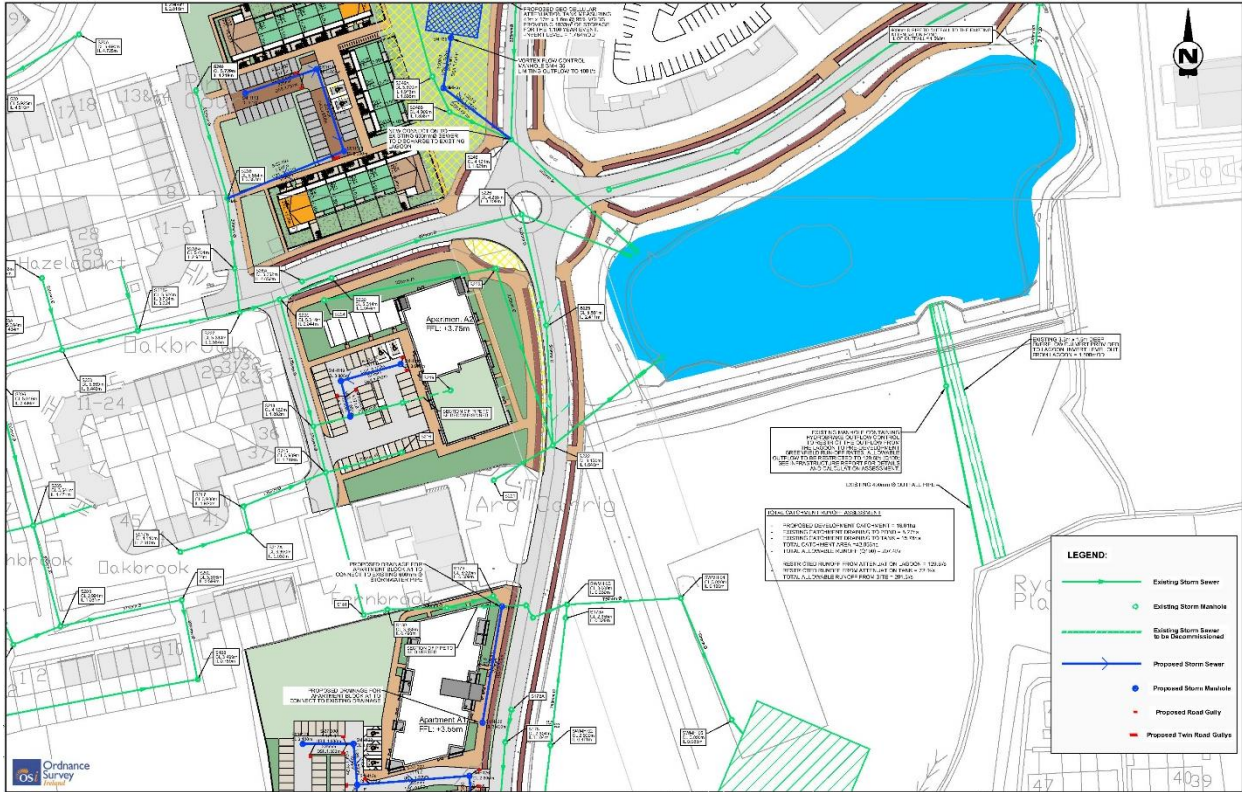


Figure 7-5 Location of surface water attenuation lagoon

The existing stormwater to the area of the existing development to the west of the site is collected via an underground gravity sewer network and discharges towards an underground attenuation system. The stormwater drainage for the primarily western section of the development, which is too low lying to connect to the amenity pond, is proposed to be collected via separate underground gravity sewer networks and discharge to an underground attenuation tank, which will be constructed south of the Castlake lands (Planning ref 00/7607 and 00/676) in Q3 of 2022. The location of the tank is shown on **Figure 7-6** below.

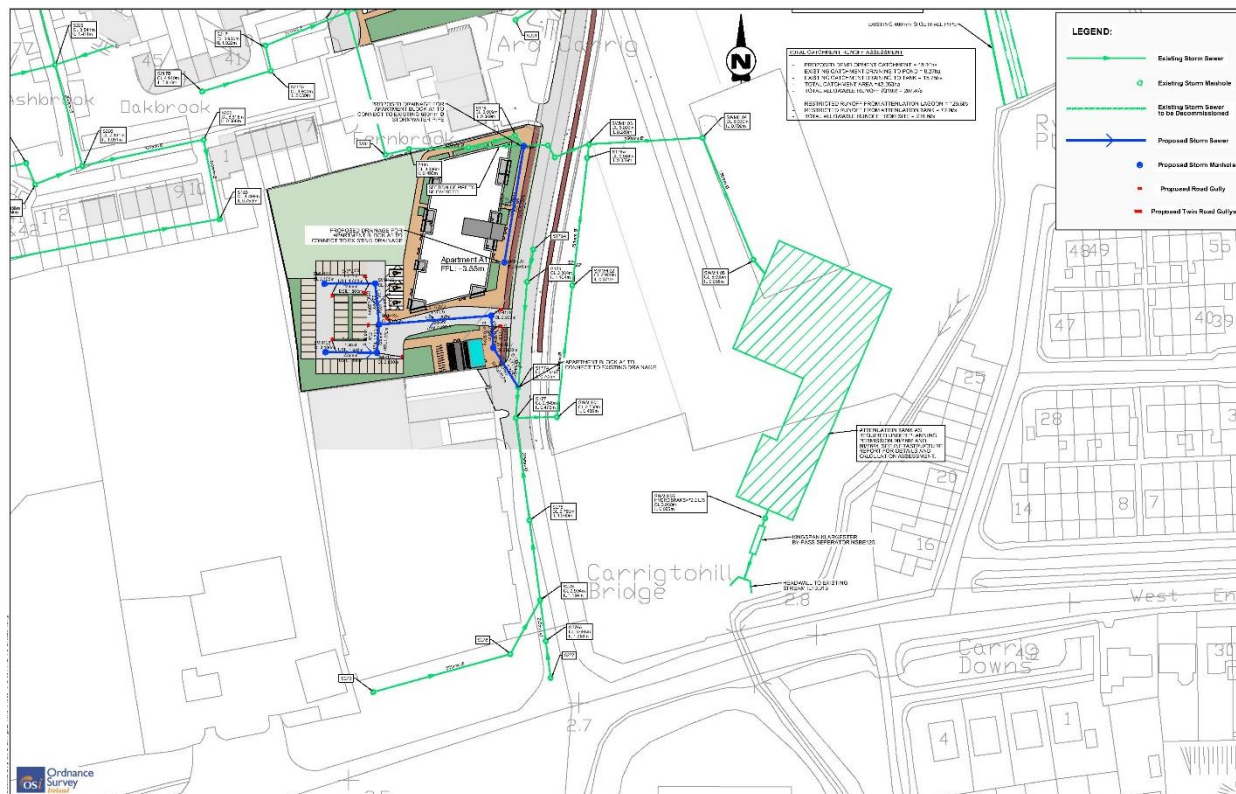


Figure 7-6 Location of underground attenuation tank

7.4.5 Hydrogeology

There are no GSI groundwater wells and springs within the site boundary. There are several groundwater monitoring and abstraction wells within a 2km radius of the site. Refer to **Figure 7-7**, below for the location of nearby groundwater wells.

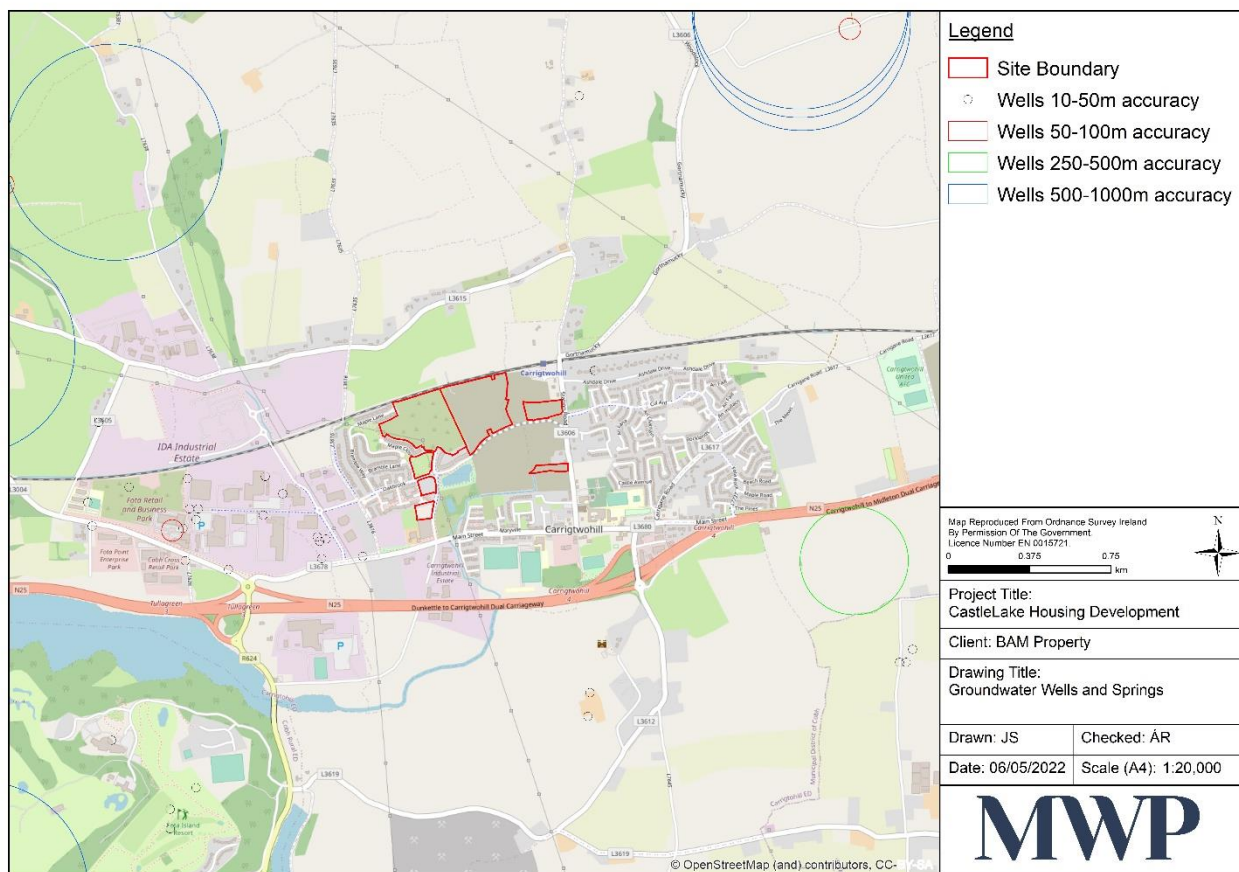


Figure 7-7 GSI Groundwater Wells and Springs

The Water Framework Directive (WFD), established under the European Communities Directive 2000/60/EC, required ‘Good Water Status’ for all European water by 2015, to be achieved through a system of river basin management planning and extensive monitoring. ‘Good status’ means both ‘Good Ecological Status’ and ‘Good Chemical Status’.

The Groundwater Body underlying the site is the Industrial Facility (P0016-02) Groundwater Body (GWB) (EU code: IE_SW_G_089)). Currently, the EPA (2020) classifies the GWB as having WFD Status (2013-2018) of ‘Good’, with a current WFD risk score of 2b, ‘Expected to achieve good status’. **Figure 7-8** below presents the most recent data from the EPA website on groundwater body risk.

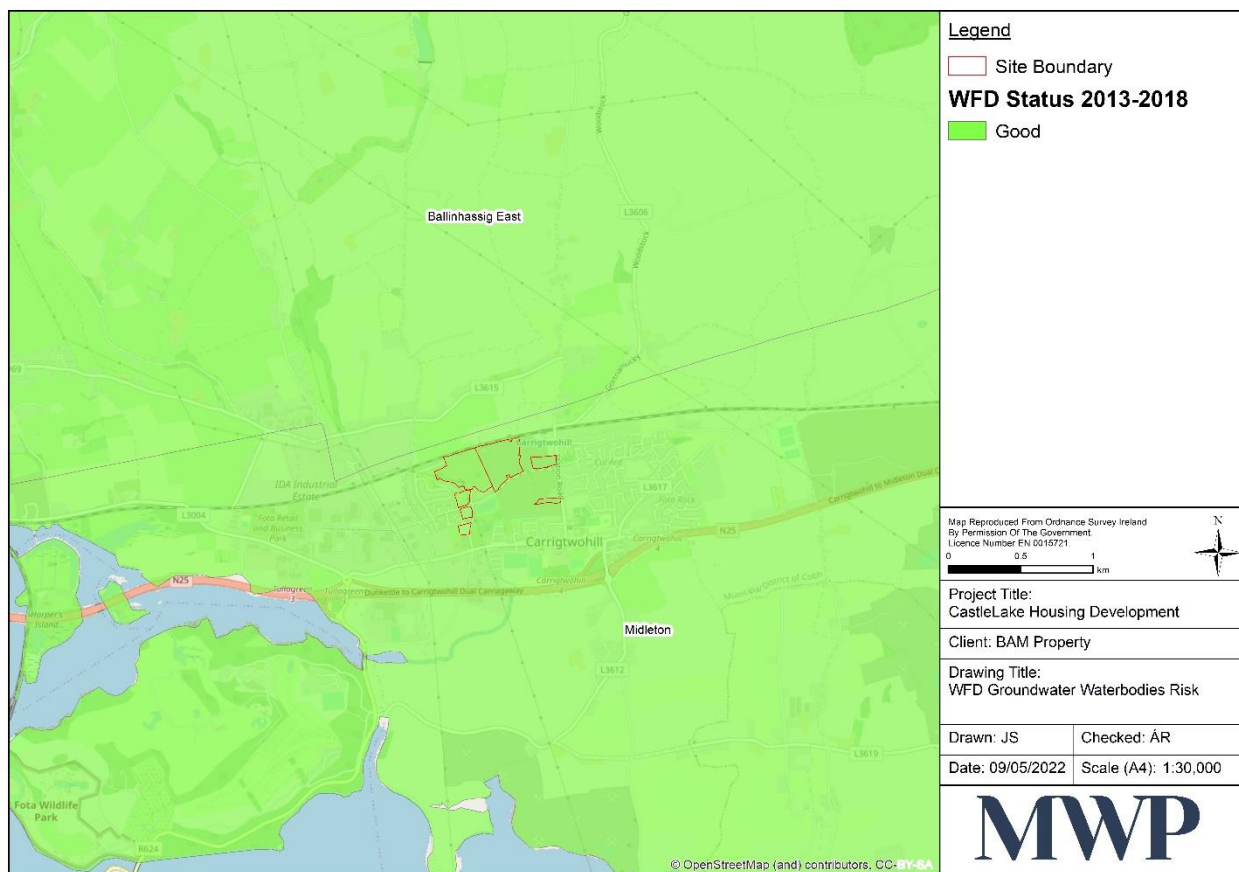


Figure 7-8 EPA Groundwater Body Risk

There are two bedrock aquifers underlying the site, according to the GSI (www.gsi.ie/mapping). The northern portion of the site is underlain by a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones (LI). The southern portion of the site is underlain by a Regionally Important Aquifer –Karstified (diffuse) (Rkd). Rkd aquifers are those in which flow is more diffuse (opposed to conduit flow karstified aquifers (Rkc)), storage is higher, there are many high yielding wells, and development of bored wells is less difficult than conduit karstified aquifers. **Figure 7-9** shows the aquifer extent and location beneath the site.

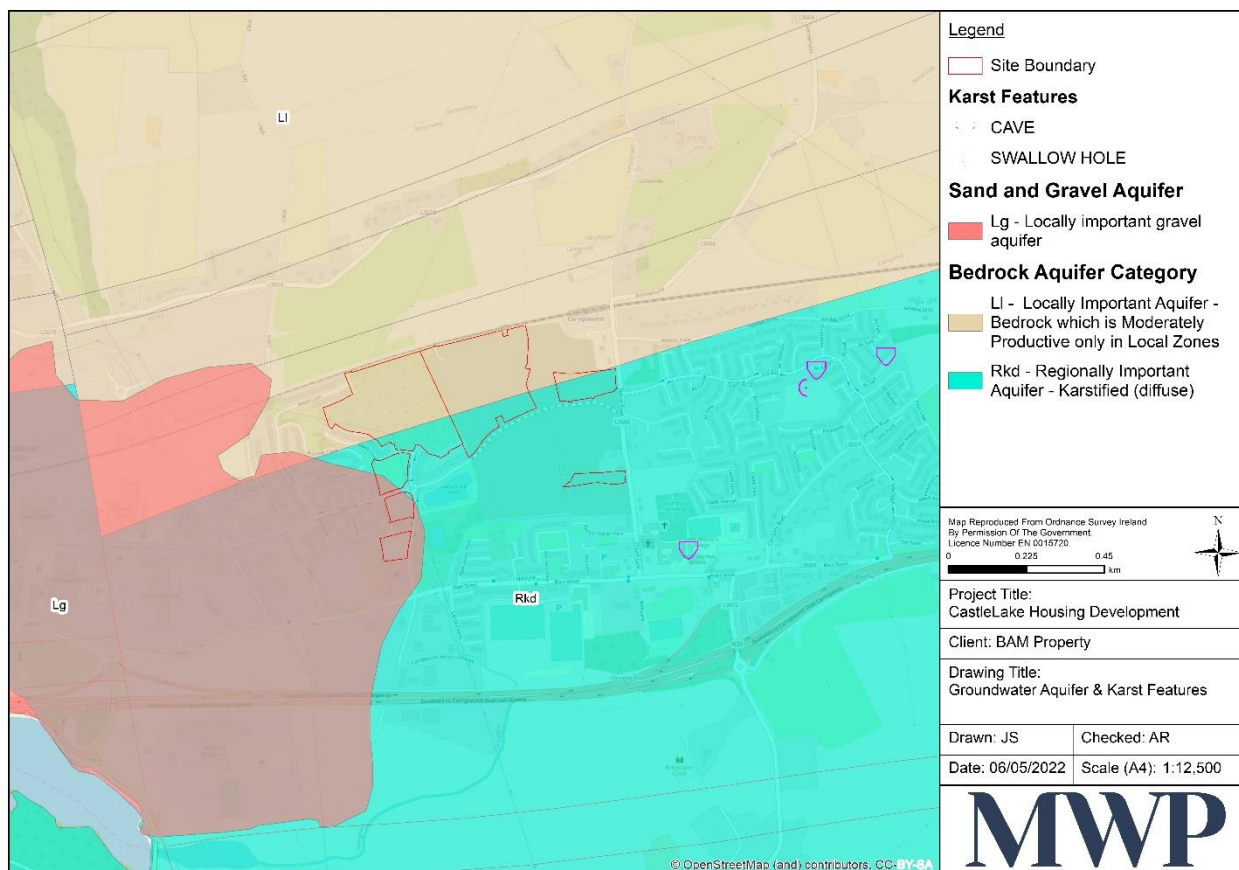


Figure 7-9 Bedrock Aquifer Classification

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Mapping provided by the GSI indicates that the majority of the site is underlain by aquifer of moderate vulnerability. A portion of the site to the southwest, in the Castlelake South and Castlelake West land parcels, is underlain by aquifer of High vulnerability. Refer to **Figure 7-10**, below for groundwater vulnerability mapping beneath the site and the greater area.

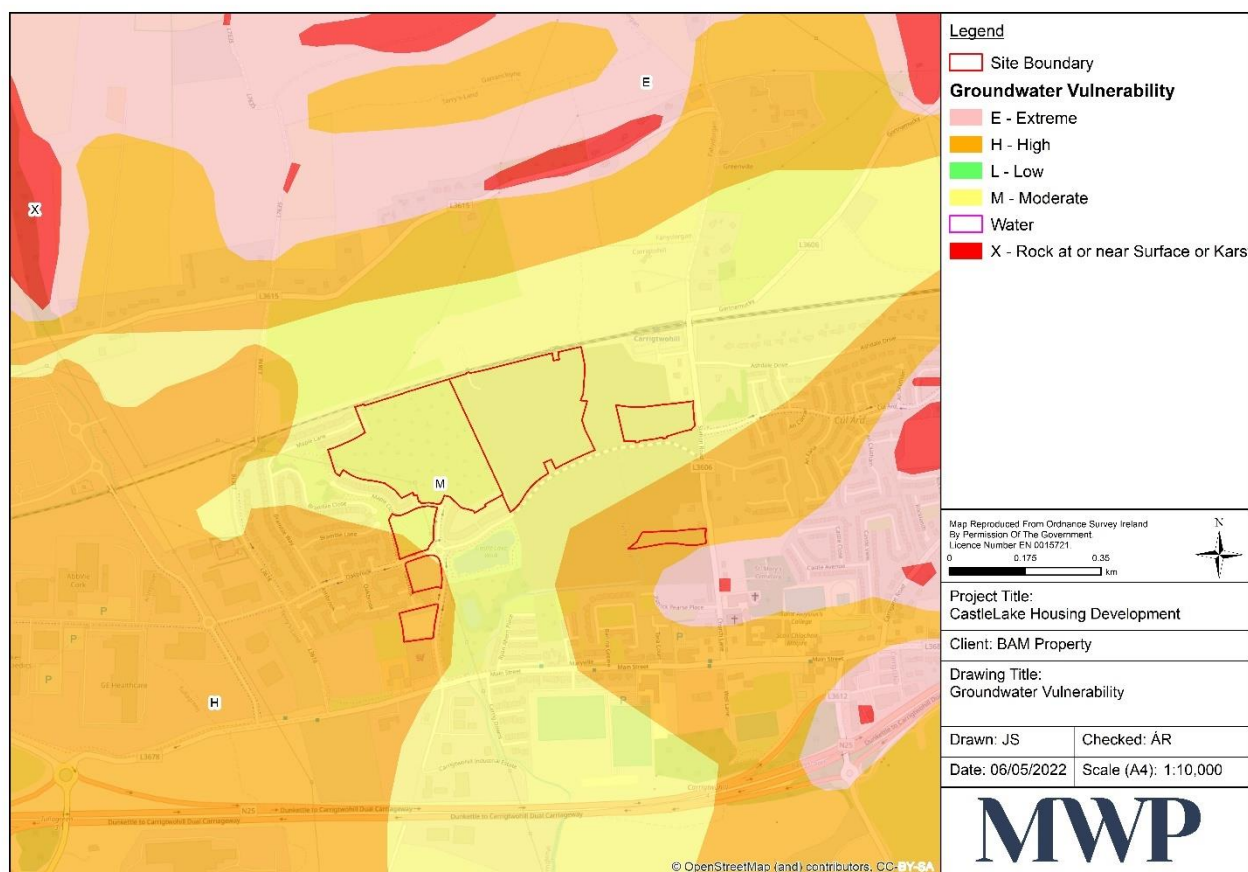


Figure 7-10 Groundwater Vulnerability Classification

The flow direction in the overburden generally follows no fixed pattern or trend. Flows of this nature are typical of low permeability clay strata with intermittent fill areas, where often the water level measures represent pore water seepages into the overburden monitoring well (opposed to bedrock wells) or perched groundwater conditions (not bedrock aquifer water).

The onsite gradient infers a north-south groundwater flow orientation towards Lough Mahon. Although due to the karstified nature of the bedrock a more diffuse flow can be expected. Regionally the flow would be expected to be from north to south towards Lough Mahon.

7.4.6 Flood Risk

A Flood Risk Assessment (FRA) was undertaken by JBA to support the planning application for the project.

A review of the available sources of flooding indicates there are no instances of historic flooding on-site, but there may be a risk from moderate-probability fluvial and pluvial events. According to the FRA report the majority of the proposed development on-site is located within Flood Zone C. The proposed development within Flood Zone C is deemed appropriate. For development within Flood Zones A and B, mitigation measures have been proposed to manage the ongoing risk of inundation from coastal and fluvial sources.

To summarise, the FRA concludes that the site is not at risk of flooding nor will the project have an adverse impact on flooding. The Flood Risk Assessment report is provided in **Appendix 7.1**.

7.4.7 Water Quality

The water features at proposed development site (PDS) were examined in February 2022. The entire length of the water features were assessed qualitatively using methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). Watercourses were photographed at various locations throughout the study area. Anthropogenic influences on fluvial and riparian habitats were noted along the surveyed stretches.

Most water features at the proposed development site are highly modified and/or artificial. With regard to the drainage ditches located on the site, these waterbodies are of low ecological value due to their homogenous character (trapezoidal cross section, few substrate types), level of recent disturbance and degree of siltation. The Woodstock stream which flows along the site boundary is physically diverse, with a combination of rock, cobble, gravel and fine substrates as well as various flow features, and is considered to be of Local importance (higher value).

7.5 Likely Significant Impacts and Effects

This section addresses the potential impacts on the hydrological environment from activities arising during construction and operation of the proposed development and makes a determination on the likelihood of occurrence. The project has incorporated some elements of mitigation into the construction and operational design of the project. Assessments are therefore based on this being implemented.

7.5.1 Construction Phase

7.5.1.1 Impacts on Hydrology and Hydrogeology

In considering the receiving environment and the proposed activities, the principal issues relating to the hydrological environment on the site during the construction phase are the potential impairment of water courses associated with surface water run-off and de-watering during excavations, mobilisation of sediment and accidental spillages / leaks of substances from machinery such as lubricants, fuels, oils and concrete wash out.

For details of the surface water management drainage during the construction phase, refer to the information provided in the CEMP, **Appendix 2.1** of Volume 3.

7.5.1.1.1 Impacts of phased development on assessment

As described previously in Chapter 2 Description of the Proposed Development, the project will be developed on a phased basis over a period of approximately 10 years. There will be a total of five phases. The potential for impacts on water resources from the proposal will vary slightly in each phase.

The existing drainage ditch which flows from north to south through the centre of the site has the greatest potential to be impacted during the Phase 1 and 2 developments. It is proposed to retain this drain as a water feature during the operational phase and it will therefore not be culverted. Surface water management controls implemented during the construction phase will ensure that there is minimal impact on the flow or quality of the drain during Phase 1 or 2, or during any of the concurrent phases of development.

The quality, significance and duration/frequency of effects on surface and groundwater will vary. For drainage ditches that are being culverted effects will be **slight adverse permanent and likely to occur**. In the case of drainage ditches which are being retained, **slight adverse short-term effects are likely** during the construction phases. Effects on groundwater are **imperceptible short term and unlikely to occur**.

7.5.1.1.2 Excavation

There is potential for contamination to the underlying bedrock aquifer and to local watercourses from increased suspended solids and mobilisation of existing contamination within the disturbed soil resulting from excavations during the construction phase. The removal of subsoil across the site can also theoretically increase the vulnerability of the underlying aquifer and impair water quality in watercourses. The site is underlain by a bedrock aquifer mapped by the GSI as having a Moderate vulnerability. The depth of existing overburden and the application of good construction practice will significantly reduce the risk of sediment mobilising and impacting on the underlying groundwater regime. Excavation depths across the site during construction are not expected to intercept with the water table. However, there remains some potential for groundwater levels to be affected due to excavations, however these levels will rebound to normal levels following completion of the works.

It is considered that potential impacts on groundwater levels and quality from excavations during the construction phase of the proposed development are **not significant short term and unlikely to occur**.

Considering that there are several existing watercourses on the site, including the Woodstock Stream and the north – south drainage ditch which is to be retained, there is potential for excavation works to cause adverse effects during the construction phase. The implementation of good practice and a surface water management plan during construction will reduce the risk of contamination to watercourses. It is likely that water levels will be affected during construction. These levels will rebound to existing levels following completion of the works.

It is considered that **slight adverse short-term effects** on hydrology are **likely** to occur as a result of excavations during construction in the absence of mitigation.

7.5.1.1.3 Accidental spillage

The potential spillage of hydrocarbons from fuel and oils used during construction have the potential to contaminate adjacent watercourses and the underlying ground water on the site. Water quality can therefore be disimproved in adjacent and other local watercourses. Groundwater may also be affected through percolation of contaminants. It is considered that there is a short term moderate risk to water quality during construction. However, good construction practice and the implementation of all measures outlined in the preliminary CEMP will effectively reduce the potential for impacts on water quality on the site. Effects are therefore considered unlikely to occur.

It is considered that **significant adverse short-term effects** on surface and groundwater may occur without mitigation.

7.5.2 Operation Phase

7.5.2.1 Impacts on Hydrology and Hydrogeology

The operational phase of the development will represent a permanent change to the existing environment. Drainage ditches will be controlled using culverts in certain areas and for the safety of residents. It is proposed to retain the existing drain which currently flows in a north – south direction through the centre of the site. The stream will be retained as a water feature and as a green/amenity corridor through the site for the operational phase.

The surface water generated by the proposed development will be collected by rainwater pipes located at building perimeters and by road gullies to the roads and hardstanding areas, with the run-off directed towards the new surface water gravity sewer system to be provided for the proposed development. The stormwater will flow by gravity towards either the existing attenuation lagoon or the underground attenuation tank.

The lagoon has been designed to cater for this proposed development. The lagoon discharges attenuated flows to the Woodstock Stream, to the south of the site. Surface water collected at the lagoon will be attenuated to pre-development

greenfield rates of run-off, prior to discharge to the Woodstock Stream. The location of the lagoon was previously shown on **Figure 7-5**, above.

The underground attenuation tank will be located to the south of the Castllake lands, as shown previously on **Figure 7-6** above. The tank structure discharges to the Woodstock Stream to the south of the site and is designed to cater for the requirements of the proposed development. It is designed to provide sufficient storage capacity to restrict run-off from the developed catchment to that equivalent to the pre-development greenfield run-off rates.

The RPS infrastructure report which describes the proposed drainage systems described above is provided in **Appendix 9.1**. Associated surface water drainage drawings are provided in **Appendix 9.4**.

The operational phase of the development will represent a permanent change to the existing hydrological regime. The flow of drainage ditches on the site will recover following construction and be unchanged during operation. These and other adjacent watercourses will therefore be unaffected.

There will be a significant increase in the surface area of impermeable surfaces across the site which has the potential to reduce drainage and increase surface water run off rates, however the attenuation system has been designed to provide sufficient storage capacity to restrict run-off from the developed catchment to that equivalent to the pre-development greenfield run-off rates.

A flood risk assessment which was undertaken for the proposed developed determined that the proposed development will not increase the risk of flooding on the site. The flood risk assessment is provided in **Appendix 7.1**.

Having considered the existing hydrological and hydrogeological regime and the proposed development, including the operational surface water management protocols outlined previously, it is **likely** that there will be a **not-significant permanent effect** on hydrology and a **neutral long term effect** on hydrogeology.

7.5.3 Do-Nothing

In the event of a do-nothing scenario the existing hydrology and hydrogeology of the site will remain unaffected.

7.5.4 Cumulative Impacts and Effects

Cumulative effects relates to the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.

A number of planning applications and planning permissions which are relevant to the proposed development are currently underway or at design stage. These projects are described in greater detail in Chapter 2 Project Description and are listed as follows:

- 18/5707 Station Road Schools Campus
- 19/5836 Internal road upgrades, IDA Business Park
- Carrigtwohill URDF–Public Realm Infrastructure Bundle
- Bury’s Bridge Cycleway
- Carrigtwohill–Middleton Inter-Urban Cycleway Phase 1

The plans and projects outlined above have or will be put through a rigorous design process for obtaining planning permission. Where relevant these projects/plans have incorporated Construction Environmental Management Plans and Appropriate Assessments to ensure that there will be no adverse effects on hydrology or hydrogeology.

A Natura Impact Assessment was completed for the proposed development and determined that there will be no adverse impacts on any qualifying species of protected Natura 2000 sites. Additionally, mitigation measures will be implemented as part of this EIAR and the CEMP to ensure that there will be no significant adverse effects on the hydrological or hydrogeological regime pertaining to the development site.

Having considered the implementation of good construction practice and design for the proposed development and other development in the surrounding area, no cumulative effects are anticipated.

7.6 Mitigation and Monitoring

Proposed mitigation measures for the development are outlined in the following sections.

The project will be developed in accordance with the control measures outlined below. The following guidance documents were referenced in developing mitigation measures specific to water:

- CIRIA 532 (2001) Control of Water Pollution from Construction Sites–Guidance for consultants and contractors
- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in adjacent to Waters
- Fisheries Guidelines for Local Authority Works (Department of Marine and Natural Resources, 1998)

The control measures and monitoring requirements listed in this section must be implemented throughout the project.

7.6.1 Drainage and Sediment Control

Control measures to be implemented include:

- Contact will be maintained with the relevant authority such as the Inland Fisheries Ireland when required.
- Special attention will be paid to minimising the opportunities for wash-off of inert solids(usually from exposed soil mounds, embankments or excavated trenches etc.) from entering watercourses. Silt traps and interceptors will be used where necessary.
- Care will be taken to avoid interference with the supply or quality of any ground water resource.
- Waste products associated with the works will not be permitted to enter watercourses adjacent to the works through the use of French drains, petrol interceptors or other agreed methods.
- Water that is high in solids or contaminated with cement or oil, will not be pumped from excavations directly to watercourses without pre-treatment (e.g. sedimentation/filtration and oil separation).
- All site run-off associated with the construction will be directed to storm control areas or tanks to prevent direct discharge into the river.
- All operational machinery used in-stream will be kept to an absolute minimum.
- Spill kits will be provided at all river locations identified.
- Fuels, oils, greases and hydraulic fluids will be stored in bunded compounds well away from watercourses. Refuelling of machinery, etc. must be carried out in bunded areas. Fuels will be stored during the construction phase in bunded fuel storage tanks with a110% holding capacity. Where it is necessary to dispense fuels on site, this will be undertaken in areas covered with an impermeable surface to protect surface water and ground water;
- Construction works, especially ones involving the pouring of concrete, will be conducted in the dry where possible. Precast concrete will be used in preference to uncured concrete, which kills aquatic fauna through

alteration of stream pH. When cast-in-place concrete is required, all work will be done in the dry where possible and allowed cure for 48 hours before re-flooding.

- To help prevent the contamination of the ground and groundwater, contaminated materials (oils, fuels, chemicals etc.) will be used and stored in an appropriate manner as outlined in the relevant guidance, i.e. CIRIA (2001) and DMRB Volume 11 (1994).

7.6.2 Temporary Construction Compound

- Drainage within the temporary site compound will be directed to an oil interceptor to prevent pollution if any spillage occurs.
- Temporary toilet facilities will be managed by the Contractor during the construction phase.
- A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc.
- The compound will be in place for the duration of the construction phase and will be removed once commissioning is complete.

7.6.3 Storage and Stockpiles

- Temporary stockpiles of excavated earth will be constructed within the lands during construction.
- Stockpiles will be located away from drainage systems and silt retaining measures (silt fence/silt curtain or other suitable materials) to reduce risk of silt run-off shall be installed along the downgradient edges of stockpiled earth materials.
- All excavated materials from the site or introduced materials for construction will be either used or removed from the site.
- No permanent spoil or stockpiles will be left on site, other than those materials required for landscaping, berm construction and construction generally.
- Temporary storage areas for fuels and other hazardous materials required by the contractor during construction will be stored in appropriately bunded facilities to prevent the accidental spillage of hazardous liquids that could cause soil and groundwater contamination.
- Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider.
- On-site washing of concrete truck barrels should not be allowed. The washing of the chutes at the rear of the trucks may be permitted. A designated wash area will be required.

7.6.4 Construction Wheel Wash

A Construction Wheel Wash will be used to wash truck tyres leaving the construction site. Water residue from the wheel wash will be fed through a settlement pond, interceptor and then discharge to the stormwater drainage network. The wheel wash area will be cleaned regularly so as to avoid the build-up of residue.

7.6.5 Monitoring

Surface water quality should be regularly inspected during construction to ensure the surface water management controls are operating correctly. In line with Section 8.1.2 of the EMP, Water quality monitoring will be conducted regularly when work on or close to existing water courses.

7.7 Residual Impacts and Effects

Section 7.7.1 and 7.7.2 below outline the residual effects of the proposed development pre and post mitigation during the construction and operational phases of the development respectively.

7.7.1 Construction

Element of Work	Receptor	Effect (Pre-Mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
Phasing of development	Culverted drainage ditches	Likely slight adverse permanent	Refer to Section 7.6	No change
	Retained drainage ditch	Likely slight adverse short term		
	Hydrogeology	Unlikely imperceptible short term		
Excavations	Hydrogeology	Unlikely not significant short term	Refer to Section 7.6	No change
	Hydrology	Likely slight adverse short term		Unlikely slight adverse short term
Accidental spillages	Hydrology and Hydrogeology	Likely significant adverse short term	Refer to Section 7.6	Unlikely not significant short term

7.7.2 Operational Phase

Receptor	Effect (Pre-Mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
Hydrology	Likely not significant permanent	Refer to Section 7.6	No change
Hydrogeology	Neutral long term		

7.8 Risk of Major Accidents and Disasters

This section presents an assessment of the vulnerability of the proposed housing development in relation to major accidents and disasters. It assesses the likelihood of the proposed housing development to cause an increased risk of major accidents and disasters.

Major accidents can relate to any incident, technological or otherwise, which has the potential to have a significant impact on the facility or on the receiving environment. Examples of major accidents which have such potential are fire, explosion, traffic collisions, contamination and pollution.

A natural disaster is an all-encompassing term which describes any severe natural event which has the potential to cause disturbance to an individual, development or population. The severity depends on the receptor and the type of disaster. Examples of natural disasters are earthquakes, flooding, tsunamis, lightning strikes, hurricanes or any other extreme natural event. This section has considered the potential increased risk of such events occurring as a result of climate change, such as sea-level rise and increased frequency in the occurrence of extreme weather events.

The principle risk associated with the proposed development relates to increased flood risk due to the increase in impermeable hard standing across the site. As discussed previously under **Section 7.4.4**, a Flood Risk Assessments (FRA) was undertaken. The reports concluded that the site is not at risk of flooding nor will the proposal have an adverse impact on flooding.

It is considered that there is no potential for the proposed SHD development to cause a major accident or disaster. Furthermore, there is no increased risk to the development from a major accident or disaster.

8. Air Quality and Climate

8.1 Introduction

This chapter considers the potential effects on air quality and climate arising from the proposed housing development. A full description of the proposed development, development lands and all associated project elements is provided in **Chapter 2** of this EIAR. The nature and probability of effects on air quality and climate arising from the overall project has been assessed for both the construction and operational phases.

8.1.1 Competency of Assessor

The assessment was completed by Valerie Heffernan BSc, MSc. Valerie has worked as an environmental professional since graduating in 2015 and has been employed as an Environmental Scientist with Malachy Walsh and Partners since 2018. She has managed and been a contributing author on several EIA projects.

8.2 Methodology

The methodology used for this study included desk-based research of published information. At a local level, the existing air quality at the site was characterised. The scale and duration of the construction works was examined and its potential to significantly impact on local air quality and climate assessed. Mitigation measures are described to minimise the potential effects. The local climate was characterised based on 30-year averages measured at a representative weather observatory.

8.2.1 Legislation, Guidelines and Best Practice

8.2.1.1 Air Quality and Climate - Construction Phase

The Environmental Protection Agency manages the ambient air quality monitoring network. In order to protect our health, vegetation and ecosystems, EU directives set down air quality standards in Ireland and the other member states for a wide variety of pollutants. These rules include how we should monitor, assess and manage ambient air quality.

The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) was published in May 2008 and was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011).

There will be some pollutants named in the CAFÉ directive arising during construction from plant and machinery exhaust emissions. These include carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM₁₀). However, these emissions will be minor and temporary, will be quickly dispersed and will not exceed the limit values (refer to **Table 8-1**) as set out in the CAFÉ Directive 2008/50/EC.

Table 8-1 Limit values of CAFÉ Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m3	Basis of Application of the Limit Value
SO ₂	Protection of human health	1 hour	350	Not to be exceeded more than 24 times in a calendar year
SO ₂	Protection of human health	24 hours	125	Not to be exceeded more than 3 times in a calendar year
SO ₂	Protection of vegetation	calendar year	20	Annual mean
SO ₂	Protection of vegetation	1 Oct to 31 Mar	20	Winter mean
NO ₂	Protection of human health	1 hour	200	Not to be exceeded more than 18 times in a calendar year
NO ₂	Protection of human	calendar year	40	Annual mean
NO + NO ₂	Protection of ecosystems	calendar year	30	Annual mean
PM ₁₀	Protection of human health	24 hours	50	Not to be exceeded more than 35 times in a calendar year
PM ₁₀	Protection of human	calendar year	40	Annual mean
PM _{2.5} -	Protection of human	calendar year	25	Annual mean
PM _{2.5} -	Protection of human	calendar year	20	Annual mean
Lead	Protection of human	calendar year	0.5	Annual mean
Carbon Monoxide	Protection of human health	8 hours	10,000	Not to be exceeded
Benzene	Protection of human	calendar year	5	Annual mean

There is greater potential for temporary nuisance to occur as a result of fugitive dust from the excavation and transport of soil and materials during construction. The National Roads Authority (NRA) has published guidance for assessing dust impacts at a local level from road construction ('Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes'). Similar construction methodologies will be used during the proposed development therefore it is considered appropriate to adopt the criteria described in **Table 8-2**, which are taken from the aforementioned NRA guidance document.

Table 8-2 provides a list of distances at which dust could be expected to result in a nuisance from construction sites for impacts such as soiling, particulate matter (PM₁₀) deposition and vegetation effects. These distances present the potential for dust impact with standard mitigation in place. The proposed development is considered a moderate construction site.

Table 8-2 Assessment Criteria for the impact of dust from construction with standard mitigation in place

Source		Potential distance for significant effects (distance from source)		
Scale	Description	Soiling	PM ₁₀	Vegetation
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

The Climate Action Plan 2021 has outlined Ireland’s National Climate Target’s. The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to reach a legally binding target of net-zero emissions no later than 2050, and a cut of 51% by 2030 (compared to 2018 levels). Under the 2021 Act, Ireland’s national climate objective requires the state to 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.

8.2.1.2 Air Quality and Climate - Operational Phase

Once operational, the proposed Castlelake residential development may impact on air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development. Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values.

The Net Zero Energy Buildings standard applies to all new buildings occupied after the 31st December 2020. The definition for Nearly Zero Energy Buildings (NZEB) in the Energy performance in Buildings Directive (EPBD) is "a very high energy performance, as determined in accordance with Annex 1, The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby". There will be no natural gas supplies to the development. Further 5% of the total apartments & Duplex parking spaces will be allocated as Electric Vehicle (EV) spaces.

The proposed development is in line with objectives set out in the 2021 Climate Action Plan.

8.2.2 Study Area

The Study Area for the purpose of this assessment of Air Quality and Climate primarily focuses on the local receiving environment in the vicinity of the proposed development site. The proposed development site is located in Carrigtwohill 16km east of Cork city and 9km east of the Jack Lynch tunnel, on the northern side of the N25 Cork to Waterford road. The proposed development is located circa 500m west of Carrigtwohill village.

The site is bounded by the railway line and agricultural lands to the north, the existing Castlelake housing estate to the west and the Cork Road L3680 to the south. In 2016, there were 7,334 persons living in Carrigtwohill, 8,922 in Middleton Rural and 8,353 in Cobh Rural Electoral Divisions.

Traffic on the local road network emits Carbon Dioxide (CO₂) and Nitrox Oxides (NO_x) from vehicle exhausts. Agricultural practices on nearby farmland generate methane (CH₄) emissions. Representative Environmental Protection Agency (EPA) ambient air quality data has been used to characterise the existing air quality in the area. Designated or ecological sites within the vicinity of the site location include Cork Harbour SPA (004030) and Great Island Channel SAC (001058) that are sensitive to low levels of dust or minor exhaust emissions within or near the site boundary. Where potential impacts could occur, these are addressed in the biodiversity chapters.

8.2.3 Scope of Assessment

The aim of this assessment is to consider whether the proposed development would be likely to result in significant air quality and climate impacts. The cumulative effect of the proposed development in combination with neighbouring existing and permitted developments is then assessed to determine any likely significant air quality and climate impacts.

8.2.4 Statement on Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of this impact assessment.

8.3 Baseline Environment

There are several large urban centres within approximately 16 km of the proposed development site, the largest of which is Cork City which lies approximately 16km to the west (population 125,657, CSO 2016) and the town of Middleton (population 12,232, CSO 2016) lies approximately 6 km east. Along with local traffic (CO₂, NO_x), within Carrigtwohill these urban centres are the largest nearby potential sources of pollution.

The proposed development is with 1km of estates in Castl lake, to the west, Carrigtwohill to the south and Cois Carrigtwohill to the east. Carrigtwohill provides a range of local community facilities, including primary schools, sporting clubs, churches, general shops, and post offices.

The site can be directly accessed from the Cork Road L3680 and from the west via the Castl lake housing estate. The N25 is easily accessible at junctions to the west and east of the site. Traffic on the local road network emits Carbon Dioxide (CO₂) and Nitrox Oxides (NO_x) from vehicle exhausts. Agricultural practices on nearby farmland generate methane (CH₄) emissions.



Figure 8-1 Site Location

8.3.1 EPA Air Quality Index for Health (AQIH)

Representative Environmental Protection Agency (EPA) ambient air quality data has been used to characterise the existing air quality in the area. The EPA's Air Quality Index for Health (AQIH) is a number from one to ten that describes the current air quality in a region. A ranking of 10 means the air quality is 'Very Poor' and a ranking of 1 – 3 inclusive means that the air quality is 'Good'. The AQIH is calculated on an hourly basis using representative sampling from each region. There are six regions as follows: Dublin, Cork, Large Towns (>15,000 population), Small Towns (5,000 – 15,000 population), Rural East and Rural West. The AQIH is based on measurements of five air pollutants all of which can harm health. The five pollutants are:

- Ozone gas
- Nitrogen dioxide gas
- Sulphur dioxide gas
- PM2.5 particles and
- PM10 particles

The AQIH is calculated on an hourly basis using representative sampling from each region. Each region is ranked 1 – 10 (as outlined above). There is no accompanying health message for at risk groups and the general population in areas classed as 'Good'. Outdoor activities can be enjoyed as usual. In areas of 'Fair to Poor' air quality i.e. AQIH ranking 4 to 10 certain types of outdoor activity should be restricted or avoided for at risk individuals and the general population depending on the AQIH ranking. The AQIH is calculated every hour. The index was accessed via the EPA's website (<https://gis.epa.ie/EPAMaps/>) on the 25th April 2022. Carrigtwohill and the proposed development are located on the boundary of Rural West AQIH Region 6. The air quality in this area is currently ranked as '3 - Good'. Refer to **Figure 8-2**.

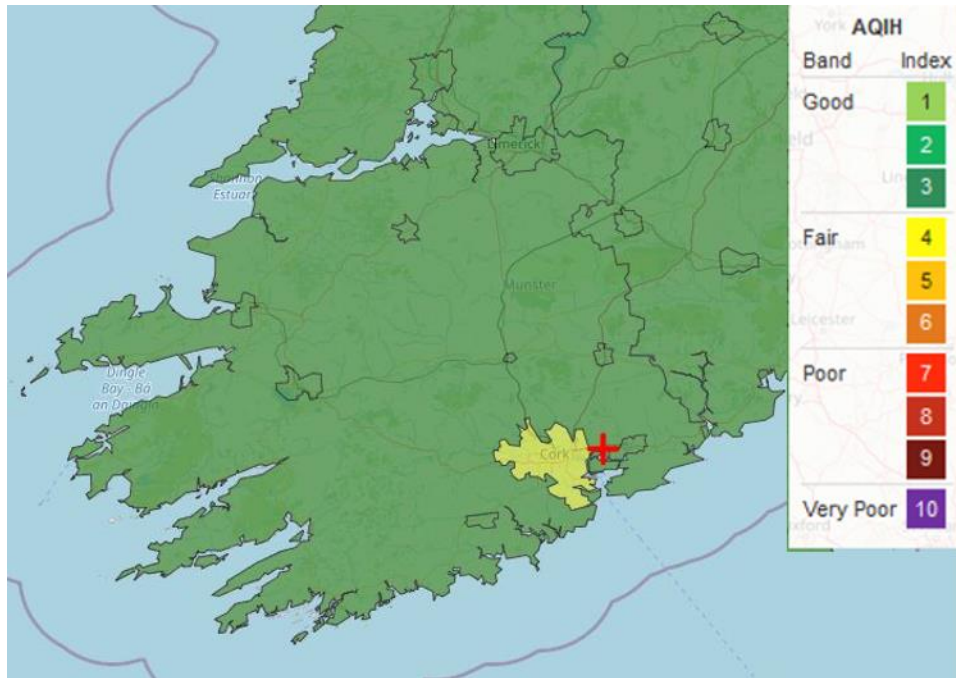


Figure 8-2 Existing Air Quality Index for Health (AQIH)

The nearest air quality station to the site is in Cobh Carrignafoy, Co. Cork, approximately 10km southwest of the site. This station monitors PM₁₀, PM_{2.5} and is located in an Urban Area.

Cobh Carrignafoy, updates every hour with the calculated Air Quality Index for Health (AQIH). As of 25th of April 2022, the air quality index characterised by this station was classified as 3 'Good'.

8.3.2 Local Climate

There are a total of 25 synoptic stations located throughout Ireland. These stations are operated by Met Eireann. The parameters measured and recorded at these stations include rainfall, temperature, wind speed and direction, relative humidity, solar radiation, clouds, atmospheric pressure, sunshine hours, evaporation, and visibility.

The nearest synoptic station, approximately 10 km, to the proposed development site is Roches Point, however 30 year averages were not available for this location. The next closest station was Shannon Airport, Co. Clare, approximately 130km northwest of the proposed development. The climate of the proposed development is best represented by data collected at this station. The most recent average 1981-2010 was not available for this location, the next available readings were 1971-2000. The average monthly precipitation, rainfall, and wind speeds for the 30 year period between 1971 and 2000 are summarised in **Table 8-3** below.

Table 8-3 Shannon Airport 1971–2000 averages

TEMPERATURE (degrees Celsius)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mean													
daily	8.8	8.8	9.9	11.7	13.9	16.6	18.6	18.5	16.5	13.8	11	9.6	13.2
max													
SUNSHINE (hours)													
mean													
daily	1.8	2.2	3.4	5.4	6.3	6	5.8	5.5	4.5	2.9	2.3	1.5	4
duration													
RAINFALL (mm)													
mean													
monthly	79.5	72	63.9	39.7	50.6	43.3	42.4	61.8	57.2	79.8	60.6	77.3	727.9
total													
greatest													
daily	34.5	47.2	31.8	30.2	39.6	56.2	46.9	49.2	41.8	60.8	30.4	32.4	60.8
total													
WIND (knots)													
mean													
monthly	14.6	14.1	13.6	11.6	11.4	10.7	10.1	10	11.3	12.8	13	14.2	12.3
speed													
max.													
gust	86	82	76	68	58	53	57	60	71	76	69	89	89
WEATHER (mean no. of days with..)													
snow or													
sleet	1.7	1.8	0.9	0.2	0	0	0	0	0	0	0	0.4	5
hail	0.8	0.7	1.8	1.1	0.5	0.1	0	0.1	0	0.2	0.2	0.3	5.9
thunder	0.2	0.2	0	0.1	0.2	0.4	0.6	0.5	0.2	0.3	0.1	0.1	2.9
fog	1.5	1.8	2.1	2	2.5	3.3	3.4	3.4	3.2	2.2	2.1	1.6	29.2

8.3.3 Sensitive Receptors

The development site will undergo site clearance and preparation works, earth moving, construction of foundations and site infrastructure and subsequent construction of the units that make up the development. The principal local receptors that may be impacted by the development are existing residential developments to the west, south and east of the proposed development site. (See **Figure 8-3**)

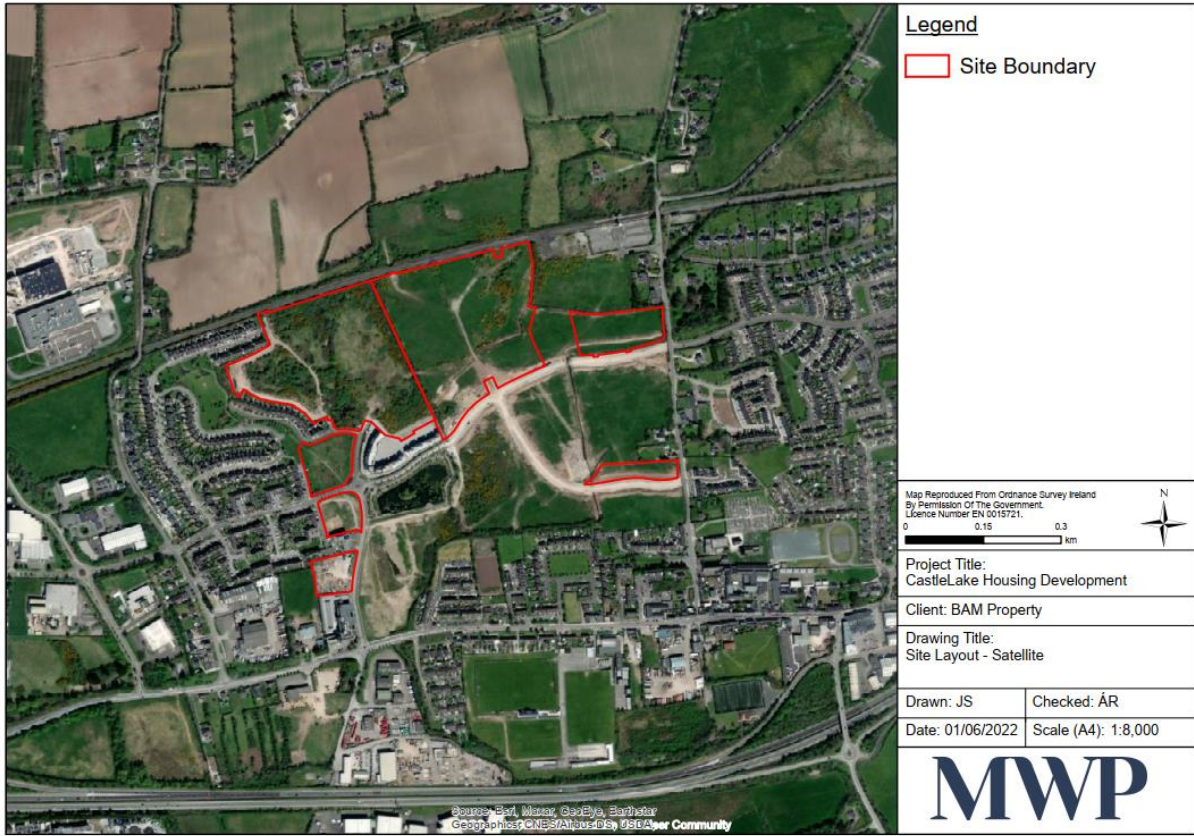


Figure 8-3 Surrounding developments to the proposed development lands

8.4 Likely significant effects

8.4.1 Do Nothing Scenario

The proposed development lands currently comprise mainly improved agricultural grassland in the eastern portion of the site and mainly scrub and immature woodland in the western portion. There are some treelined hedgerows mainly in the centre of the site and along the boundary with Station Road. There are no buildings on site currently. If the site remains undeveloped, it will continue to have no adverse impact on existing ambient air quality or on the local micro-climate. Any increase in traffic related emissions, without the subject development would be insignificant. This increase above the existing situation would be minor and would not result in a perceptible change in the existing local air quality environment.

The do nothing scenario is unlikely given the Cork County Development Plan to prioritise Carrigtwohill as an area of rapid urban development around Cork City. The development of residential estates in the existing greenfield areas within the Carrigtwohill urban area is a central component of the county development plan.

8.4.2 Construction Phase

During the construction phase there will be emissions from vehicle exhausts. Dust will be generated from moving and transporting soil and materials in and around the construction site and on public roads. Weather conditions will play an important role in the quantity of dust generated. The potential for fugitive dust emissions is greatest during periods of prolonged dry weather.

8.4.2.1 Dust Emissions

Using the NRA criteria listed in **Table 8-2**, the dust emission during the construction of the proposed development can be characterised as a moderate-sized construction site. Therefore, dust is unlikely to cause an impact at sensitive receptors beyond 50 m of the source, with standard mitigation measures in place. Any receptors within 50m of the proposed development, will be reduced by applying standard mitigation measures for dust prevention and control are presented in **Section 8.2.1**. There are no designated sites within the potential zone of impact for significant effects from dust. The nearest designated SPA is approximately 700m away which is too far away to experience any significant impact from the proposed development regarding air quality or climate.

The majority of the site (in greenfield areas) and specifically the whole of Phase 1 (which will take about 5 years) there are no sensitive human receptors within 50m of the construction activities. It is only at the western periphery of the site where some immediate neighbours may be affected. Also, some new residents of the phase 1 and 3 sections of the development may get impacted by dust from the construction of phase 4 (15 months). There is therefore potential for **significant adverse short-term impact** from dust if prolonged dry weather conditions persist during construction works in this area. Specific mitigation measures will therefore be put in place at this location to ensure fugitive dust emissions are minimised (refer to **Section 8.5**).

8.4.2.2 Vehicle Emissions

Exhaust emissions from construction and delivery vehicles during construction are unlikely to have an adverse impact on local air quality and will not impact significantly on local, regional or national air quality standards given the scale of plant and machinery involved, the high levels of dispersion, and the limited extent and duration of the works.

Overall, with appropriate mitigation measures in place there will be **no significant effects on air quality or climate at sensitive receptors for the medium-term duration of the construction phase**.

8.4.3 Operational Phase

8.4.3.1 Air Quality

Traffic movements associated with the development have been evaluated and assessed as part of the Traffic Impact Assessment in **Chapter 13**. The split in am and pm peak traffic movements will not result in an adverse impact on local air quality at any of the junctions and it is expected that the impact of the additional car engine exhaust emissions will have a negligible change on local ambient air quality.

It is expected that a proportion of the commuting residents will avail of the Bus Éireann and private bus operators commuter services and the local Iarnród Éireann rail service at Carrigtwohill. The availability of public transport will significantly reduce the number of private vehicles exiting and entering the development during am and pm peak times. The proposed development layout includes provision for Cork County Council's Part 8 planning approved Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1, which is part of the Council's Dunkettle to Midleton Inter-Urban Strategic Cycleway. The proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1 links with the recently constructed Castlelake Link Road and with Carrigtwohill Train Station, reducing dependence of future residents on the private car for urban travel.

The private car fleet will continue to transition to electric vehicles. The Irish government has presented a climate protection plan that also includes targets for electrification in the transport sector. A total of almost one million electric vehicles are to be on the country's roads by 2030. Overall, the implementation of the climate change plan is expected to reduce emissions in the transport sector by between 42 and 50 per cent. There will be provisional electric car charging points in the development with 5% of the total apartments & Duplex parking spaces allocated Electric Vehicle charging spaces. The total number of apartments & Duplex parking is 565 spaces of which 5% is 30 Spaces.

The proposed residential dwellings will be energy efficient with high Building Energy Ratings. The development has been designed to achieve Part L NZEB compliance with a minimum BER of A2 with compliance demonstrated using the DEAP (Dwelling Energy Assessment Procedure) methodology. Efficient heating systems are proposed throughout the development, including the use of photovoltaic panels for the multi-unit apartment and duplex units, with each building designed to achieve efficiencies to minimise running and maintenance costs. No significant increases to greenhouse gas emissions are expected to occur and there will be no significant impact to Ireland's contributions to global emissions.

The design and construction of all buildings in accordance with National Building Regulations (The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings) shall ensure that modern building materials are used and that they are designed to be thermally efficient. There will be no natural gas supplies to the proposed development.

Adverse impacts to Air Quality during the operational phase will be **imperceptible, regional and long-term**. The beneficial impacts of reduced fuel consumption and emissions will be **positive moderate, regional, and long term**.

8.4.3.2 Climate

The proposed residential dwellings will be energy efficient with high Building Energy Ratings as discussed in 8.4.3.1.

It is expected that a proportion of the commuting residents will avail of the Bus Éireann and private bus operator's, commuter services and the local Iarnród Éireann rail service at Carrigtwohill. The availability of public transport

will significantly reduce the number of private vehicles exiting and entering the development during am and pm peak times as discussed in 8.4.3.1.

The sustainable transport links associated with the proposed development such as the commuter train line and the inter urban cycleway are aligned with the National Climate Action Plan's objectives of reducing internal combustion car trips and increased travel choices. Walking, cycling, and public transport is readily available to this development.

Impacts to climate during the operational phase will be **imperceptible and long-term**. The beneficial impacts of efficient housing and availability of public transport will reduce fuel consumption and emissions will be **positive moderate, regional, and long term**.

8.4.4 Cumulative Effects

This section has considered the cumulative impact of the proposed development in conjunction with future and current developments in the vicinity of the subject site. The cumulative air quality impact of the proposed development, on other developments and existing local transport infrastructure is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality.

There are a number of planning applications and planning permissions which are relevant to this proposed development are currently underway or at design stage. These include 18/5707 Station Road Schools Campus, 19/5836 Internal Road upgrades, IDA Business Park, Carrigtwohill URDF–Public Realm Infrastructure Bundle, Bury's Bridge Cycleway and Carrigtwohill–Middleton Inter-Urban Cycleway Phase 1, which are all described in Chapter 2. Should the construction phase of the proposed development coincide with the construction of any other permitted developments within 500m,

There is the potential for cumulative dust emissions. The dust mitigation measures outlined below should be applied throughout the construction phase of the proposed development. This combined with similar best practice mitigation measures applied to other permitted developments will avoid significant cumulative impacts on air local quality.

The traffic impact for the proposed development is expected to have a negligible impact on local air quality, it is unlikely that other future developments of similar scale would give rise to a dissimilar impact on climate or air quality during the construction and operational stages of those projects. EVs will continue to replace combustion engine vehicles and associated emissions regardless of the development will continue to decrease cumulatively.

Future projects of a large scale would need to conduct an EIAR to ensure that no significant impacts on air quality will occur as a result of those developments. It is predicted that the cumulative impact of the construction phase of the proposed development and other local development sites will be medium-short term and slight.

It is predicted that the cumulative impact of the operational phase of the proposed development and other local development sites will be **long-term and not significant**.

8.5 Mitigation Measures

8.5.1 Air Quality Mitigation Measures - Construction Phase

It is recommended that best practice is adhered to during the construction phase in order to minimise fugitive dust emissions in particular. Outlined below are a series of mitigation measures and good working practices to ensure that any potential impacts during the construction phase are minimised and to ensure there will be no adverse impact on the receiving environment. The mitigation measures have been sourced from national and international best practice guidance documents for the implementation of dust management plans including:

- 'Control of Dust from Construction and Demolition Activities', UK British Research Establishment (BRE), 2003.
- 'Environmental Good Practice on Site', Construction Industry Research and Information Association (CIRA), 2015.
- 'Environmental Management Plans', Institute of Environmental Management and Assessment (IEMA), 2013.
- 'Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan' National Roads Authority of Ireland (NRA), 2005.

The potential effects arising from dust and exhaust emissions will be minimised through compliance with the following mitigation measures that will be incorporated in the site-specific Construction and Environmental Management Plan.

- The use of water as a dust suppressant, e.g., a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise.
- Public roads will be inspected regularly for cleanliness and cleaned as necessary.
- All loads entering and leaving the site will be covered during dry periods if dust becomes a nuisance on site.
- Control of vehicle speeds passing over access roads and crane hardstanding areas within the site.
- Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site and preventing its deposition on public roads.
- Site stockpiling of materials will be designed and laid out to minimise exposure to wind.
- Daily site inspections will take place to examine dust measures and their effectiveness.
- Site hoarding will be erected along the boundary with Maple Land, Maple Close, Pine Close, Oakbrook road and the new internal road between the phase 3 and 4 development sections (if phase 3 is occupied when phase 4 is under construction) to minimise fugitive dust emissions to these residential areas.

8.5.2 Climate Mitigation Measures - Construction Phase

Construction traffic emissions can be reduced using the following measures:

- Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently.
- Implementation of the Traffic Management Plan to minimise congestion; and
- All site vehicles and machinery to be switched off when not in use - no idling.
- Construction personnel will be encouraged to car pool and use public transport – this is outlined in the CEMP.

8.5.3 Operational Phase – Air Quality and Climate

It is not expected that any significant negative impacts to the climate will occur during the operational phase of the Castl lake Development, therefore no mitigation measures are required. The inherent design of the buildings will ensure no adverse impact to air quality or climate.

8.6 RESIDUAL IMPACTS

8.6.1 Construction Phase

During the construction phase there will be a short term slight adverse effect on local air quality primarily within the works area. There will be no impacts to the macro or micro-climate.

8.6.2 Operational Phase

Once operational, there will be no negative residual air quality or climate impacts. Given the scale of the development and the temporary nature of construction works, the construction phase will not impact adversely on Ireland's National Climate Objectives. In the operational phase beneficial effects associated with energy efficiency of the buildings, use of public transport and electric vehicles will be **positive not significant and long term**.

References

Construction Industry Research and Information Association (CIRA) (2015) *Environmental Good Practice on Site*. CIRA.

Department of Climate, Communications, and the Environment (DCCAE) (2021). *Climate Action Plan*. DCCAE.

National Roads Authority (NRA) (2011) *Guidelines for the Treatment of Air Quality During the Planning of and Construction of National Road Schemes*. NRA.

9. Material Assets

9.1 Introduction

This chapter considers the potential effects on relevant material assets arising from the Proposed Development. A full description of the Proposed Development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on material assets arising from the overall project has been assessed. The assessment comprises:

- A review of the existing receiving environment.
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

9.1.1 Competency of Assessor

The survey was undertaken, and this report was prepared by Kieran Barry BEng, PgDip. Kieran is an experienced Environmental Scientist. Kieran works on a variety of infrastructure projects conducting environmental assessments and supporting the delivery of a number of environmental deliverables including Environmental Impact Assessment (EIA) Screening Reports, feasibility and constraints studies, route options assessments and Environmental Impact Assessment Reports (EIAR).

9.2 Methodology

9.2.1 Desktop Study

The methodology used for this study included desk-based research of published information and site visits to assemble information on the local receiving environment. The desk study included the following activities:

- Review of Ordnance Survey Mapping and aerial photography to establish existing land use and settlement patterns within the study area.
- Review of local and regional development plans and planning policy in order to identify future development and identify any planning allocations within the study area.
- Review of Cork County Council's Planning Register to identify relevant development proposals currently under consideration by the Council.

9.2.2 Guidelines and Best Practice

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

- Guidelines on the information to be contained in Environmental Impact Assessment Reports EIAR (EPA 2022)

9.2.3 Sources of Information

Information for the assessment of potential impacts on the identified material assets was obtained by means of a desk-based review, and included the following sources:

- Gas Networks Ireland Dial Before You Dig Maps (DBYD);
- ESB Dial Before You Dig Maps (DBYD);
- EIR CYBD Mapping;
- Irish Water Utility Mapping;

Further information has been sourced from the RPS Infrastructure Report and Drawings which detail proposed utility designs for wastewater, water supply and surface water drainage infrastructure. The RPS Infrastructure Report can be found in **Appendix 9.1**.

9.2.4 Scope of Assessment

Table 9-1 outlines the issues which the EPA guidance documents suggest may be examined as part of the material assets impact assessment.

Table 9-1 Issues relevant to the Human Environment

Material Asset	Topics to be Covered
Built Services	Electricity Telecommunications Gas Water Supply Infrastructure Sewerage
Waste Management	Construction Waste Operational Waste
Roads & Traffic	Construction Phase Operational Phase Unplanned Events (i.e. Accidents)

Accordingly, the scope of this assessment is made with respect to these topic areas and considers the effects of the construction, and operation of the proposed development in terms of how the proposal could affect built services and waste management. The subject of Roads & Traffic is addressed in a separate chapter: Chapter 13 Traffic and Transportation.

9.2.4.1 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the Guidelines on the information to be contained in Environmental Impact Assessment Reports EIAR (EPA 2022) and as outlined in **Table 1-3** of Chapter 1 Introduction.

9.2.4.2 Scoped out from Further Assessment

All built services/waste management within the proposed development area and surrounds were considered during the assessment.

9.2.5 Statement on Limitations and Difficulties Encountered

There were no particular difficulties encountered during the production of the material assets chapter of the EIAR.

9.3 Baseline Environment

The following section discusses the material assets outlined above in the existing environment relevant to the Castlelake Strategic Housing Development (SHD).

9.3.1 Existing Electricity

There is an existing ESB way leave along the western boundary of the proposed development. The wayleave is indicated in orange on **Figure 9-1**. Both the scheme design and landscape design ensure that appropriate distances and overhead heights have been considered.

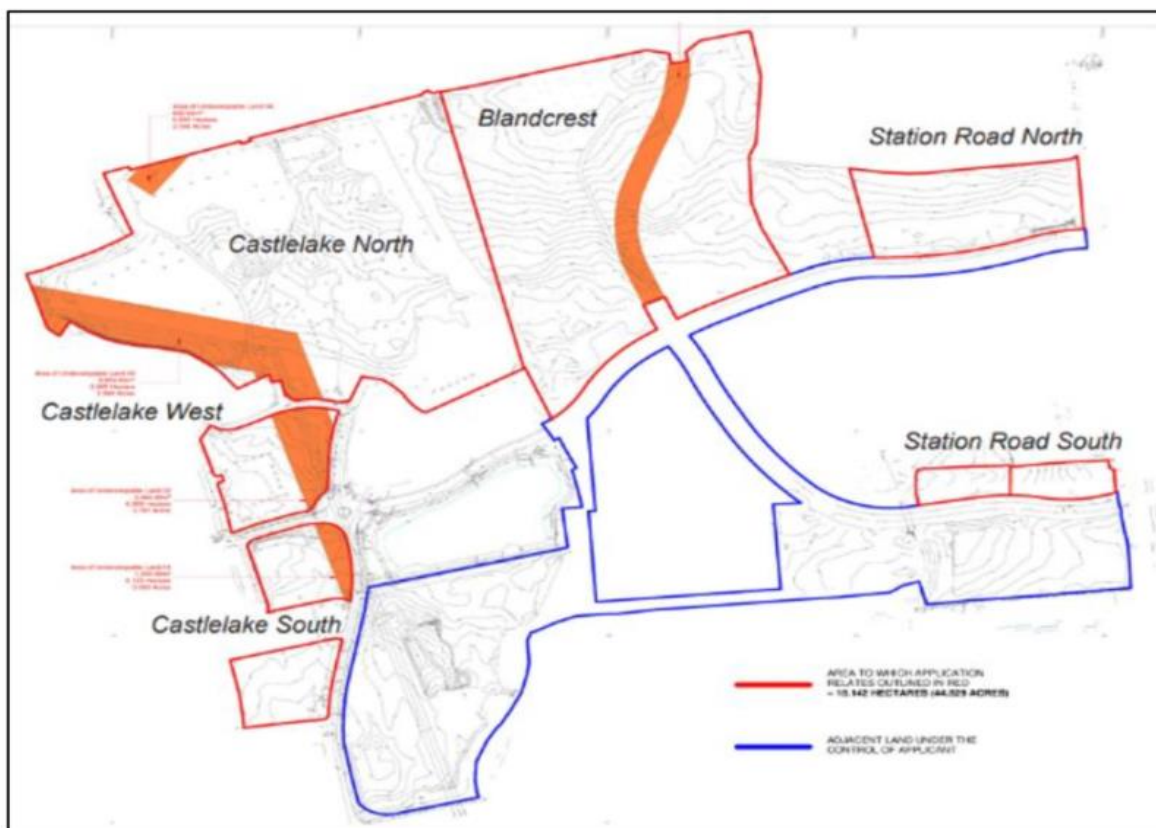


Figure 9-1 Wayleaves

Figure 9-2 shows ESB infrastructure in the wider area, provided by ESB networks. In terms of ESB networks in the vicinity of the proposed development there is a 38KV O/H line (indicated in black) which runs just inside the north west boundary. A 10KV/20KV overhead line (indicated in green) runs in a west east direction approximately 80

metres south of the largest land parcel of the proposed development (Blandcrest site). A series of 400V/230V lines (indicated in blue) are positioned along Station Road in a north-south direction, adjacent to the eastern side of the proposed development. These lines also run east-west along the main street and also serve the residential areas south of the proposed development, 'Ryan and Ahern Pl' and 'Ban Na Greine'. There is a network of 10KV/20KV/400V/230V underground cable routes (indicated in red) located within the existing residential area of Castlake which adjoins the west side of the proposed development and also residential areas to the east adjoining Station Road.

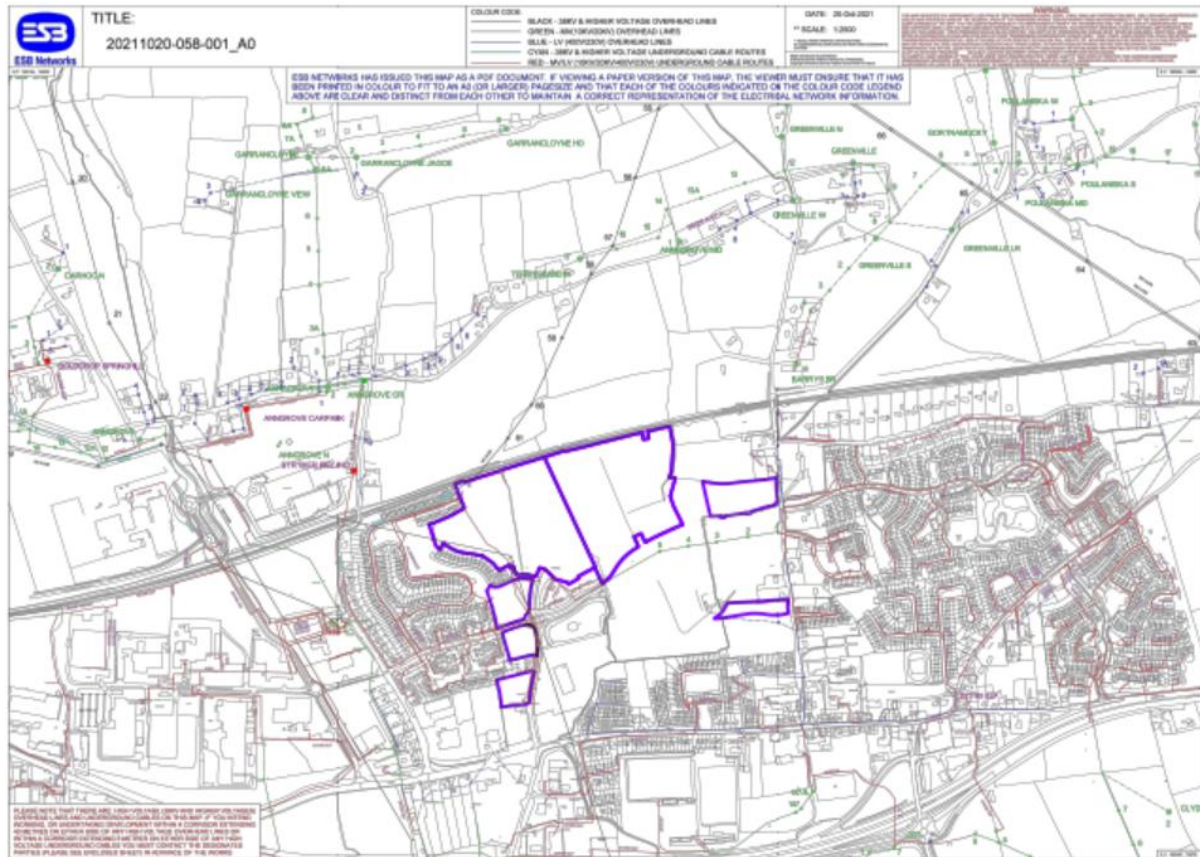


Figure 9-2 Existing ESB Infrastructure (Source: ESB Networks)

During the construction of the new link roads (North & South Roads), existing overhead ESB Network lines were placed underground on behalf of the Department of Education. This process involved the installation of 2 No. ESB ducts along the northern side of the of the North Link Road to a new transformer located at Station Road.

9.3.2 Existing Telecoms

According to Eir's Fibre Broadband Coverage Checker¹, Eir Fibre Broadband is available within Carrigtwohill including the existing Castlake estate west of the proposed development and along Station Road, east of the proposed development.

Mapping of the existing telecoms infrastructure has been sourced from the Eir 'eMaps open Eir Civil Engineering Infrastructure Service' which enables users to view and request maps of open Eir's civil engineering infrastructure.

¹ <https://www.eir.ie/broadband/coverage-map/>

Based on information received from Eir, there is no telecoms infrastructure within the proposed development site. **Figure 9-3** shows the existing telecoms infrastructure, highlighted in blue, outside of the footprint of the proposed development boundary.

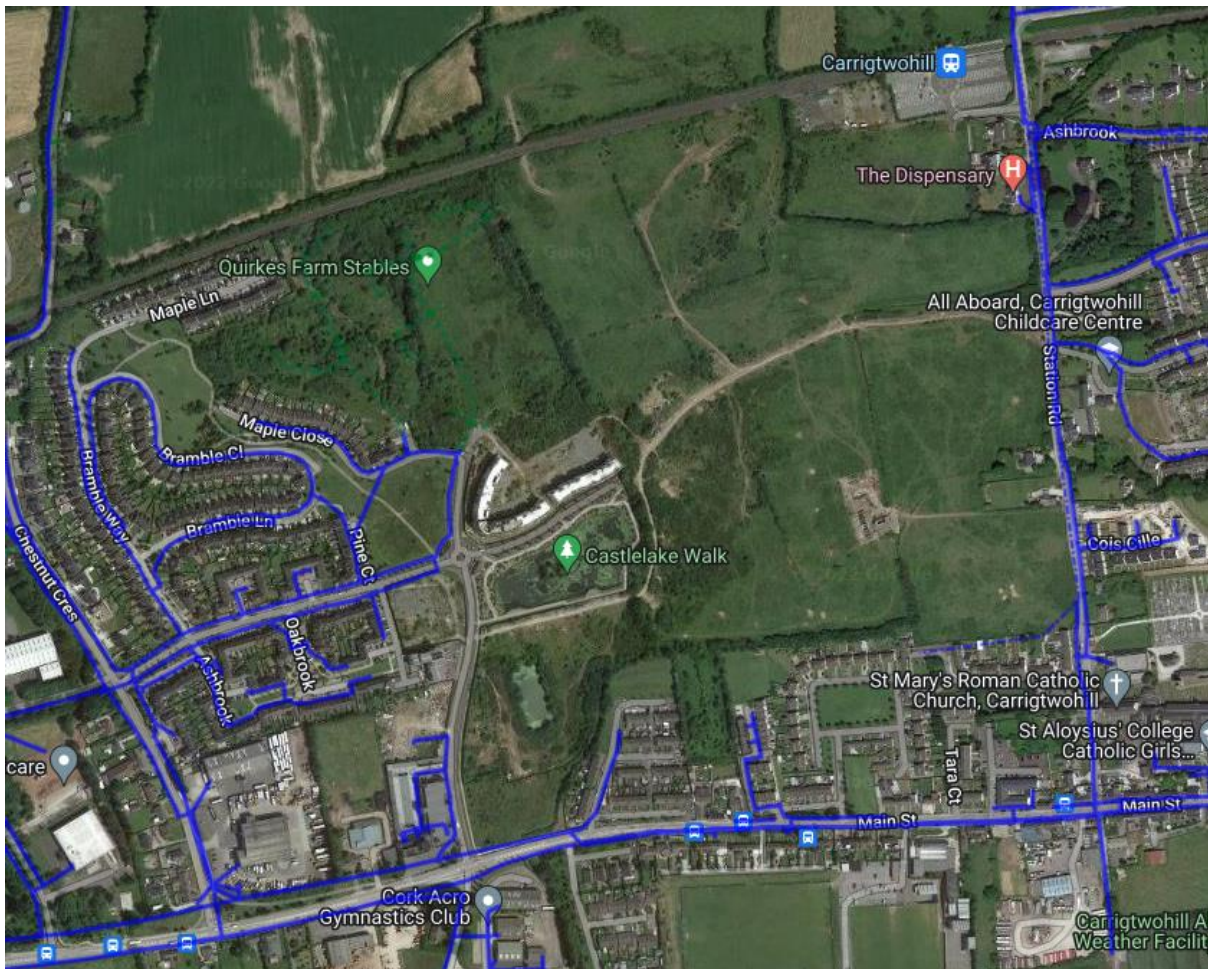


Figure 9-3 Existing Telecoms Infrastructure (Source:EIR eMaps)

Network coverage maps show that 3 Mobile, Eir and Vodafone are all available in the Carrigtwohill area.

9.3.3 Existing Natural Gas

Based on information received from Gas Networks Ireland (GNI), there are existing gas transmission pipelines in the wider area however none are located within the proposed development boundary. The gas distribution network in the vicinity of the proposed development boundary is shown in blue in **Figure 9-4**. The network is shown within the existing Castlake estate west of the proposed development, east of the proposed development at Cúl Ard estate and north of the proposed development at the Ryan and Aherne Pl estate and Ban Na Greine. There is also an existing gas transmission pipeline which runs south of the N25 in an east-west direction and is shown in red in **Figure 9-4**.

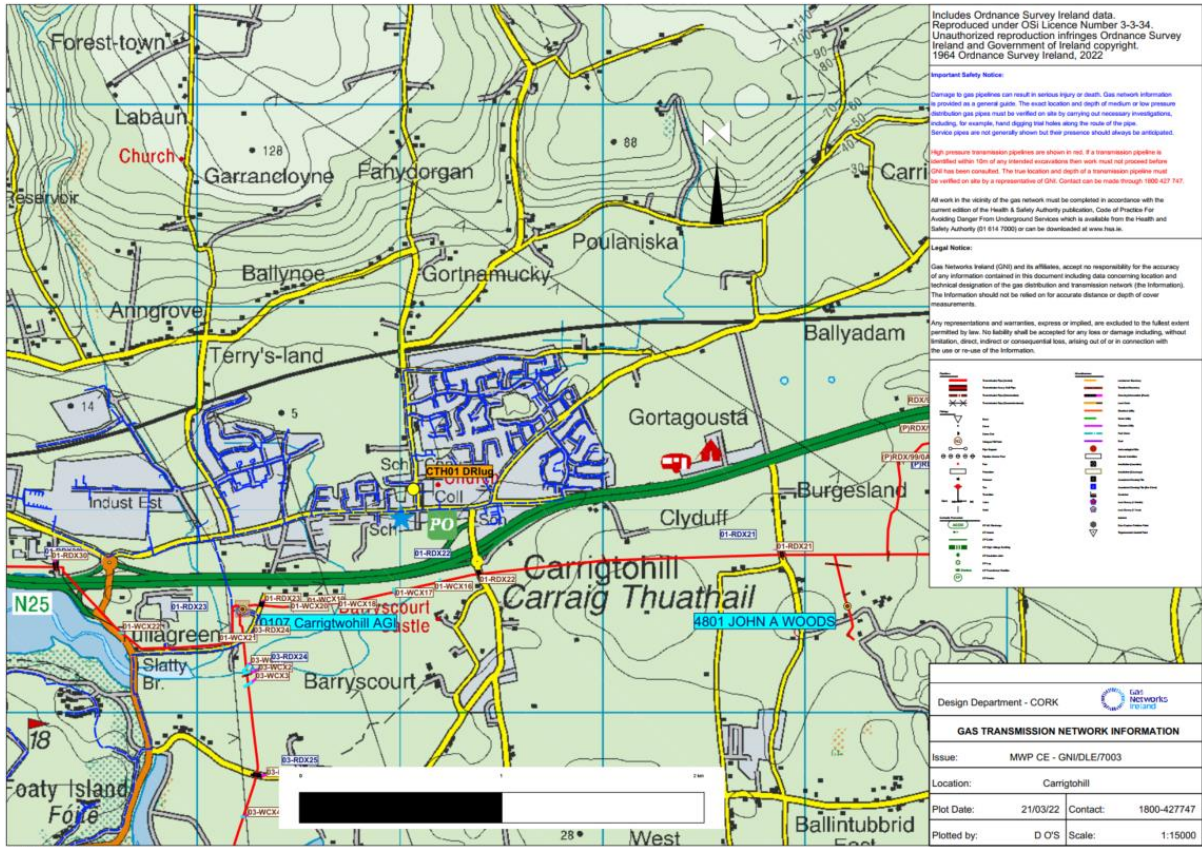


Figure 9-4 Existing Gas Infrastructure (Source: Gas Networks Ireland)

9.3.4 Existing Water Supply

The following details are sourced from the detailed Infrastructure Design Report prepared by RPS Group which accompanies this EIAR, **Appendix 9.1** of Volume 3.

In terms of current potable water supply in the surrounding area, the Harbour and City Trunk Main, passes through Carrigtohill to the north of the proposed site as a 700mm diameter ductile iron main, providing sufficient water capacity to the Carrigtohill area.

Figure 9-5 shows the existing water supply infrastructure in the wider area and in close vicinity to the proposed development. There is currently an existing DN180 PE100 watermain serving the existing section of the Castlake development, west of the proposed development. This watermain connects to the existing public infrastructure to Main Street at the access point in to the development. A bulk meter has been provided at this location. This existing watermain has not yet been taken in charge by Irish Water and is currently under the control of the applicant.



Figure 9-5 Existing Water Supply Infrastructure (Source: Irish Water pre-connection enquiry)

9.3.5 Existing Wastewater drainage

Wastewater in the Carrigtohill area is treated at Carrigtohill Waste Water Treatment Plant (WWTP). Carrigtohill WWTP was upgraded in 2016 to have capacity to treat wastewater for a population of 30,000 people. The WWTP also includes provisions for phased extensions to the plant in the future for 45,000 and 60,000 Population Equivalent (PE).

The existing site currently has no foul loading. The wastewater from the existing Castlelake residential development is currently discharged to the public trunk sewer network located at the Main Street. The main trunk wastewater sewers as constructed to the existing Castlelake development have been previously designed to take account of the future development of the entire Castlelake site, i.e the existing trunk sewer drainage as laid within Castlelake has sufficient capacity to accept the wastewater flow from all existing and proposed development within the subject lands.

9.3.6 Existing Surface Water Drainage

The existing stormwater drainage falling onto the northern section of the existing Castl lake development is collected via an underground gravity sewer network and discharges to the feature amenity attenuation lagoon, which is located centrally to the development lands (discussed further below). It is proposed that the section of the proposed development to the northern extents of the site, which is at an elevated level, is also to discharge to the feature amenity attenuation lagoon. From here, the lagoon will provide for surface water storage to the discharge of attenuated runoff to the Woodstock Stream.

The existing stormwater falling onto the existing development to the west of the proposed development is collected via an underground gravity sewer network and discharges towards an underground attenuation system, which will be constructed in Q3, 2022. This attenuation structure was required to be constructed under the previous planning permissions granted under application Planning Reference Nos. 00/7607 and 00/676, to provide surface water attenuation for the development to western section of the lands. While it was not installed previously, it has now been designed and is to be constructed by the applicant as required infrastructure to facilitate the existing development under the previous planning permission. The stormwater drainage for the primarily western section of the development, which is too low lying to connect to the network draining towards the amenity pond, is proposed to be collected via separate underground gravity sewer network connections and discharge to this attenuation tank. As stated, the tank is currently under construction and will be in place and operational prior to the commencement of any works on this subject application.

The existing site is currently traversed by the following two waterbodies:

North to South Waterbody

An existing culvert crosses under the railway line at the northern boundary of the Castl lake lands. The culvert connects to an existing 750mm diameter culvert at the southern side of the railway line, which flows in an easterly direction for approximately 230m. From here, the waterbody turns to flow in a southerly direction through the site before discharging to the Woodstock Stream.

East to West Drainage Ditch

An existing open drainage ditch enters the proposed site on its eastern boundary with Irish Rail lands. This waterbody flows under the railway in an existing culvert, prior to entering the site and flows in a westerly direction to connect to the drainage ditch travelling south through the site.

9.3.7 Existing Waste Management

The existing area of the proposed development site is currently greenfield and no waste is currently being generated from the site.

9.3.8 Rail Infrastructure

The proposed development lands bound the Cork-Midleton Railway line to the north. Carrigtohill train station is located circa 160m to the north east of the site boundary. The train station serves Midleton and Cobh to the east and south and Cork to the west, with onward links to Dublin and the rest of the country.

9.4 Proposed Development

9.4.1 Proposed Electricity

The proposed development will implement energy efficiency in to the design with the implementation of LED lighting and air to water heating systems. Electricity will be supplied to the proposed development via the ESB networks in accordance with ESB Networks relevant guidelines and requirements.

It is envisaged that electricity supply to Castlflake SHD will be connected on a phased basis and will involve a tie in with existing ducts. Preliminary discussions with ESB Networks have occurred to this end.

9.4.2 Proposed Natural Gas

As detailed previously in **Figure 9-4**, there is existing gas infrastructure in the surrounding areas. The proposed development however is not designed to utilise gas and therefore connections to the gas network will not be required.

9.4.3 Proposed Telecoms

A series of ducts and access chambers have been installed in the footpath and cycleways as part of the Link Roads infrastructure (North and South Roads) that is currently nearing completion, see **Figure 9-6**. The green line denotes ducting installed within the new roads.

This ducting will link with Station Road to the east on both road junctions. It is anticipated that this ducting will be used to serve all of BAM Developments along the new Link roads (North & South Roads) and will also be shared with Department of Education school sites. As each phase of Castlflake SHD progresses, these ducting routes will be extended to serve the residential development.

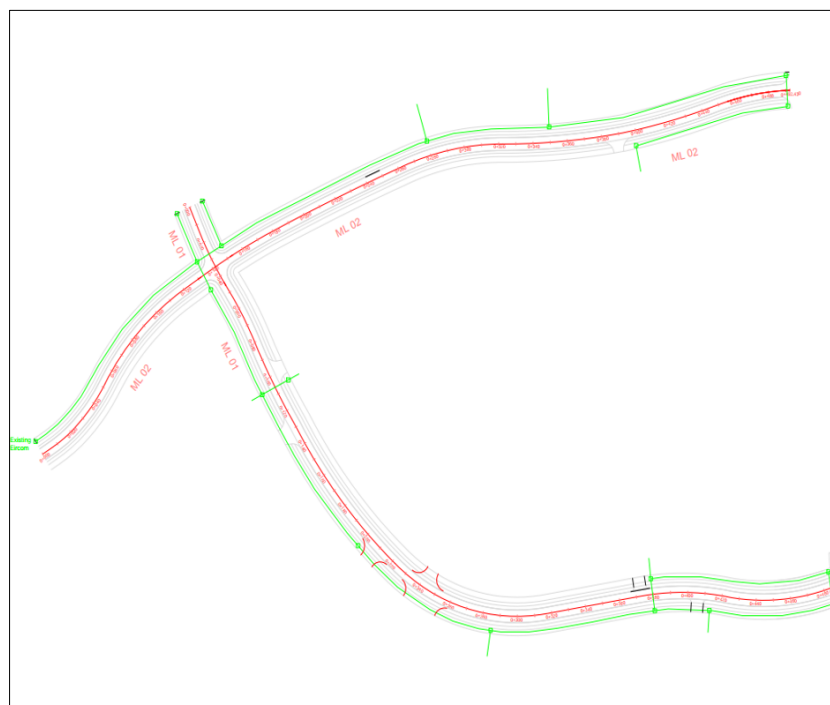


Figure 9-6 Ducting Routes at Link Roads infrastructure (North and South Roads) to be extended

9.4.4 Proposed Water Supply

The proposed water supply infrastructure design has been sourced from the RPS Engineering Services Infrastructure Report, included in **Appendix 9.1**, Volume 3 of this EIAR. Details of the proposed developments watermain infrastructure layout are shown in Drawings no. MCW1088-RPS-00-XX-DR-C-UT0101-01 to MCW1088-RPS-00-XX-DR-C-UT0101-09 in **Appendix 9.2** of this EIAR.

It is proposed to form a new connection with the existing internal watermain to the development with a new DN180 PE100 watermain to serve the proposed development. The watermains will be provided with fire hydrants at no more than 46m from any dwelling and sluice valves will be provided to isolate the dwellings in groups of no more than 4 no. dwellings.

There will be no new connections proposed to the public watermain external to the development. Instead, new connections will be made to the network as constructed within the Castllake lands, but not yet taken in charge.

The water demand arising from the proposed development associated with the new development is 1,812m³/day. Calculations are included in the RPS Engineering Services Infrastructure Report.

9.4.5 Proposed Wastewater Drainage

The proposed water supply infrastructure design details have been sourced from the RPS Engineering Services Infrastructure Report, included in **Appendix 9.1**, Volume 3 of this EIAR. Details of the proposed developments wastewater drainage infrastructure are shown in RPS Drawings no. MCW1088-RPS-00-XX-DR-C-DR0101-01 to MCW1088-RPS-00-XX-DR-C-DR-0101-09 of **Appendix 9.3**.

It is proposed that a new underground gravity wastewater network will be provided to serve the proposed development. This wastewater network has been designed to fall by gravity towards the existing wastewater network as laid for the existing Castllake development, which discharges to the public wastewater sewer network at the existing access junction into the development.

Based on the provision of 716 no. residential dwellings, the Dry Weather Flow has been calculated to be 3.7l/s and the Design Flow is 34.2l/s. Detailed calculations for the wastewater infrastructure design are available in Appendix A of the RPS Engineering Services Infrastructure Report, included in **Appendix 9.1**, Volume 3 of this EIAR.

9.4.6 Proposed Surface Water Drainage

Details of the proposed storm infrastructure drainage layout are shown in the RPS Engineering Services Infrastructure Report, included **Appendix 9.1** and associated Drawings no. MCW1088-RPS-00-XX-DR-C-DR0201-01 to MCW1088-RPS-00-XX-DR-C-DR0201-09, of **Appendix 9.4**.

Drainage ditches will be controlled using culverts in certain areas and for the safety of residents. It is proposed to retain the existing drain which currently flows in a north – south direction through the centre of the site. The stream will be retained as a water feature and as an ecological/amenity corridor through the site for the operational phase.

The surface water generated by the proposed development will be collected by rainwater pipes located at building perimeters and by road gullies to the roads and hardstanding areas, with the run-off directed towards the new surface water gravity sewer system to be provided for the proposed development. The stormwater will flow by gravity towards either the existing attenuation pond/lagoon or the underground attenuation tank.

The lagoon has been designed to cater for this proposed development. The lagoon discharges attenuated flows to the Woodstock Stream, to the south of the site. Surface water collected at the lagoon will be attenuated to

pre-development greenfield rates of run-off, prior to discharge to the Woodstock Stream. The location of the lagoon is shown on **Figure 9-7**.

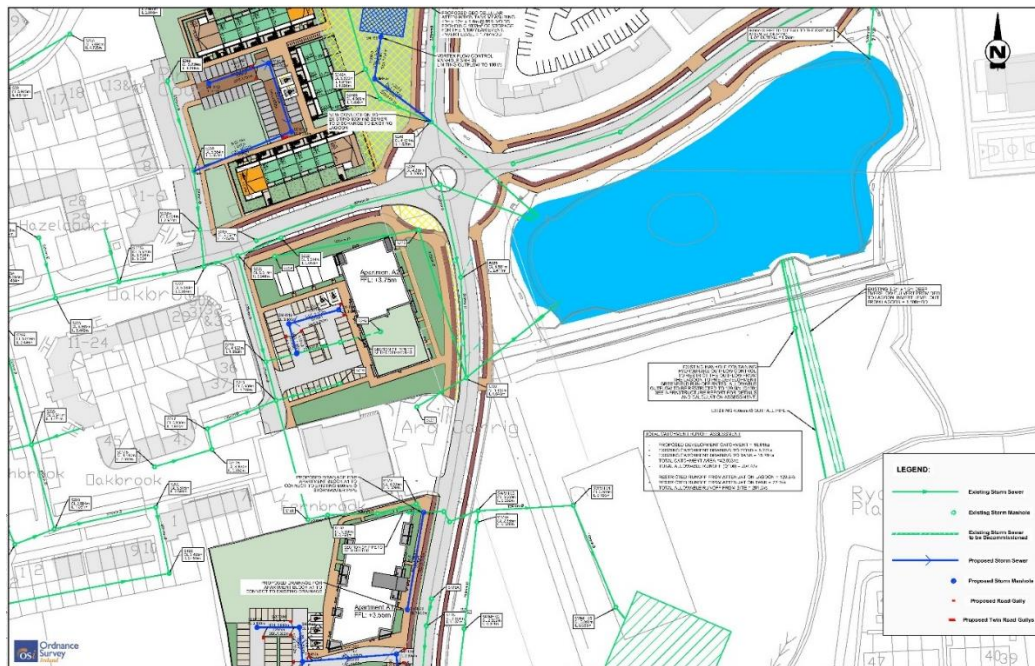


Figure 9-7 Location of surface water attenuation tank

The underground attenuation tank, which is currently under construction is located to the south of the Castlelake lands, as shown on **Figure 9-8**. The tank structure discharges to the Woodstock Stream to the south of the site and is designed to cater for the requirements of the proposed development. It is designed to provide sufficient storage capacity to restrict run-off from the developed catchment to that equivalent to the pre-development greenfield run-off rates.

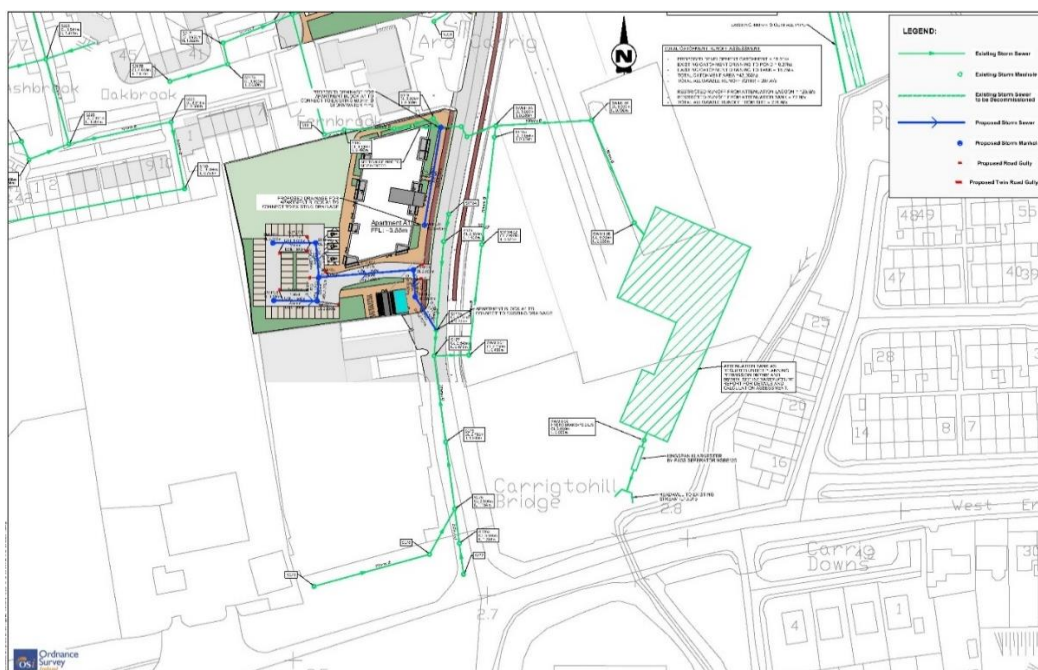


Figure 9-8 Location of underground attenuation tank

A flood risk assessment which was undertaken for the proposed developed determined that the proposed development will not increase the risk of flooding on the site. The flood risk assessment is provided in **Appendix 7.1**.

9.4.7 Proposed Waste Management

The Construction Waste Management Plan (WMP) is included as Appendix A of the Construction Environmental Management Plan (CEMP) in **Appendix 2.1** of this EIAR. The WMP outlines detailed measure for the handling, storage and recovery of waste during the construction phase.

Castlelake SHD will provide a dedicated waste handling and segregation area as shown in **Figure 9-9**.

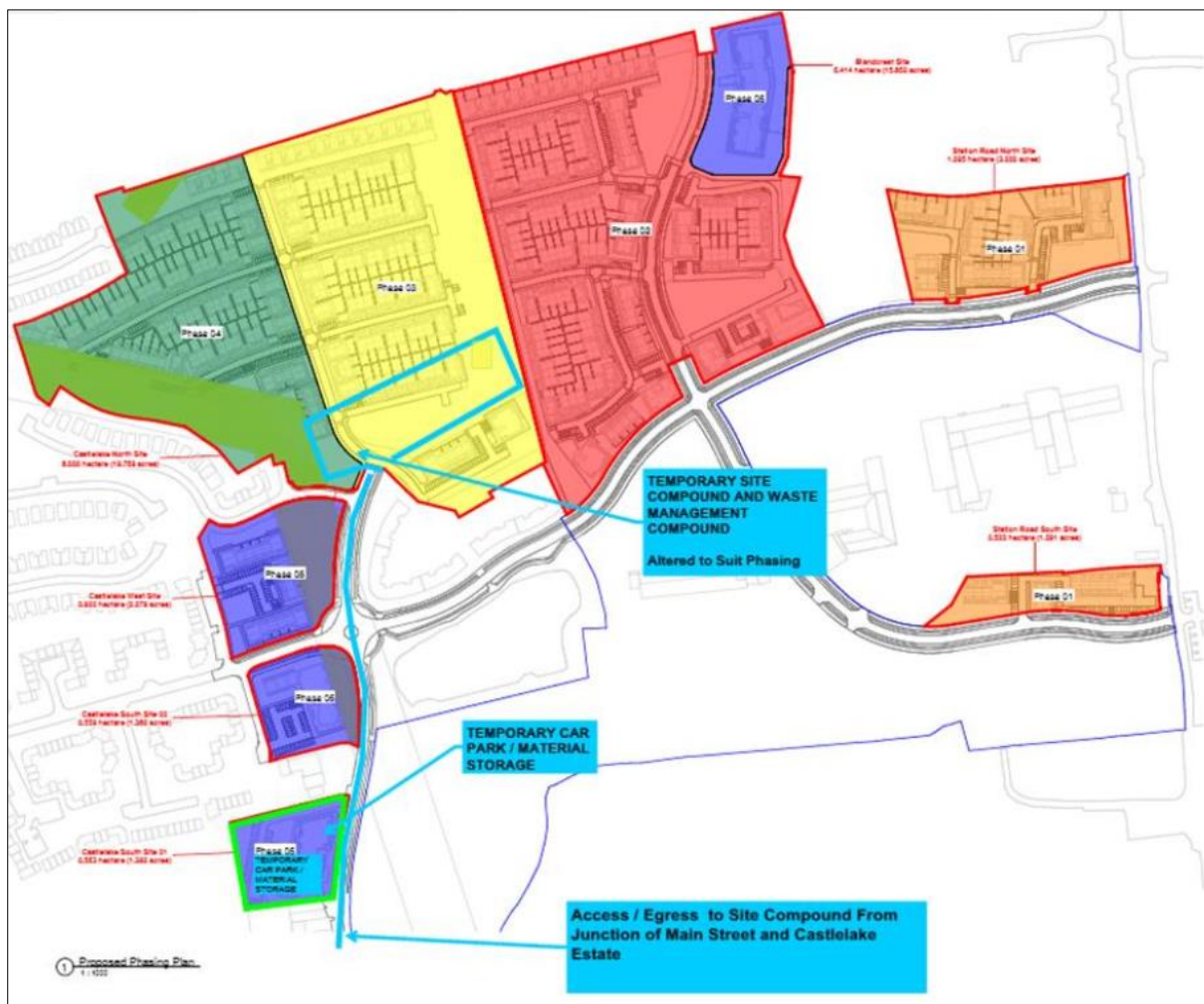


Figure 9-9 Waste Handling and Storage Areas

The proposed development site management team will maintain a waste log of all waste removed from site to ensure all movements are recorded on site for Local Authority Inspections. The waste log will contain the following information:

- Date of collection
- Waste description (as per List of Waste/European Waste Catalogue (EWC)*)

- Name of waste collector/haulier and National Waste Collection Number (NWCP)
- Destination of waste and Facility Permit/Licence Number
- Weight

The Operational Waste Management Plan (OWMP) for the completed residential development is located in **Appendix 9.5**. The OWMP provides a strategy for segregation, storage and collection of wastes generated within the development during the operational phase including dry mixed recyclables, organic waste, mixed non-recyclable waste and glass as well as batteries, bulbs, WEEE and cooking oil, if generated.

9.4.8 Proposed Public Lighting

As part of the recent project to construct the distributor roads within the Castl lake lands as part of a separate project with planning registration reference PL 19/05707, a public lighting layout design for the new roads infrastructure was produced. This proposal consists of a public lighting of design class M4, with C3 lighting class used at conflict areas. The lamps have been provided in a staggered arrangement, installed either side of the road, as this distributes the light more uniformly. The public lighting layout was submitted to Cork County Council Roads Management and Development Department for their agreement. Following the compliance submission, on 28th July 2021 Cork County Council noted their acceptance of the proposed lighting design.

In order to ensure compatibility across the proposed SHD site, it is proposed that the public lighting arrangement for the Castl lake SHD should reflect the existing lighting arrangement as recently installed. Therefore it is proposed that as part of the proposed SHD works, new public lighting consisting of design class M4 lamps, located typically as a staggered arrangement will be provided. The existing lamp specification consists of 9.5km LED lanterns which are post top mounted on 8m columns. A similar specification is proposed for the Castl lake SHD development.

Plan arrangement drawings, MCW1088-RPS-00-XX-DR-E-PL001 01 to 09 are available in in **Appendix 9.6** of this EIAR. In addition, drawings MCW1088-RPS-00-XX-DR-E-PL01-10 provide typical cross-sections indicating the proposed locations of the lamp standards relative to the road cross-section.

9.5 Assessment of Impacts and Effects

9.5.1 Construction Phase

9.5.1.1 Electricity

During construction, there will be a requirement for a temporary connection to the local electrical supply network.

In relation to working near overhead electric lines, the contractor will comply with ESB Networks Code of Practice for Avoiding Danger from Electricity Lines, 2019.

During the construction phase there is potential for some temporary loss of power to existing dwellings associated with connecting the new development to the ESB network. During construction, it is **likely** that the proposed development electricity cause **brief-to-temporary, slight, adverse** effect on power supply to houses in the vicinity.

9.5.1.2 Telecoms

The installation of telecoms during the construction phase will require access to the local telecoms networks in the vicinity of the proposed development. A series of ducts and access chambers have been installed in the

footpath and cycleways as part of the Link Roads infrastructure, mentioned in **Section 9.4.3**. As each phase of the proposed development progresses, these ducting routes will be extended to serve the residential development.

The telecoms works construction phase will be carried out in accordance with the utility providers method statement and service providers Codes of Practice, as well as best practice in accordance with the CEMP, **Appendix 2.1** of Volume 3.

There is potential for a temporary loss of connection to the telecommunications infrastructure while carrying out works to provide connection to the proposed development.

Any disruption in the local telecoms network during the construction phase would **likely** result in a potential **brief-to-temporary, slight, adverse** impact on telecoms network for receiving users.

9.5.1.3 Gas

The gas distribution network in the surrounding areas of the proposed development boundary is shown in blue in **Figure 9.5**. Given that there is no requirement to connect to existing gas infrastructure in surrounding areas or to provide a gas network within the proposed development boundary, the potential impact of the construction phase on the existing gas network in the surrounding area is considered to be **neutral**.

9.5.1.4 Water Supply

The construction of the new water supply infrastructure will involve trench excavation and installation of infrastructure such as pipes, valves, hydrants and manhole chambers.

The proposed watermain layout, involves connecting the proposed watermain network to the existing network. Any such work will require a shutdown of water supply. Users will be notified prior to any shutdown of water supply and consultation and agreements with Irish Water will also be required. In addition to water supply interruptions, there is also potential for discolouration of water supply to users during shutdowns.

During construction, a water connection will also be required for the temporary site compound. Agreement from Irish Water will be required prior to any new connections made during the construction phase.

The water supply infrastructure works are likely to cause a **brief-to-temporary, slight, adverse** effect on the receiving water supply network.

9.5.1.5 Wastewater Drainage

The construction of the new wastewater infrastructure will involve trench excavation and installation of infrastructure such as pipes, valves, manhole chambers. The wastewater infrastructure construction phase will require connection to the existing wastewater network.

The proposed wastewater infrastructure works are **likely** to have **brief-to-temporary slight, adverse** effect on the local wastewater infrastructure which supplies wastewater to Carrigtwohill WWTP.

There will a requirement to connect the temporary compound to an onsite wastewater facility. Potential adverse impacts include improper discharge of foul drainage from temporary site compound which could result in contamination of groundwater and seepage in to watercourses. Any potential **adverse** impact to the local watercourses would **likely** be **brief-temporary** and **slight**.

9.5.1.6 Surface Water Drainage

The construction phase of the stormwater infrastructure will involve installation of pipes, gullies as well as the attenuation tank and lagoon.

There are several existing surface water drainage systems and watercourses on the site, including the Woodstock Stream and there is potential for excavation works to cause adverse effects during the construction phase. The water pollution control measure outlined in the CEMP (**Appendix 2.1**) during construction will reduce the risk of contamination to watercourses.

It is considered that surface water drainage works are **likely** to have a **brief-temporary, slight, adverse** effects on watercourses or existing surface water drainage systems.

9.5.1.7 Waste Management

During the construction phase, the proposed development will generate a range of non-hazardous and potentially hazardous waste materials. The construction employees will generate typical municipal waste and packaging of materials will also contribute to the waste streams. Waste material will be managed and stored correctly to prevent litter issues arising on site. If waste material is not stored correctly and managed, this could lead to litter issues on site. Any litter issues on site could potentially lead to the presence of vermin on site or at adjacent sites.

The use of permitted waste contractors and authorised waste facilities is essential to appropriately manage waste to prevent adverse environmental impacts. All waste will be dealt with in accordance with regional and national legislation. Resources and efficient waste management practices will be utilised to prevent adverse effects on the environment. The majority of construction waste arising from the proposed development will be recyclable or recoverable. There will also be soil, stone, gravel and clay excavated to facilitate site preparation for construction and foundation excavations. There will be a certain amount of excavated materials re-used as fill. Any remaining material will be removed offsite via a licensed haulier to an appropriately authorised facility. Correct classification and segregation of material is required to prevent adversely affecting workers on site or soils and watercourses.

Should waste management issues occur, there is **likely** to be a **brief-temporary, slight adverse** effect on the local environment.

9.5.2 Operational Phase

9.5.2.1 Electricity

The operational phase of the proposed development will result in an increase on the demand of the local electricity supply. Regarding connections for the future phases of the proposed development, preliminary discussions with ESB Networks and BAM have began and currently no issues with the provision of the required power have been identified for the proposed development.

The potential impact from the operational phase of the proposed development on the electricity supply network is **likely** to be **long term/permanent** and **imperceptible**.

9.5.2.2 Telecoms

During the operational phase of the proposed development, there will be telecom connections required for users.

Given that there is a wide range of telecom providers in the wider area, this will provide a greater range of choice of service and will result in a **long-term positive** effect for the users.

The new telecoms duct infrastructure for each phase of the proposed development will act as a point for service providers to link new telecoms and carry out maintenance. The new underground infrastructure upgrades for telecoms will result in a **permanent, positive** effect for service providers and surrounding telecoms infrastructure.

Given that new telecoms infrastructure will be provided, there are no impacts expected on the surrounding network during the operational phase of the proposed development. Potential adverse effect on the surrounding telecoms networks are therefore considered **likely** to be **imperceptible** and **long term/permanent**.

9.5.2.3 Gas

The proposed development is not designed to utilise gas during its operation. There is therefore no impact anticipated to the existing surrounding gas network and therefore the effects are anticipated to be **long term** and **neutral**.

9.5.2.4 Water Supply

The impact of the operational phase of the proposed development on the public water supply is likely to be an increase in the demand on the existing supply. Additional water quantities would need to be treated and supplied through the existing network to the site.

Subject to the aforementioned upgrades on the existing public network being carried out, as per the requirements from the connection agreement with Irish Water, the potential adverse effect of the proposed development on the public water supply network is **likely** to be **long term/permanent** and **imperceptible**.

9.5.2.5 Wastewater

During the operational phase, there will be an increase in the wastewater discharge, which will result in an increase of wastewater entering the collection network and discharging to Carrigtohill WWTP for treatment and disposal.

As with the water supply connection, the wastewater connection has been deemed feasible, as per the confirmation of feasibility from Irish Water, subject to upgrading the network. The potential adverse effect of the proposed development on the wastewater network is **likely** to be **long term/permanent** and **imperceptible**.

9.5.2.6 Surface Water Drainage

Design calculations carried out for the underground attenuation tanks and attenuation lagoon have been deemed to provide sufficient storage capacity to restrict run-off from the developed catchment to that equivalent to the pre-development greenfield rate of run-off.

The potential adverse effects of the surface water drainage systems of the proposed development are therefore **likely** to be **long term/permanent** and **imperceptible**.

9.5.2.7 Waste Management

Improper waste management during the operational phase would divert from the principles of the waste hierarchy and mean some waste may be sent to landfill. There will be a variety of waste generated during the operational phase of the development. In the Southern Region, there is a network of waste collection, treatment, recovery and disposal infrastructure to manage waste efficiently from the proposed development.

During the operational phase, only permitted contractors should be serving the development and removing waste. Similarly, only authorised facilities should be utilised so that waste materials are dealt with in accordance with regional and national legislation. Inappropriate management of waste could result in adverse effects on the environment. The potential effect on the local environment is likely to be **long term/permanent**, **slight** and **adverse**.

9.5.2.8 Rail Infrastructure

Increased population in the area may increase usage of the rail services however there is no adverse impacts to rail infrastructure anticipated during the operation phase of the proposed development.

The close proximity of rail transport will result in a **long term, positive** effect on the rail service and on residents using the service.

9.5.3 Do-Nothing

This section considers the proposed development in the context of the likely impacts upon the receiving environment should the proposed development not take place.

In the 'do nothing' scenario, should the proposed development not take place, there would be no additional demand or loading on material assets.

9.5.4 Cumulative Impacts and Effects

Cumulative effects relates to the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.

A number of planning applications and planning permissions which are relevant to the proposed development are currently underway or at design stage. These projects are described in greater detail in Chapter 2 Project Description and are listed as follows:

- 18/5707 Station Road Schools Campus
- 19/5836 Internal road upgrades, IDA Business Park
- Carrigtwohill URDF–Public Realm Infrastructure Bundle
- Bury's Bridge Cycleway
- Carrigtwohill–Middleton Inter-Urban Cycleway Phase 1

Construction of nearby consented developments such as the Station Road Schools Campus (Ref:18/5707) may commence and overlap with the proposed development for a period of circa 1 year.

There are no predicted cumulative impacts arising from the construction phase provided that the appropriate mitigation measures outlined in the CEMP for the schools campus project and the CEMP for the SHD project are implemented.

Cumulatively with the other surrounding, permitted developments, it is predicted that proposed development will contribute to the improvement of the overall urban environment.

Once operational, the Station Road Schools Campus will provide a vital service to the local area as well as residents of the proposed development. The cycleways will provide a desirable amenity for residents of the proposed development and combined, the proposed development and surrounding developments will improve the overall urban structure of the local area.

If adjacent developments are designed to retain pre-development greenfield rate of run-off, the cumulative adverse impact of the operation of the proposed development and adjoining developments on surface water run-off is likely to be **long term** and **imperceptible**.

Wastewater from the development will ultimately be treated at Carrigtohill WWTP. The wastewater connection and water supply connections have both been deemed feasible, as per the confirmation of feasibility from

Irish Water, subject to upgrading the network. The cumulative adverse impact of the operation of the proposed development and adjoining developments is therefore likely to be **long term** and **imperceptible** provided that upgrades are made to the wastewater network.

There will be an increase in water demand during the operational phase of the proposed development and adjacent developments such as the Station Road Schools Campus (Ref:19/5707). Provided the required local network upgrades for this proposed development and adjoining developments are carried out to the existing public water supply to conform with Confirmation of Feasibility agreements with Irish Water, the potential impact to the public water supply is likely to be **long term** and **imperceptible**.

There are no cumulative adverse impacts anticipated from the proposed development in combination with surrounding developments.

9.6 Mitigation and Monitoring Measures

9.6.1 Mitigation Measures for Electricity

9.6.1.1 Construction Phase

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.

All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.

Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements.

9.6.1.2 Operational Phase

It is not envisaged that any other reductive measures will be necessary upon completion of the development.

9.6.2 Mitigation Measures for Telecoms

9.6.2.1 Constructional Phase

All works in the vicinity of the telecommunications providers infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines that are included in the CEMP in **Appendix 2.1** of Volume 3.

9.6.2.2 Operational Phase

The design and construction of the required telecoms services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

9.6.3 Mitigation Measures for Wastewater/Water Supply

9.6.3.1 Construction Phase

All mitigation measures outlined in the CEMP, **Appendix 2.1** of Volume 3 should also be implemented during installation of water supply and wastewater infrastructure.

Any temporary water supply for the temporary site compound will be agreed with Cork County Council and Irish Water. To enable leak detection, a water meter will be installed for the temporary water supply. The water meter will monitor consumption of water and will be used to help confirm potential leaks.

Effluent generated on site from the contractors sanitary facilities will be discharged to a holding tank and removed off site to a licensed removal contractor. Temporary discharge utilising the existing, or permitted sewerage network will be in agreement with Cork County Council and Irish Water. All necessary health and safety measures will be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.

9.6.3.2 Operational Phase

Once the proposed development is complete, the water supply network and wastewater network will be vested to Irish Water who will have responsibility for operation and maintenance of the water supply.

Private drainage areas, such as the various apartment blocks, will be maintained by the units maintenance company. Any issues going forward will therefore be addressed and mitigated against.

9.6.4 Mitigation Measures for Surface Water Drainage

9.6.4.1 Construction Phase

The contractor will be obliged to consult the CEMP **Appendix 2.1** of Volume 3, which includes a Surface Water Management Plan (SWMP) for implementation of mitigation measures to prevent impacts damage to existing infrastructure and over ground infrastructure and watercourses.

Prior to excavation the Contractor will ensure that adequate silt management methods are implemented and that silt controls are in place as recommended in CEMP and SWMP.

All silt controls will be checked on a regular basis in accordance with a monitoring schedule outlined in the CEMP and SWMP.

9.6.4.2 Operation Phase

Appropriate maintenance regimes will be put in place to monitor/maintain surface water drainage. This will include periodic cleaning out of gully pots & drainage channel sumps and cleaning out of pipes if/when blockages occur.

9.6.5 Mitigation Measures for Waste Management

9.6.5.1 Construction Phase

All measures included in the Waste Management Plan (WMP), Appendix A of the CEMP which is included in **Appendix 2.1** of this EIAR, should be adhered to ensure effective waste management and minimisation, reuse, recycling and disposal of waste material generated during the construction phase of the proposed development.

Prior to commencement of the construction phase, the contractor (s) will be required to refine/update the WMP to detail specific measures to minimise waste generation and provide details of the proposed waste contractors and destinations for each waste stream.

9.6.5.2 Operation Phase

An Operational Waste Management Plan (OWMP) has been prepared and is included in **Appendix 9.5**. The implementation of the OWMP will ensure a high level of recycling, reuse and recovery at the development during the operational phase. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving targets set out in the Southern Region Waste Management Plan 2015-2021.

9.6.6 Monitoring Measures and Reinstatement

9.6.6.1 Construction Phase

Visual monitoring will be undertaken as part of the regular site audits during the construction of the proposed development. A programme of monitoring will be outlined within the CEMP in **Appendix 2.1** of Volume 3. Close contact with the electricity and water utility providers will be under the control of the main contractor.

Temporary construction compounds will be completely removed from the site following the end of the construction phase. Reinstatement at completion of the works will involve restoring areas to their original condition. The temporary connections will be removed, leaving the area in an acceptable and clean condition, removing all deleterious materials that may have been deposited during construction works.

Monitoring and auditing details of waste management are detailed in the WMP, part of the CEMP in **Appendix 2.1** of Volume 3.

9.6.6.2 Operational Phase

The ESB will test and commission all their work and network cabling post installation. All supplies will be metered to allow the new loads on network be monitored in use.

Pressure tests will be carried out on the newly constructed water supply, wastewater and drainage network to assess the potential for leaks.

The proposed water supply system will incorporate water meters at all points of connection to the public watermain network and will facilitate ongoing monitoring of demand.

All other utilities will be monitored and metered in accordance with the service agreements for the various utilities. Appropriate maintenance regimes will be put in place to monitor/maintain surface water drainage. This will include periodic cleaning out of gully pots & drainage channel sumps and cleaning out of pipes if/when blockages occur.

The management of waste during the operational phase to ensure effective implementation of the OWMP should be carried out by the building management company and the nominated waste contractor (s).

9.7 Residual Impacts and Effects

The residual impacts on material assets associated with the development have been assessed post the implementation of the specific mitigation measures and are tabularised in **Table 9-1** below.

Table 9-2 Residual Impacts and Effects

Impact (Pre-mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
ELECTRICITY		
Construction		
Likely Brief/Temporary Slight Adverse Impact	Refer to Section 9.6.1.1	Likely Long Term/Permanent Neutral
Operational		
Likely Long Term/Permanent Imperceptible Adverse Effect	None	Likely Long Term/Permanent Neutral
TELECOMS		
Construction		
Likely Temporary Slight Adverse Impact	Refer to Section 9.6.2.1	Likely Long Term/Permanent Neutral
Operational		
Likely Long Term/Permanent Imperceptible Impact	Refer Section 9.6.2.2	Likely Long Term/Permanent Neutral
WATER SUPPLY		
Construction		
Likely Brief-Temporary Slight Adverse Effect	Refer to Section 9.6.3.1	Likely Long Term/Permanent Neutral
Operational		
Likely Long Term/Permanent Imperceptible Impact	Refer to Section 9.6.3.1	Likely Long Term/Permanent Neutral
WASTEWATER DRAINAGE		
Construction		
Likely Brief/Temporary Slight Adverse Effect	Refer to Section 9.6.3.1	Likely Long Term/Permanent Neutral
Operational		
Likely Long Term/Permanent Imperceptible Impact	Refer to Section 9.6.3.1	Likely Long Term/Permanent Neutral
SURFACE WATER DRAINAGE		
Construction		
Likely Brief/Temporary Slight Adverse Effect	Refer to Section 9.6.4.1	Likely Long Term/Permanent Neutral
Operational		

Likely Long Term/Permanent Imperceptible Impact	Refer to Section 9.6.4.2	Likely Long Term/Permanent Neutral
WASTE MANAGEMENT		
Construction		
Likely Brief/Temporary Slight Adverse Effect	Refer to Section 9.6.5.1	Likely Long Term/Permanent Neutral
Operational		
Likely Long Term/Permanent Slight Adverse Impact	Refer to Section 9.6.5.2	Likely Long Term/Permanent Neutral

9.8 References

In addition to the sources noted in the chapter, the documents listed below were also consulted.

- Cork County Development Plan 2022-2028
- Cobh Municipal District Local Area Plan 2017
- Irish Waters Code of Practice for Water Infrastructure
- Irish Waters Code of Practice for Wastewater Infrastructure
- ESB Networks ‘Housing Schemes: Guidebook For ESB Networks Standards For Electrical Services’
- <https://cei.openeir.ie/>
- RPS Castlelake SHD Infrastructure Report (2022)
- Gas Networks Ireland Dial Before You Dig Maps (DBYD);
- ESB Dial Before You Dig Maps (DBYD);

10. Cultural Heritage

10.1 Introduction

This chapter considers the potential effects on relevant cultural heritage assets arising from the Proposed Development. A full description of the Proposed Development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on cultural heritage assets arising from the overall project has been assessed.

The phrase '*Cultural Heritage*' is a generic term covering a multitude of cultural, archaeological and architectural sites and monuments within the landscape. For the purpose of this report, Cultural Heritage is divided into three sub-groups, namely Archaeology, Cultural Heritage and Architecture.

Archaeological Heritage

Archaeological heritage can be described as the study of past human societies through their material remains and artefactual assemblages. The Valetta Treaty (or the European Convention on the Protection of the Archaeological Heritage, 1992) defines archaeological heritage as "all remains and objects and any other traces of humankind from past times" this includes "structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water". In order to obtain a comprehensive appraisal of the archaeological potential of the proposed development site, much of which is no longer visible above ground, a study area comprising circa 1.5km radius of the proposed development site was examined. Significant archaeological sites which are located outside the immediate study area but reflect human activity within the broader landscape are included, where relevant.

Cultural Heritage

Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation. This includes customs, practices, places, objects, artistic expressions and values. Cultural Heritage is often expressed as either Tangible or Intangible Cultural Heritage (ICOMOS, 2002). Environmental Protection Agency Guidelines (2015) define Tangible Cultural Heritage as movable cultural heritage (artefacts), immovable cultural heritage (monuments, archaeological sites and so on) and underwater cultural heritage (shipwrecks, underwater ruins and cities). Intangible cultural heritage encompasses oral traditions, folklore, history and language. In this assessment cultural heritage encompasses the following; the history of Carrigtohill from a small rural village to a commuter area to Cork City; the surrounding rural landscape of single dwellings and small farm complexes depicted on historic OS mapping; quarrying in the surrounding area in the 19th century and its growth to industrial usage. It also encompasses the placenames and history of the proposed development site and study area.

Architectural Heritage

Architectural heritage is defined in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 as structures and buildings together with their settings and attendant grounds, fixtures and fittings, groups of such structures and buildings, and sites, which are of architectural, historic, archaeological, artistic, cultural, scientific, social or technical interest. The assessment includes an appraisal of buildings of architectural, historical and social interest within a 1km radius of the proposed development site.

The assessment comprises the following steps:

- A review of the relevant legislation and guidelines
- A review of the existing receiving environment by desktop study and walkover survey;
- The proposed development site was inspected on the ground to determine its suitability for geophysical survey. The entire site was assessed to be wholly unsuitable due to prevailing ground conditions and previous extensive ground disturbance throughout (Nicholls, **Appendix 10.3**);
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

10.1.1 Competency of Assessor

The assessment was carried out by Musetta O’Leary MA of Lane Purcell Archaeology. Musetta has over 15 years of experience in all aspects of archaeological consultancy. She has co-ordinated and authored the Cultural Heritage section of numerous diverse EIAR projects for road construction, industrial, residential and sporting developments, energy delivery and quarrying. She has presented expert witness evidence at numerous oral hearings.

10.1.2 Legislation

In Ireland, the principal legislative measures protecting cultural heritage assets are the National Monument (Amendments) Act 1930 to 2014, the Heritage Act 1995, the relevant provisions of the National Cultural Institutions Act 1997, the Architectural Heritage (National Inventory) and Historic Monuments (Misc. Provisions) Act 1999 and the Local Government (Planning and Development) Act 2000, as amended. Stemming from the principle conventions, acts and regulations, which govern Cultural Heritage, there are several mechanisms for protecting cultural heritage sites in Ireland. These include the following:

National Monuments

Section 8 of the National Monuments (Amendment) Act, 1954, provides for the publication of a list of monuments, the preservation of which are considered to be of national importance. Ministerial consent must be granted before any works are carried out with respect to a national monument. The closest such monument to the proposed development site is Barryscourt Castle (CO075-018001- and Bawn CO075-018003- ;Reg. no. 641 in the ownership of the state), located 830m to the south.

National Monuments subject to Preservation Orders (POs)

Section 8 of the National Monuments Act 1930 provides for the making of Preservation Orders to protect national monuments that are considered to be under threat. A preservation order makes it unlawful to interfere in any way with a national monument without the expressed permission of the Minister. The closest such monument is Barryscourt Castle (CO075-018001- and Bawn CO075-018003-) located 830m to the south subject to Preservation Order number (PO 4/1974).

Archaeological sites listed in the Register of Historic Monuments (RHM)

Section 5 of the National Monuments (Amendment) Act 1987, requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Department of Housing, Local Heritage and Government) to establish and maintain the Register of Historic Monuments. Two months’ notice must be given in writing to the Minister in advance of any proposal to carry out work in relation to a historic monument or archaeological area entered in the Register. There are no such monuments within the Study Area.

Archaeological sites listed in the RMP

Section 12 of the National Monuments (Amendment) Act 1994 states that the Commissioners of Public Works in Ireland 'shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each county in the state'. Two months' notice must be given in writing to the Minister in advance of any proposal to carry out work in relation to a site listed in the Record of Monuments and Places. There are no recorded archaeological sites listed in the RMP within the proposed development site. There are twenty four recorded archaeological sites within a 1.5km radius of the proposed development site.

Archaeological sites listed in the Database of the ASI

The purpose of the ASI is to compile a base-line inventory of the known archaeological monuments in the State. The large record archive and databases resulting from the survey are being continually updated. This database, complete with maps is now available for consultation via the NMS website at www.archaeology.ie. There are no recorded archaeological sites listed in the SMR within the proposed development site.

Architectural sites listed in the Record of Protected Structures (RPS)

Buildings recorded in the RPS can include archaeological monuments listed in the RMP and SMR, structures listed in the NIAH or buildings deemed to be of architectural, archaeological or artistic importance by the Minister. Such sites receive statutory protection from injury or demolition under the 1999 Planning Act. All current RPS sites in Cork are listed in the County Development Plan 2022-2028. There are no PS within the proposed development site. There are seven PS within a 1km radius of the proposed development site.

Architectural Conservation Areas (ACAs)

The County Development Plan for Cork includes areas designated as Architectural Conservation Areas. The stated objective of ACAs is to conserve and enhance their special character, including their traditional building stock and material finishes, spaces, streetscapes, landscape and setting. The closest ACA to the proposed development site is that around Middleton c. 6km to the east.

National Inventory of Architectural Heritage (NIAH)

The National Inventory of Architectural Heritage was set up under the Convention for the Protection of the Architectural Heritage of Europe or the Granada Convention of 1985. It was established on a statutory basis under Section 2 of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. There are no structures listed in the NIAH within the proposed development site. There are twelve structures listed in the NIAH within a 1km radius of the proposed development site.

10.2 Methodology

The methodology used for this study included comprehensive desk-based research of published information and walkover surveys to assemble information on the local receiving environment.

10.2.1 Desktop Study

The desktop study provided an overview of the archaeology, architecture and cultural heritage environment of the proposed development site and surrounding area using the following primary sources:

- Record of Monuments and Places (RMP) of County Cork

This record was established under Section 12 (1) of the National Monuments (Amendment) Act 1994. It lists all monuments and places believed to be of archaeological importance in the County. The numbering system consists of two parts: the first part is the county code (CO for Cork) followed by the Ordnance Survey map number (six inches to the mile scale); the second part is the number of a circle surrounding the site on the RMP map, e.g. (CO075-068) refers to circle 068 on OS sheet 075 for County Cork. The

area within the circle is referred to as the *Zone of Archaeological Potential (ZAP)* or zone of notification for that site. Its diameter can vary depending on the size and shape of the site but it averages out at approximately 180m. The RMP for County Cork was published in 1998.

- Sites and Monuments Record (SMR) Database of the Archaeological Survey of Ireland (ASI)
www.archaeology.ie

The purpose of the ASI is to compile a base-line inventory or SMR, of the known archaeological monuments in the State. The SMR contains details of all monuments and places or sites known to the ASI which pre-date AD 1700, and a selection of monuments which post-date 1700. The large record archive and databases resulting from the survey are continually updated. Archaeological sites which are added to the database are proposed to be included in the next published edition of the RMP and will then be afforded its protection. This database, complete with maps, is available for consultation via the National monuments Service (NMS) website in www.archaeology.ie.

- Archaeological Inventory for East and South Cork Volume 2 (1994) and Volume 5 (2009)

The inventories for each county are follow-ons by the ASI, to the RMPs. They give a written description of each archaeological site in the county. The archaeological inventory for East and South Cork, Volume 2 (Power, Byrne, Egan, Lane & Sleeman, 1994) was published in 1994 and a follow up volume, Volume 5 (Ronan, Egan & Byrne, 2009), was published in 2009.

- Consultations

During the compilation of the EIAR consultation was undertaken with Mary Sleeman, Archaeologist Cork County Council. (awaiting response, I have emailed Mary, will give her a call to discuss next week).

- Files of the National Monuments Service (NMS)

The topographic files of the NMI were searched for finds from townlands in the study area. These finds are referred to in the Existing Environment Section 10.2.

- Database of Excavation Reports in www.excavations.ie

This website provides a database of summary accounts of archaeological excavations and investigations in Ireland undertaken between 1970 and 2021. Until 2010, these accounts were also published in book form. The database was queried for any investigations undertaken in any of the townlands within the Study Area. Details of these excavations are given in **Section 10.2.5** below.

- National Inventory of Architectural Heritage (NIAH)

The NIAH was established on a statutory basis under Section 2 of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from 1700 to the present day, in a systematic and consistent manner. It is divided into two parts; The Building Survey and Historic Garden Survey (www.buildingsofireland.ie). The main function of both is to identify and evaluate the State's architectural heritage in a uniform and consistent manner, so as to aid its protection and conservation. The NIAH carried out a survey of the buildings of County Cork between 2006 and 2011 and includes approximately 6,500 items of architectural importance. Under Section 53 of the Planning and Development Act 2000, all structures considered of regional, national or international importance within the survey are recommended for inclusion in the RPS by the Minister for Arts Heritage and the Gaeltacht.

If this is not adopted by the local authority, the reasons must be communicated to the Department. The Building and Historic Garden Survey for County Cork is available online in www.buildingsofireland.ie.

- Cork County Development Plan (2022-2028)

The Cork County Development Plan (CDP) outlines Cork County Council's objectives with regard to the preservation of the archaeological, architectural and cultural heritage of the County. The plan outlines the Council's objectives regarding the protection of archaeological heritage, including the protection of monuments listed in the SMR and RMP, by preservation *in situ*, or in exceptional cases, preservation by record. The zones of archaeological potential identified in the RMP are also to be protected. The CDP aims to safeguard 'sites and settings, features and objects of archaeological interest generally'. According to the CDP, previously unidentified archaeological sites that are uncovered during construction works must be investigated and recorded. The CDP identifies the significance of medieval archaeology, industrial and post medieval archaeology, battlefield and siege sites, as well as structures shown on the 1st and 2nd edition Ordnance Survey 6-inch maps which are to be assessed prior to any development.

The rich and varied architectural heritage of the County is protected through the inclusion of buildings in the Record of Protected Structures (RPS), as required in the Planning and Development Act 2000 (Part IV). This record includes all structures or parts of structures which are, in the opinion of the Council, of 'special, architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest'. This designation is to ensure that changes or alterations to the included buildings or their settings will be carried out in such a way that their existing special character and setting is retained and enhanced.

The CDP outlines how the rich and diverse cultural heritage of the County will be promoted and protected by Cork County Council "as an important economic asset". The Plan includes "*language, the arts, creative industries, enjoyment of the natural, historic and built environment, events and festivals, use of tourist attractions, libraries, museums, archives and galleries, industrial heritage, the diversity of the faith communities and places of worship, local cultural traditions and sport and recreation*" as culture that helps to define the perception of the County and provides a sense of identity. The Plan acknowledges the importance of folklore, oral cultural heritage, and historic heritage sites, including battle sites, historic rights of way, and Irish place names.

- Cartographic Sources

The following maps were consulted some of which are reproduced in **Section 10.2.4 below and in Appendix 10-1**.

Down Survey Parish and Barony maps (1654-1659);

Taylor and Skinner maps (1777);

The 1811 Grand Jury map of Cork compiled by Neville Bath in the 1790s and published in 1811 at a scale of three quarters of an inch to one mile;

1:50,000 OSI Discovery Series;

Ordnance Survey (OS) 6-inch maps; the three editions of the 6-inch to one mile scale maps were consulted, the first edition published in 1841-1842, the second edition published in 1897-1904 and the third edition published in 1938;

The 25-inch to one mile scale map, from which the second edition 6-inch map was derived in 1902.

- Aerial photographs and images

Ordnance Survey of Ireland (OSI) and Google maps have posted a number of online aerial photographs dating from 1995 (OSI; 1995, 2000 and 2005-2012, 2011-2013 and 2013-2018). These were examined to identify any previously unrecorded features of archaeological/cultural heritage significance that may only be visible from the air. No archaeological features were apparent on the photographs.

- A comprehensive range of published documentary sources were utilised and are listed in the bibliography in Section 10.7.

10.2.2 Guidelines and Best Practice

Policies for both the archaeological and architectural heritage are set out in a series of specific published guidelines. This assessment is prepared having regard to the following:

- Framework & Principles for the Protection of the Archaeological Heritage. Department of Arts, Heritage, Gaeltacht & the Islands, 1999;
- Policy & Guidelines on Archaeological Excavation. Department of Arts, Heritage, Gaeltacht & the Islands, 1999;
- Architectural Heritage Protection, Guidelines for Planning Authorities, 2004. (Department of the Environment, Heritage and Local Government).

10.2.3 Scope of Assessment

Table 10-1 outlines the issues which the EPA guidance documents suggest may be examined as part of the material assets impact assessment.

Table 10-1 Issues relevant to Cultural Heritage

Topic Area	Potential Issues
Archaeology	Potential hitherto unknown subsurface archaeological sites may be present within areas of undisturbed ground within the proposed development site
Architectural heritage	There are no structures of architectural merit within the proposed development site and therefore no significant effect on this topic will occur.
Cultural Heritage	Potential hitherto unknown subsurface archaeological sites may be present within areas of undisturbed ground within the proposed development site which would be part of the cultural heritage of the area.

Accordingly, the scope of this assessment is made with respect to these topic areas and considers the effects of the construction, operation and decommissioning of the proposed development in terms of how the proposal could affect archaeology and cultural heritage. While there are no upstanding buildings or structures of architectural merit within the proposed development site, architectural heritage is part of the overall cultural heritage of the area. Therefore, an appraisal of the architectural heritage within a 1km radius of the proposed development site is included in this report to provide an account of the residential, spiritual and social history of the surrounding region.

10.2.3.1 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022) as set out in Table 10-2 below.

Table 10-2 Impact Assessment Criteria

	Term	Description
Quality of Effects	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative /adverse	A change which reduces the quality of the environment
Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequence
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant	An effect which, by its character, magnitude duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude duration or intensity alters most of a sensitive aspect of the environment
	Profound	An impact which obliterates sensitive characteristics
Duration of Effect	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 than can be undone e.g. through remediation or restoration
	Frequency	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effects	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create a larger, more significant effect.
	‘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).

Source: EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022)

10.2.3.2 Scoped out from Further Assessment

There are no upstanding buildings or structures of architectural merit within the proposed development site and therefore no significant effect on this topic will occur. An appraisal of the architectural heritage within a 1km radius of the proposed development site is included in this report to provide an account of the residential, spiritual and social history of the surrounding region.

10.2.4 Statement on Limitations and Difficulties Encountered

While many archaeological sites survive today as upstanding structures, many more survive only as subsurface remains, often forgotten and concealed from view. Subsurface archaeological remains are commonly uncovered during archaeological investigations in advance of development. The proposed development site has been subject to varying degrees of ground disturbance since c. 2012, when it was utilized during the construction of the residential developments that border it to the west and the south. There are, however, areas of undisturbed ground throughout the proposed development site where hitherto unknown subsurface archaeological remains may be present. Where extensive earthmoving is involved, there is always the possibility that archaeological material will be uncovered.

Sections of the proposed development site were difficult to fully assess due to overgrown ground conditions, impenetrable in places (Area 1) and the presence of mounded soil and building rubble in areas of the site (Area 2).

The proposed development site was inspected on the ground to determine its suitability for geophysical survey. The entire site was assessed to be wholly unsuitable due to prevailing ground conditions and previous extensive ground disturbance throughout (Nicholls, **Appendix 10.3**).

10.3 Baseline Existing Environment

10.3.1 Site Location and Description

The proposed development site is situated in the townlands of Terry's-Land and Carrigtohill in the parish of Carrigtohill and Barony of Barrymore on the western outskirts of the village of Carrigtohill. The village of Carrigtohill lies in the gently-rolling, low-lying setting of Cork harbour, c. 16km to the east of Cork City. The land around the village is fertile and generally in agricultural use with a large portion under intensive arable cultivation. The prevailing limestone geology has attracted quarrying activity in the area since at least the mid-19th century and this is now at industrial extraction levels to the south of the N25 at Lagan Milebush Quarry in the townland of Ballynabointra and Roadstone Quarries in Ballyvodock West, 2.5km to the southeast of the proposed development site.

The village of Carrigtohill owes its name, *Carraig Tuathail*, meaning Toohal's Rock, to a prominent knoll of limestone situated c. 600m to the north-east of the proposed development site in the townland of Terrysland (Coleman, 1934, 76). Caves occur in the greater Midleton area where the limestone breaks the surface in a series of ridges and knolls. The knoll at Terrysland provides access to an extensive limestone cave system (CO076-003) that was explored by Coleman in 1934 (*ibid.*). This site has been determined to be non-archaeological and has been de-listed from the SMR Database and is now a Redundant Record. A section of the cave was subsequently excavated by Coleman (*ibid.* 71) in 1944 and a wolf skull and recent domestic faunal remains were recovered. The village remained much the same until relatively recently. The opening of a by-pass in November 1994 provided direct and easy access to and from Cork City, thus instigating an unprecedented growth in housing developments which now border the village to the North, East and West. This has transformed the once rural village of Carrigtohill into a commuter area to Cork City.

The proposed development site lies to the west of Carrigtohill village. It comprises seven individual areas of ground where development is proposed. These seven areas are as follows;

Area 1 (Castlelake North Site) and **Area 2** (Blandcrest Site) are bordered to the north by the Cork to Midleton Railway line and to the south by a newly constructed road and residential developments;

Area 3 (Station Road North Site) and **Area 4** (Station Road South Site) lie to the west of Station Road and to the north of a newly constructed road;

Area 5 (Castlelake West Site), **Area 6** (Castlelake South Site 02) and **Area 7** (Castlelake South Site 01) lie to the west of Castlelake Avenue which provides access to a number of existing residential developments (**Fig. 10-1**).

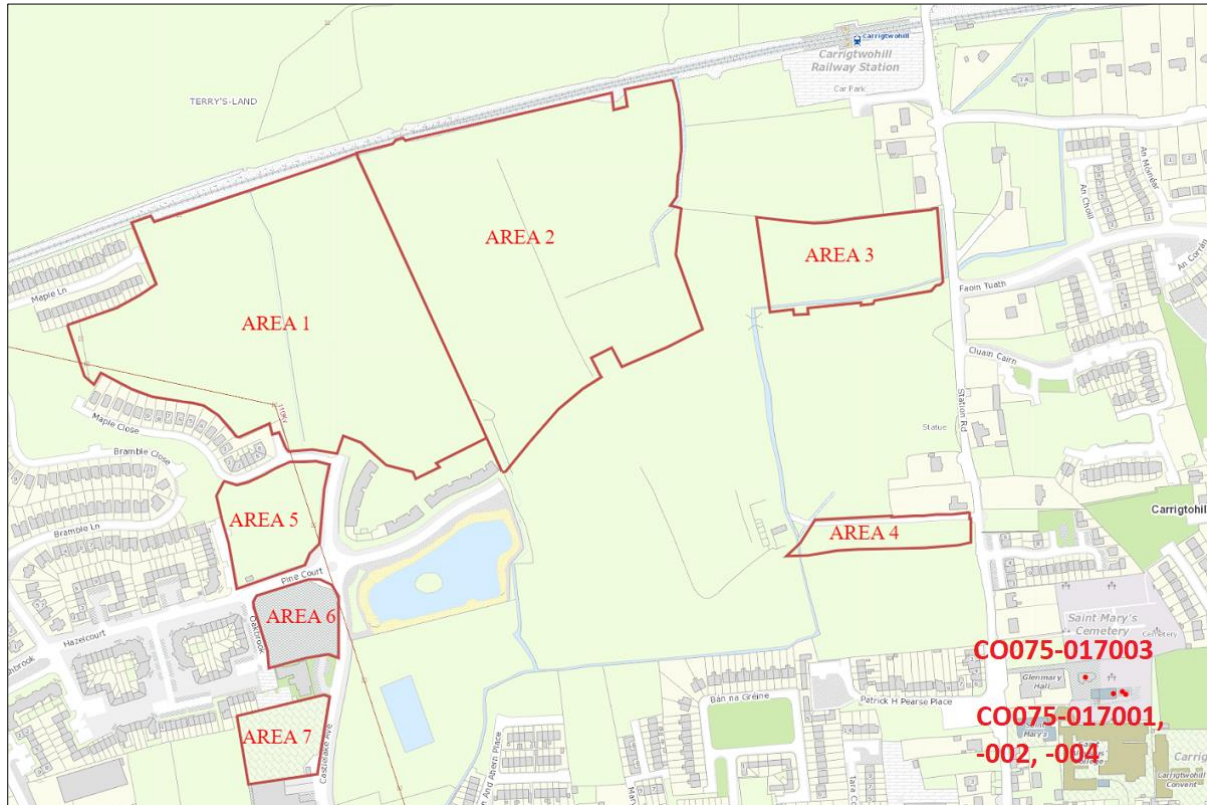


Figure 10-1 Proposed development site (AREAS 1-7) outlined on OS map with closest RMP sites
www.archaeology.ie

10.3.2 Archaeology and Cultural Heritage

There are no recorded archaeological monuments listed in the RMP or the SMR within the proposed development site (**Figures 10-1 and 10-2**). The closest recorded archaeological sites are a graveyard (CO075-017001-), situated c. 160m to the southeast of Area 4 within which lie two churches (CO075-017003- and CO075-017002-) and a redundant record (CO075-017004-). One of the churches (CO075-017002-) comprises the medieval remains of the St. David's parish church of Carrigtohill and is also a Protected Structure (PS854) included in Cork County Development Plan (2022-2028).

In total, there are twenty four recorded archaeological sites within a 1.5km radius of the proposed development site (**Table 10-3 and Figure 10-2**). These monuments provide evidence for human settlement and activity within the study area dating back to the Bronze Age. Since this time, human populations have organised and altered the landscape in which they live for a diversity of purposes, be it agricultural, social, political, or religious.

Table 10-3 RMP sites within 1.5km of the proposed development site

RMP	SITE TYPE	TOWNLAND	DISTANCE
CO075-014	Enclosure	Killacloyne	1km to SW
CO075-015001-	Graveyard	Kilcurfin Glebe	1.1km to NW
CO075-015002-	Church	Kilcurfin Glebe	1.1km to NW
CO075-016	Country house	Garrancloyne	1.3km to N
CO075-017001-	Graveyard	Carrigtohill	160m to SE
CO075-017002-	Church	Carrigtohill	160m to SE
CO075-017003-	Church	Carrigtohill	160m to SE
CO075-017004-	Redundant Record	Carrigtohill	160m to SE
CO075-018001-	Tower House	Barryscourt	830m to S
CO075-018002-	Fulacht fia	Barryscourt	780m to S
CO075-018003-	Bawn	Barryscourt	830m to S
CO075-019	Country house	Tullagreen	780m to SW
CO075-050	Country house	Carhoo	1km to NW
CO075-051	Country house	Anngrove	880m to NW
CO075-068	Midden	Carrigtohill	310m to SE
CO075-070	Fulacht fia	Barryscourt	1km to S
CO075-071	Fulacht fia	Barryscourt	1km to S
CO075-072	Fulacht fia	Barryscourt	1km to S
CO076-001	Limekiln	Terrys-Land	540m to E
CO076-002	Linear earthwork	Barryscourt/Clyduff	1km to SE
CO076-003	Redundant Record	Terrys-Land	700m to E
CO076-005	Prehistoric lithic scatter	Clyduff	1.4km to SE
CO076-071	Ringfort	Clyduff	1.2km to SE
CO076-124	Fulacht fia	Carrigtohill	1.2km to SE

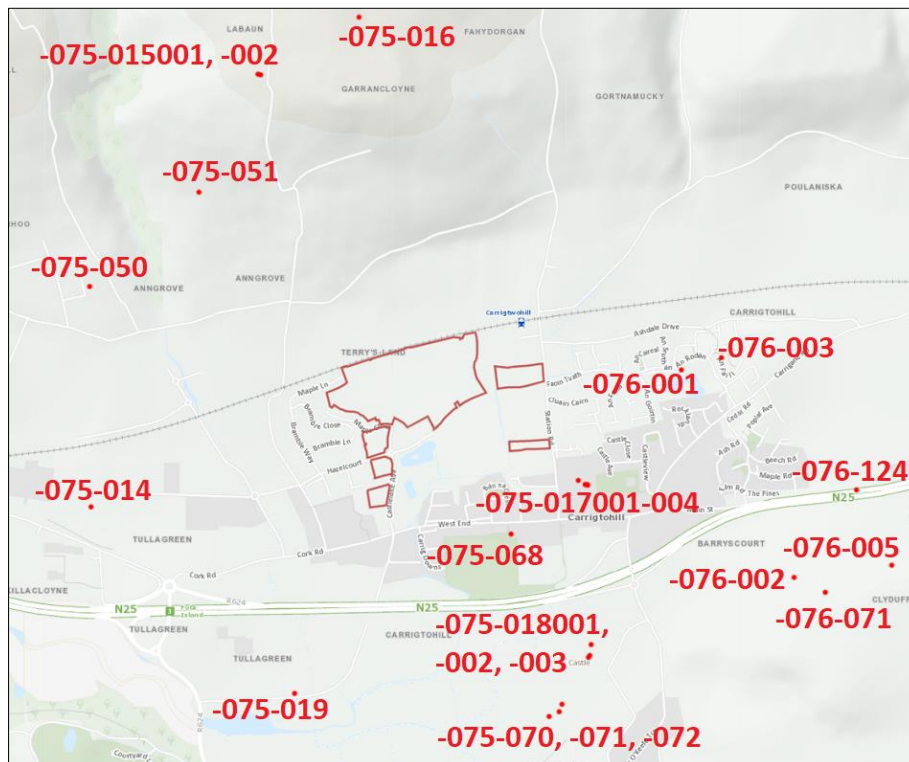


Figure 10-2 Proposed development site outlined on OS map with RMP sites within a 1.5km radius www.archaeology.ie

The pace of landscape change in Ireland accelerated in the second half of the 20th century and many archaeological sites have been levelled by activities associated with modern development and progress such as agriculture, industry and infrastructural improvements. This has ensured that the present day archaeological landscape is not fully representative of the human occupation of this island, which has spanned some twelve thousand years. While many archaeological sites survive today as partially upstanding structures, such as earthworks and stone monuments, many more survive only as subsurface remains, often forgotten and concealed from view. Subsurface archaeological remains are usually uncovered during archaeological investigations in advance of development. Much of the physical evidence for the existence of past societies has been altered by each successive community, all of which leave their mark on the landscape they have occupied.

The archaeological timescale can be divided into two major periods, each with a number of sub-sections:

1. **The prehistoric period:** Mesolithic - (*circa* 8000 to 4000 BC); Neolithic - (*circa* 4000 to 2400 BC); Chalcolithic c. 2450-2200; Bronze Age (*circa* 2200 to 700 BC) – Iron Age (*circa* 700 BC to AD 400)
2. **The medieval period:** Early medieval 5th – 12th century; high medieval 12th century – *circa* 1400; late medieval *circa* 1400 – 16th century.

Mesolithic, Neolithic and Chalcolithic

The earliest evidence for human colonisation and settlement in Cork can be dated to 8000 BC, the Mesolithic Period. The people of this era were hunter-gatherers, entirely dependent on what food could be obtained through hunting and gathering, amongst other things, edible plants and shellfish. The transition of the early settlers from hunter/gatherers to a farming way of life in the Neolithic period brought about revolutionary change. This led to more permanent settlements and substantial houses and a more complex and structured social hierarchy. A steady food supply meant that people had more time to increase their toolkit and domestic equipment and develop specialised crafts. The Chalcolithic, meaning the ‘Copper and Stone Age’ is a transitional phase in Ireland between the Neolithic and Bronze Age that is characterised by the adoption of copper metallurgy as an established technology prior to the use of bronze. This period is also frequently represented on excavated sites ‘by the widespread cultural adoption of a new form of pottery, collectively referred to as Beaker Ware’ (Hanley, 2013).

Prehistoric activity is evident in the study area through a lithic scatter of flint arrowheads (CO076-005), found during ploughing in the townland of Clyduff, 1.4km to the southeast of the proposed development site. These lithics can date from the early to the later prehistoric periods (c. 8000BC – AD 400). Outside the study area, in the broader region, early prehistoric settlement and occupation has been identified approximately 15km to the south of the proposed development site. Just outside and to the east of the mouth of Cork Harbour a number of finds of flint scatters, some of which date to the later Mesolithic period have been found in the course of systematic field walking (Power *et al.* 1994). Much evidence for the Neolithic period now remains below ground but the characteristic upstanding feature of this period is the Megalithic tomb, the closest of which to the study is that at Rostellan (CO088-010) on the shoreline of Poulnalibe, c. 8km to the southeast within the broader region of Cork Harbour. Neolithic settlement activity was discovered during development works at Foaty on Fota Island (CO075-077), approximately 2.3km to the southwest (Power *et al.* 1994, 365) and at Carrigrenan, c. 5.3km to the southwest, a Neolithic polished stone axe was found during monitoring of topsoil removal prior to the construction of the waste-water treatment plant (Lane 2001). A number of Neolithic polished stone axes have now been recorded from the Cork Harbour area (*ibid*). These finds provide valuable evidence of Neolithic activity in the greater region around the study area

Bronze Age and Iron Age

The Irish Bronze Age is characterised by the adoption of bronze, distinctive pottery styles, changes in burial traditions and an increase in population. The burial traditions of the Bronze Age were generally much simpler than the elaborate megalithic tombs of the earlier Neolithic and Chalcolithic periods, although these were frequently reused for later burials. Most Bronze Age burials, either cremated or inhumed, were placed in stone-lined cists or simple earth-cut pits often accompanied by grave goods. Some graves were marked with a cairn or a mound of stones, while others were marked by a mound of earth known as a barrow.

There are five fulachtaí fia in the study area, four in the townland of Barryscourt (CO075-070, CO075-071, CO075-072 and CO075-018002-) to the south and one in Carrigtohill (CO076-124) to the east. Fulachtaí fia are the most common prehistoric site type in the country and are generally interpreted as ancient cooking sites but could have been used for any purpose that required large quantities of hot or boiling water such as bathing, processing textiles, tanning, brewing, extraction of fats from meat, and soap making, or even a combination of these functions (Ó Drisceoil, 1988; Monk 2007; Quinn & Moore 2007). While many fulachtaí fia have been dated to the later Bronze Age (2400-500BC), a minority of excavated examples have been dated to the earlier Neolithic (4000-2400 BC). Fulachtaí fia are sometimes recognisable as horseshoe-shaped mounds of heat-shattered stones, often located near a stream or in waterlogged areas. Water in a stone or wood-lined trough was brought to the boil by immersing hot stones in it. The stones were heated in a nearby fire and shattered on impact with the cold water in the trough. After each cooking session, the stones were removed from the trough and thrown to the side, finally forming the characteristic horseshoe-shaped mound of stones. Regular ploughing of the mound reduces it to a spread of heat-shattered stones in the field. Fulachtaí fia generally enjoy a good survival rate owing to their siting in areas of low-lying, poorly drained and sometimes boggy environments where tillage is generally not practiced. The four fulachtaí fia in Barryscourt, three of which are in one field, consist of spreads of burnt material of varying sizes. The largest spread is that (CO075-018002-) outside the bawn wall of Barryscourt Castle, which measures 16m N-S and 12m E-W. The fulacht fia in the townland of Carrigtohill (CO076-124) was discovered in 2007 during construction of a sewerage scheme near the village (Cleary, 2007). Similar to the examples in Barryscourt, it too presented as an irregular spread (18m E-W; 12m N-S; D 0.3m) of heat-shattered stones and charcoal enriched soil. Under the spread lay a circular area (diam. 5.1m) defined by a fosse which surrounded a central sub-oval pit (3.6m E-W by 1.75m N-S and 0.4m deep). A fragment of a lignite bracelet was recovered from the pit. Five other pits, all filled with burnt stone were also excavated. One contained an oak post and six driven stakes and was the terminus of a U-shaped channel (7.3m long, 1.1m wide and 0.25m deep). Both the spread and the circular area beneath were dated to the later Bronze Age (*ibid.*). The fulacht fia spread was cut by an early medieval fosse (*ibid.*).

The Iron Age in Ireland marks the transition from bronze to iron working which was a significant technological innovation that had a major impact on agriculture, making it more efficient and productive and thus having an effect on society as a whole. Iron, a much harder substance than bronze, was used to make more efficient tools to clear large tracts of dense forest. Approximately 1km to the southeast of the proposed development site, a linear earthwork (CO076-002) known as the Claidh Dubh or 'black ditch/dyke' forms part of the townland boundary between Barryscourt and Clyduff. Linear earthworks, sometimes called travelling earthworks are defensive features which may define ancient tribal boundaries probably from the later prehistoric period. The best known examples are the Dorsey and the Black Pig's Dyke in the north of the country, constructed around the first century BC which have been interpreted as regional territorial boundaries of different tribal groups (O'Brien, 2012). The Claidh Dubh survives in three sections in County Cork, stretching from the north to the east of the county and a section in north County Cork was surveyed and excavated as part of the Discovery Programme, Ballyhoura Hills Project in 1993 (Doody, 1993). The excavated section comprised an earthen bank (c. 1.5m high) which was constructed alongside a silted-up stream bed to the west and a shallow ditch and well-constructed roadway to the east. While the excavation did not produce any finds or direct dating evidence, radiocarbon analysis of peat directly above the roadway to the east, indicated the onset of peat growth at c. 100 AD meaning that the road had gone out of use by the middle of the Iron Age (*ibid.*). This would place the Claidh Dubh in the late prehistoric period along with the Dorsey and Black Pig's Dyke in Northern Ireland (*ibid.*). The section of the Claidh Dubh to the southeast of the proposed development site is 550m in length and consists of an earthen bank (H 1m) which is stone-faced in parts (Power *et al.* 1994).

Early Medieval Period

This period in Ireland is characterised by the influx and influence of Christianity, which had become widely established by the 6th century AD. The ecclesiastical site, 'Inispicht' (CO087-065002), on Spike Island, situated c.

8.5km to the south of the proposed development site in lower Cork Harbour was probably established at this time. Monasteries became a focal point for the lay communities of this period who were spread throughout the countryside in settlements such as ringforts/raths, crannogs and simple huts.

There is one ringfort in Clyduff (CO076-021), c 1.2km to the southeast of the proposed development site. The site is levelled with no visible surface trace. Ringforts (also known by the names rath, lios, cathair or caiseal/cashel) are defended farmsteads and are the most characteristic monument of this period. The main phase of construction and occupation of ringforts dates from the beginning of the 7th century AD to the end of the 9th century. They are generally circular or oval in plan, defined by an earthen bank with an external ditch or fosse. Larger ringforts with double defences (bi-vallate) and triple defences (tri-vallate) are generally interpreted as higher status sites and these can be particularly associated with specialised craft working. The sub-surface remains of circular dwelling houses and associated outbuildings are frequently revealed within ringforts during excavation. Some ringforts have associated souterrains (underground chambers connected by narrow creepways) as defensive features which may have also been used for storage. Others have associated corn-drying kilns and sometimes external structures. The early medieval economy was dominated by cattle rearing with dairying being the primary activity and cattle were the indicator of one's status and were the currency for payment of fines, rent, tributes and gifts. Land was valued on the basis of the number of cattle it could support (Feehan, 2003). Cattle raiding was widespread and the ringfort provided protection for the animals at night when they would have been kept within its defences (*ibid*, 62). Generally, it has been speculated that the elite of society occupied ringforts and that the less wealthy lived in undefended settlements scattered across the landscape. In more recent archaeological investigations, particularly on road infrastructure projects in County Cork, the number and type of newly identified, unenclosed medieval settlements has been growing, suggesting more diversity in contemporary settlement patterns and challenging the perceived importance of ringforts within the early medieval landscape (Monk, 2019). Ringforts tend to be geographically focused on what is considered relatively good agricultural land and thus many have been levelled by modern agricultural activity and largescale development, but substantial remains may still exist below ground. There is one enclosure (CO075-014) in the townland of Kilacloyne, 1km to the southwest of the proposed development site. The term enclosure is loosely applied to describe the enclosure of an area of ground and without further investigation it is not possible to determine whether the site is archaeological in nature. The enclosure is indicated on the OS map of 1842 as a subrectangular enclosure (L. c. 40m N-S; c. 20m E-W) cut across by a field fence. The site is levelled with no above ground trace (Power *et al.* 1994).

High Medieval and Late Medieval Periods

The Anglo-Normans arrived in Ireland in 1169 at the request of Diarmait Mac Murchada, the deposed king of Leinster. By 1350 Norman influence was evident on the rural landscape in the form of manorial villages with open field systems, occupied by colonists from England and Wales (Aalen, Whelan, Stout 1997, 55). The earth and timber fortresses constructed by the Anglo-Normans settlers in the late 12th/early 13th century functioned as defensive homesteads, replacing the earlier ringfort while the less formidable moated sites formed part of the second wave of Anglo Norman settlement in Ireland. They were most likely the homes of minor lords and well-to-do tenant farmers and would have formed the focal point of large agricultural estates. At the same time as the Anglo-Norman invasion of Ireland, the church in Europe experienced a period of reform, which resulted in the foundation of many new religious orders, like the Cistercians who founded their first house in Ireland at Mellifont, county Louth in 1157. Within a few years other houses were established around the country like that in the historic town of Midleton (CO076-063005) c. 7km to the east of Carrigtohill. The Cistercian abbey of Chore, also called St. Mary of Chore (CO076-063003) was founded in 1180 (Gwynn & Hadcock 1988) adjacent to the Owenacurra River giving the town its name Midleton, in Irish *Mainistir na Corran*, meaning monastery of the ford. The Abbey was suppressed in 1543 and in ruins in 1615 (Gwynn & Hadcock 1088). The site is now occupied by Midleton Church of Ireland church and graveyard (CO076-063002 and -063001).

The majority of castles in Ireland can be broadly classified into two groups; the early castles of the late twelfth and thirteenth centuries and the tower houses of the fifteenth to sixteenth centuries. Tower houses consist of fortified residences in the form of a tower that was usually four to six storeys high and often partially enclosed by a bawn. Approximately 830m to the south of the proposed development site is Barryscourt Castle and associated bawn (CO075-018001, CO075-018003), a National Monument in State Ownership (Nat. Mon. No. 641). A notable historical landmark in the area, the castle, situated approximately 1km from the north-eastern

corner of Cork Harbour, was the seat of the Barry family. This large and complex tower house has been the focus of archaeological excavation and restoration over many decades and recent radiocarbon dating give a date of 1392 to 1420 for its construction (Sherlock, 2017). Upon the death of David, Viscount Barrymore in 1617, the castle ceased to function as the chief Barry residence, with the fortified house at Castlelyons assuming that role. In 1988 the Barryscourt Trust was formed to develop the Castle as a cultural and tourist centre in line with other projects in East Cork. It is described as 'a large tower house consisting of a rectangular main block (14m N-S; 11m E-W) with subsidiary projecting towers at NE (c. 7.5m E-W; 5m N-S) and SW (c. 4m N-S; 4.2m E-W) (Power *et al.* 1994).

The closest recorded archaeological sites are a graveyard (CO075-017001-), situated c. 160m to the southeast of Area 3 within which lie two churches (CO075-017003- and CO075-017002-) and a redundant record (CO075-017004-). One of the churches (CO075-017002-) comprises the medieval remains of the St. David's parish church of Carrigtohill. The remains of the nave, chancel and tower of St. David's parish church of Carrigtohill (CO075-017002-, PS854) is described by Power *et al.* (*ibid.*) as follows; '*By 1615 nave in repair but chancel ruinous (Brady 1863, vol. 2, 91); chancel still a ruin but nave maintained as C of I church until new church built in NW corner of graveyard in 1905 (Coleman 1908, 8); nave still roofed and used as hall with recent flat-roofed extension on W side. Tower appears late medieval in date, as presumably was this larger-than-usual parish church of Carrigtohill, associated with nearby Barryscourt castle (CO075-018001-), seat of the Barry family*'. In the northwest corner of the old graveyard are the remains of the Church of Ireland Church (CO075-017003) which was built in 1905 as a replacement to the earlier church (Power *et al.*, *ibid.*). The oldest inscribed headstones within the graveyard (CO075-17001-) are on the south side and date to early 18th century (*ibid.*). There is one site within the graveyard that is listed as a Redundant Record (CO075-017004-) on the SMR Database and described as follows; '*Listed as an 'abbey' in the SMR (1988) and the RMP (1998) based on the fact that the words 'Abbey (in Ruins)'* appear here on the 1842 OS 6-inch map. No such abbey is listed in Gwynn and Hadcock (1988) and the remains are those of a late medieval parish church and tower (CO075-017001-). The evidence is not sufficient to warrant accepting this as the location of an archaeological monument (*ibid.*).

Post Medieval Period

The eighteenth century was an era of relative peace and political stability in Ireland. This encouraged a growing sense of prosperity and order, which in turn created an environment favourable to industrial and agricultural innovation as well as intellectual and aesthetic pursuits. Perhaps the most notable cultural heritage site-type of this period and the ensuing century is the country house and its demesne. The term 'demesne' or 'demaïne' is Norman French in origin and denotes that portion of the manorial estate not leased out to tenants but retained by the Lord for his own use and occupation' (Reeves-Smyth, 1997, 549). The estate system was finally dismantled in Ireland in the early twentieth century.

There are four country houses listed in the RMP within the study area, in Tullagreen (CO075-019), Anngrove (CO075-051), Carhoo (CO075-050), and Garrancloyne (CO075-016). Two of these houses, Barrys Lodge in Tullagreen (dating to the late 18th/early 19th century) and Anngrove House in Anngrove (dating to the late 17th century) have been demolished (Power *et al.* *ibid.*). The house in Carhoo, is described by Power *et al.* (*ibid.*) as a ruined two-storey later 18th/early 19th century house marked as 'Carhuegarriffe' on the 1902 and 1935 OS maps while the house in Garrancloyne, known locally as a 'Three Chimney House' is also described as being in a ruinous state (*ibid.*). Lewis (1837) mentions Tulligreen, of Hughes Martin, Esq. and Ann Grove of F. Wise, Esq as being two of the principal gentlemen's seats of the parish of Carrigtohill.

There is one shell midden (CO075-068) in the study area, in the townland of Carrigtohill, 310m to the southeast of the proposed development site. Shell middens are mounds or spreads of discarded shells, usually found along the coastline. These sites can date from many periods, sometimes as early as the Mesolithic. The example in Carrigtohill was found during construction of Scoil Mhuire Naofa to the south of the main road into the village. The site was excavated by O'Kelly (1955) and found to contain a pit (5m N-S; 2.25m E-W; max D 0.6m) cut into the subsoil. The pit contained mainly oyster shells, animal bones and fragments of glazed pottery dating from the later 13th to early 14th century (Power *et al.* *ibid.*).

There is one limekiln in the townland of Terrys-Land (CO076-001) 540m to the east of the proposed development site. Limekilns were very common features of the Irish rural landscape from the 18th to 20th centuries. The use of lime in farming was widespread; as a fertilizer, an improver of soil and general farming conditions, as a clean-all disinfectant wash in farmyards, in making mortar, as a slug, snail and ant repellent and as a frost protection for stored potatoes. Limekilns were used to produce the lime, by burning limestone at very high temperatures (900° C to 1000°C). Lewis in 1837 describes how 'great quantities of limestone are quarried and burnt into lime for manure'. The limekiln in Terrys-Land (H 10m; Wth 12.45m) is built against a rock outcrop and incorporates three kilns with arched recesses. The kiln remains preserved within a large housing development to the northeast of Carrigtohill village.

Cultural Heritage can be site specific, when an archaeological or architectural site has cultural heritage associations, or non-site specific, where less tangible aspects of cultural heritage cannot be pinpointed to a particular place but can be tied to a specific region. Our cultural heritage provides a link with our past, is part of our identity and who we are as a people and as a region. The Study Area, and its broader region, is steeped in a rich and varied tradition that is centred on its location in the gently-rolling, low-lying setting of Cork harbour, c. 16km to the east of Cork City.

Smith (1750, 148) described Carrigtwohill as '*a small village seated on the arm of the sea which, at high water flows under a bridge of four arches and overspreads a large tract of land, making an excellent marsh for fattening horses*'. Lewis (1837) described Carrigtohill as consisting of '*...one long irregular street and contains 98 small houses indifferently built. It has a constabulary police station; and fairs are held on the 12th of March and May, Aug. 26th, Sept. 19th and Nov. 8th, chiefly for horses, cattle, pigs and pedlery, and, from the central situation of the place, are in general well attended. A new line of road from this place to Cove has been recently opened through Foaty, and a very handsome bridge has been erected over the arm of the sea*'.

The prevailing limestone geology has attracted quarrying activity since at least the mid-19th century and numerous small scale quarries are depicted on the OS maps of 1842, 1897-1904 and 1938 within the study area and broader surrounding region. Smith (1750) describes '*.a large cavity, running under a rock*' close the northeast of the village while Lewis (1837) describes '*... the caverns which penetrate for a considerable distance into the limestone rocks, and some of them are very large and beautiful stalactites*' www.libraryofireland.com. Quarrying is now at industrial extraction levels to the south of the existing N25 at Lagan Milebush Quarry in the townland of Ballynabointra, and at Roadstone Quarries, in Ballyvodock West, 2.5km to the southeast of the proposed development site. Limekilns dot the landscape of the early OS maps such as that in Terry's-Land (CO076-001) detailed above. Many of these once common features have been destroyed or have become very overgrown and dilapidated, faded into the landscape and are barely recognisable.

On the OS 6-inch map of 1842 (see section 10.3.4 below), the proposed development site is depicted as comprising of agricultural fields within a rural hinterland to the northwest of Carrigtohill village. On the later OS 25-inch map (1897-1903), the most notable change to the landscape is the Cork to Midleton Railway line bordering Areas 1 and 2 to the north. The number of houses in the village of Carrigtohill increased somewhat by the later OS maps of the early to mid-20th century but overall the village remained the same with settlement focussed on Main Street. The opening of a by-pass in November 1994 prompted a surge in new residential developments which now lie to the north, east and west of the village while the IDA Business Park approximately 500m to the west of the proposed development site is occupied by a number of multinational corporations such as Stryker and GE Healthcare. The once rural village of Carrigtohill has been transformed to a commuter area to Cork City.

The proposed development site is situated in the townlands of Terry's-Land and Carrigtohill. The Irish landscape is divided into over 62,000 townlands and this system of landholding is unique in Western Europe for its scale and antiquity. Many townlands are pre-Anglo/Norman in origin and Irish historical documents consistently use townland names throughout the historic period to describe areas and locate events accurately in their geographical context. The townland names and boundaries were standardised across the country in the nineteenth century when the Ordnance Survey began to produce large-scale maps of the country. Townlands

existed long before parish and county divisions. The original Irish names were eventually systematically recorded in anglicised form in the mid-19th century during compilation of the OS 6-inch maps. The social customs or history of the people who have lived in a particular place can also be reflected in the name of the townland and are often the only records that survive of the families who held the land in pre-plantation times. The townland name Terry's-Land, in Irish 'Fearann an Tiarraigh', basically means Terrys Land. It is first referred to in 1602, when it was spelt 'Tirriestowne', in the Calendar to Fiants of the reign of Henry VIII and is spelt Terrys Land in the Books of Survey and Distribution (1660) (www.loganim.ie). Other townland names referred to easily identifiable features in the landscape, such as Carrigtohill, in Irish 'Carrig Tuathail', meaning Toohal's Rock. The village of Carrigtohill owes its name to a prominent knoll of limestone situated c. 600m to the north-east of the proposed development site in the townland of Terrysland (Coleman, 1934, 76). The knoll at Terrysland provides access to an extensive limestone cave system (CO076-003) that was explored by Coleman in 1934 (*ibid.*). Other townland names in the vicinity of the proposed development site include; Barryscourt, in Irish 'Cuir a Bharraigh' meaning Barry's court, Clyduff, in Irish 'An Cláí Dubh', meaning the black ditch/dyke and Tullagreen, in Irish 'Tulach Ghréine' meaning hill of the sun. The townland of Anngrove was formerly called Ballinsperig but had been changed to Anngrove by 1750 (Loganim.ie).

10.3.3 Architectural Heritage

There are no Protected Structures (PS) listed in the Cork CDP within the proposed development site. The closest PS's are a former dispensary (PS1316; NIAH20907554), 50m to the north of Area 3, a parochial house (PS1315; NIAH20907555), 60m to the east of Area 3 and Rockville House (PS1317) situated 115m to the northeast of Area 4 and 120m to the southeast of Area 3. The medieval remains of St. David's parish church of Carrigtohill (PS854; CO075-017002) and the late 19th century St Mary's Catholic Church (PS496, NIAH20907557), lie 160m and 180m, respectively, to the southeast of Area 4.

There are twelve structures listed in the NIAH within a 1km radius of the proposed development site, of which three are also protected structures. There are an additional four PS's, not listed in the NIAH within a 1km radius, but three of which are listed in the RMP. These buildings date from approximately the 15th century (Barryscourt Castle) to the late early 20th centuries and are listed in **Table 10-4** and displayed on **Figure 10-3** below. The closest Architectural Conservation Area (ACA) is that around the town of Midleton, c. 6km to the east.

Table 10-4: PS and NIAH sites within 1km of the proposed development site

NIAH	PS/RMP	DESCRIPTION	TOWNLAND	DISTANCE
20907554	PS1316	Former dispensary – c. 1880	Carrigtohill	50m to N of Area 3
20907555	PS1315	Parochial house – c. 1880	Carrigtohill	60m to east of Area 3
None	PS1317	Rockville House – 19 th century	Carrigtohill	115m to NE of Area 4 and 120m to SE of Area 3
20907557	PS496	St. Mary's Roman Catholic Church – c. 1880	Carrigtohill	180m to SE of Area 4
20907558	None	House – c. 1830	Carrigtohill	255m to SE of Area 4
20907550	None	Barry's Bridge - 1859	Carrigtohill	170m to N of Area 3
20907551	None	Railway station - 1859	Carrigtohill	170m to NE of Area 3
20907552	None	Station Master's House - 1859	Carrigtohill	145m to NE of Area 3
20907553	None	Wise's Bridge - 1859	Terry's-Land	150m to NW of Area 1
20907549	None	House – c. 1930	Garranclloyne	800m to N
20907559	None	Tullagreen House - 1820	Tullagreen	870m to SW
None	PS489, CO075-016	Coppinger's Three-Chimney House – 18 th century	Garranclloyne	1.3km to N of Area 1
20907560	None	Gate lodge – c. 1880	Tullagreen	1km to SW
20907561	None	Slatty Bridge - 1807	Tullagreen	1.2km to SW
None	PS497	Barryscourt Castle – late 14 th /early 15 th century	Barryscourt	830m to S

	CO075-018001, 003			
None	PS854 CO075-17002	St. David's Parish Church – c. 16 th century	Carrigtohill	160m to SE of Area 4

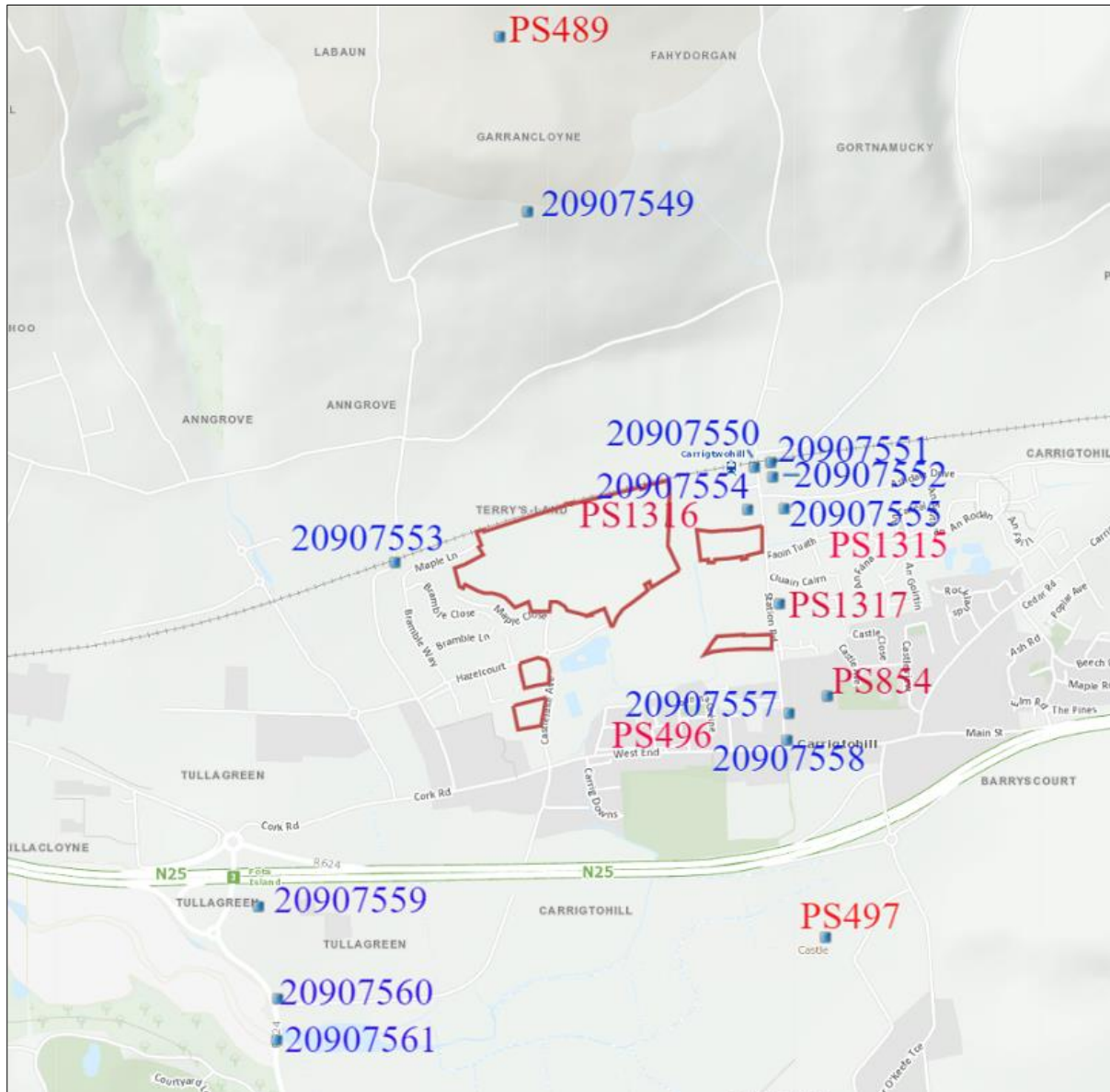


Figure 10-3 OS map showing PS (red) and NIAH sites (blue) located within a 1km radius of the proposed development site www.archaeology.ie

The structures within 1km of the proposed development site reflect the residential, spiritual and social history of the area. Barryscourt Castle (PS497; CO075-018001, 003), the seat of the Barry family (described in Section 10.2.2 above) is the earliest structure in the study area and dates to the later 14th/early 15th century. Later residential structures include the country residences of Tullagreen House (20907559) built in c. 1820. It is described in the NIAH as a detached five-bay two-storey over raised basement and important local landmark, situated on an elevated site in the landscape. Coppinger's three-chimney house (PS489), in the townland of Garrancloyne was built in the early 18th century and is now in a ruinous condition (Power *et al.* 1994). Houses within and close to Carrigtohill include a detached three-bay two-storey house (20907558) on main street built in c. 1830 and the parochial house (PS1315; 20907555) built in 1880 and situated within landscaped grounds. The house is enclosed by 'rendered boundary walls with rendered sweep walls, square-profile gate piers and cast-iron double-leaf gates'

(NIAH) on the eastern side of Station Road to the east of Area 3. The former dispensary (PS1316, 20907554), built in 1880 lies 50m to the north of Area 3 on the western side of Station Road. Dispensaries were established throughout the country in the early 18th century to cater for the poor who could otherwise not afford medical treatment.

St. David's parish church of Carrigtohill (PS854; CO075-017002-) and the remains of the Church of Ireland Church (CO075-017003) are described in section 10.2.2 above. The current St. Mary's Catholic Church (PS496; NIAH 20907557) lies 160m to the southeast of Area 3 and is described in the NIAH as an imposing, well-crafted structure built in c. 1880 which incorporates materials from a previous building, evident by a rubble limestone wall and plaque. According to the NIAH, *'the use of contrasting local red sandstone, yellow sandstone and grey limestone provides textural and chromatic variation and vibrancy to the overall composition'*.

The railway line, formerly the Great Southern and Western Railway line (GS & W), borders Areas 1 and 2 to the north. During the 19th century, with the industrial revolution, there was an increase in production and a change in population shift with more people moving to towns and cities to work. The introduction of railway lines improved communication, shortened travel times and allowed for better trade and commerce. The section of line between Dunkettle and Midleton opened for traffic on the 10th of November 1859 and was extended eastwards to Killeagh and then on to Youghal which opened in 1860 (Johnson 2005, 25). The line was closed to all traffic in 1963 but reopened under the Irish Government's Transport 21 investment programme in 2009. The reopened section of the railway line runs from Cork's Kent Station to Little Island, Glounthaune and Carrigtohill before terminating in Midleton. Approximately 230m to the west of Area 1, the railway line runs under a single-arch road bridge, Wise's Bridge (20907553) and then continues eastwards, bordering Areas 1 and 2 to the north. Carrigtohill railway station lies c.100m to the east of Area 2. Here the NIAH lists the red brick Railway Station with rusticated limestone quoins (20907551), Barry's Bridge (20907550) a single-arch bridge over the railway line and the Tudor Revival style station master's house (20907552) all built in 1859. The railway line is depicted and named the 'Great Southern and Western Railway (Youghal Branch) on the OS 25 inch map (1897-1904).

10.3.4 Cartographic Sources

A selection of early maps were examined and are reproduced in **Appendix 10-1**. The Down Survey Barony Map of 1654-1659 depicts the parish of 'Carrigtuoohill' and Barryscourt Castle (**Figure A10.1; Appendix 10-1**). The terrier/record attached to the Down Survey Maps describes the nature of the soil in the parish of Carrigtohill (spelt Carigtuoohill) as *'arable meadowe and good pasture'*. The Taylor and Skinner road map of 1777 depicts the parish of Carrigtohill (spelt Carrigtwohill) and notes the noblemen/gentlemen's seats in the area such as Barryscourt of Coppinger Esq., and Anngrove of Dobson Esq., (**Figure A10.2; Appendix 10-1**). The Grand Jury Map of Cork Harbour dated to 1811 (**Figure A10.3; Appendix 10-1**) depicts 'Carrigtuoohill' as a small rural village with Barryscourt Castle to the south and Foaty Island to the west.

On the OS 6-inch map of 1842, the seven areas that make up the proposed development site are depicted as agricultural fields to the northwest of the village of Carrigtohill. Area 1 comprises sections of nine individual fields of varying sizes. At the northern end, a trackway is depicted running southwards to provide access to and linking four individual fields. Area 2 comprises sections of one large field and three smaller fields. Areas 3, 5, 6 and 7 are similarly depicted as sections of agricultural fields with no structures or features shown. In Area 4 an east/west structure and trackway are shown off Station Road.

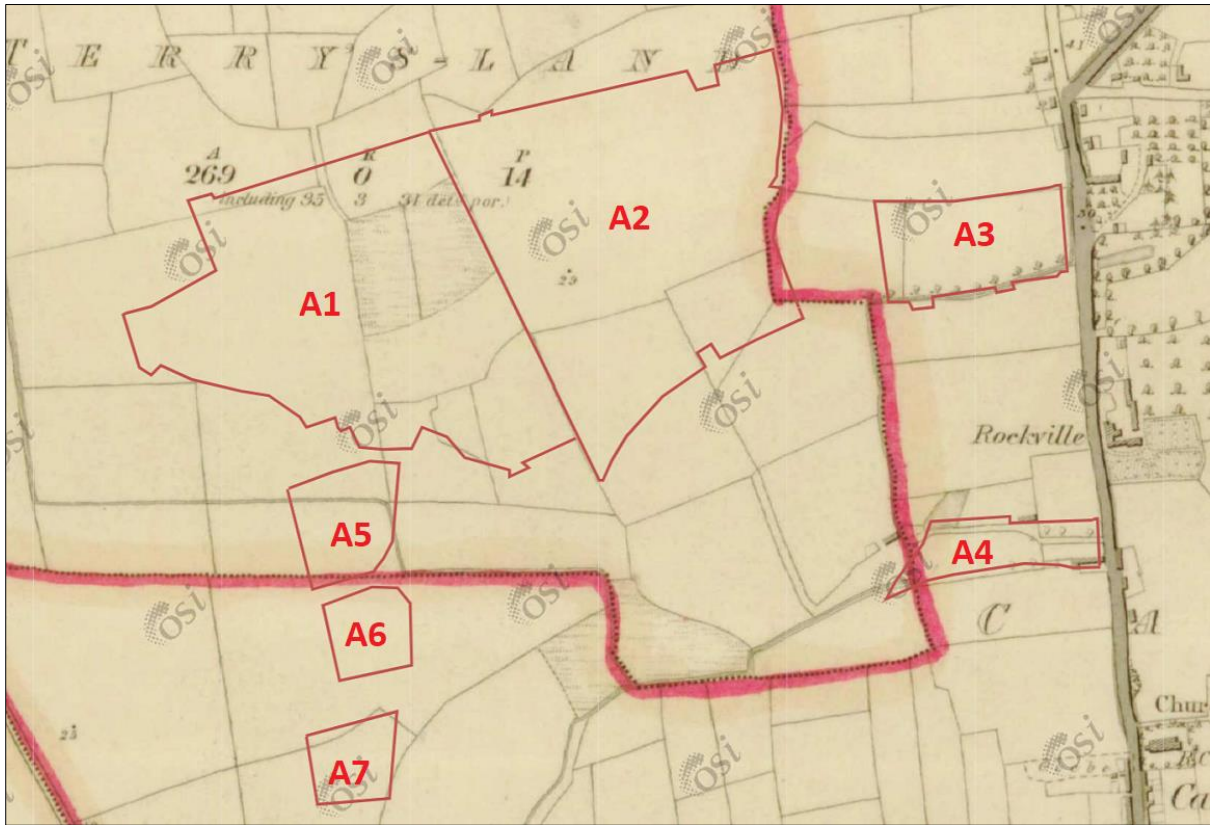


Figure 10-4: OS 6-inch map (1841) with development areas 1-7 www.archaeology.ie

On the OS 25-inch map of 1897-1904 (Fig. 10-5) the most notable difference is the Cork to Midleton Railway line running east/west and bordering Areas 1 and 2 to the north. The number of fields in Areas 1 and 2 has also been reduced with boundaries removed the land opened up. The east/west structure is again depicted in the southeast corner of Area 4 but the trackway to its north has been removed. The proposed development areas are depicted much the same on the later OS 6-inch map of 1938 (Fig. 10-6).

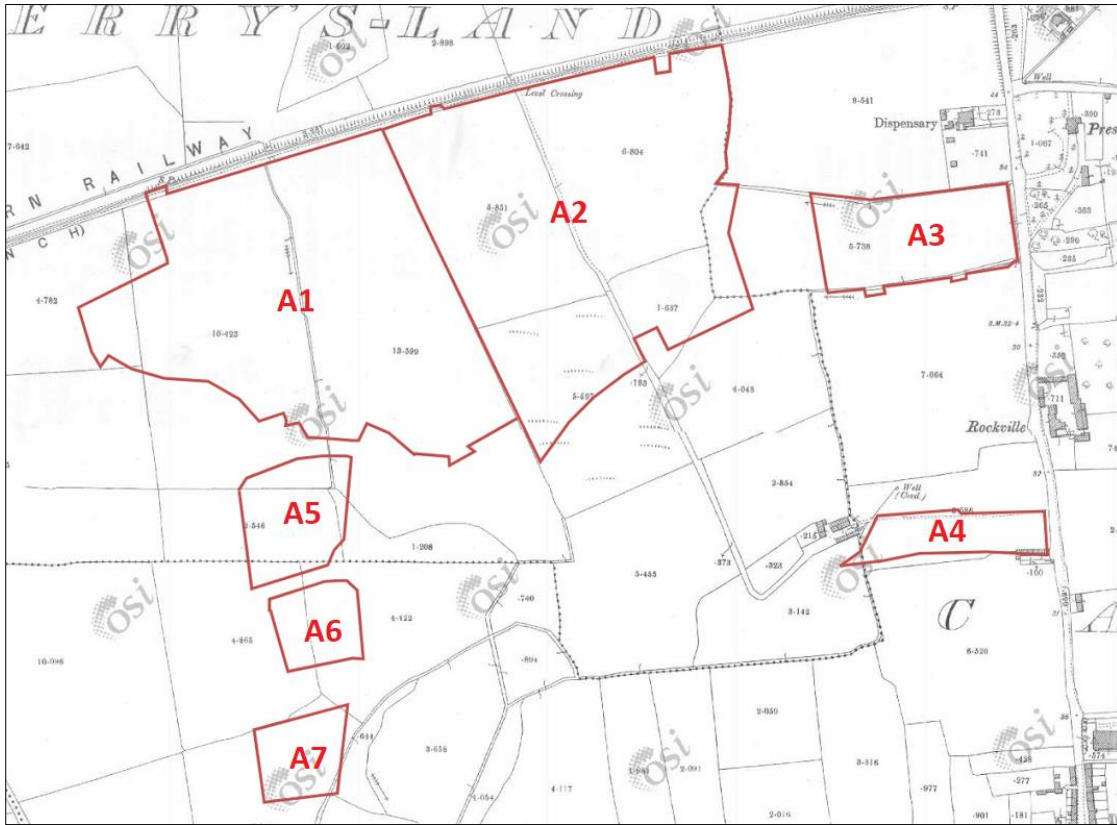


Figure 10-5: OS 6-inch map (1897-1903) with development areas 1-7 www.archaeology.ie

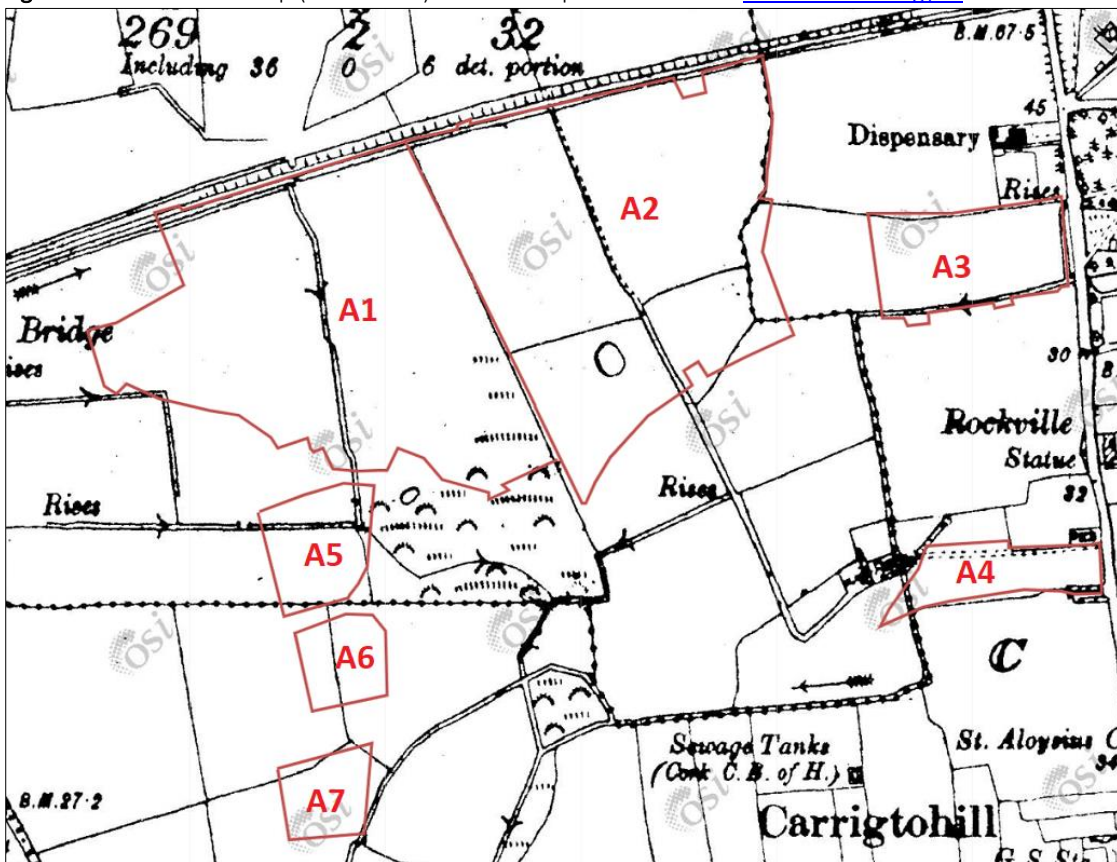


Figure 10-6: OS 6-inch map (1938) with development areas 1-7 www.archaeology.ie

10.3.5 Archaeological Investigations

Four archaeological investigations have been undertaken in the vicinity of the proposed development site in the recent past. These are listed and summarised in **Table 10-5** below (www.excavations.ie).

Table 10-5: Archaeological Investigations undertaken within the vicinity of the proposed development site

Excavation Reference	Location	Details
2015:090	Station Road, Carrigtohill	An assessment and archaeological testing on the site of a proposed post-primary school to be constructed between Areas 2 and 3. A total of forty five test trenches were excavated on the site. A kiln and pit of archaeological significance were identified and it was recommended that archaeological excavation of these features in advance of any construction should take place (Murphy, 2015).
2017:267	Main Street, Carrigtohill	Archaeological monitoring of ground works was undertaken during a development on Main Street, c. 350m to the southeast of Area 3. No features or finds of archaeological significance were identified (Purcell & O’Leary, 2017a).
2017:268	Church Road, Carrigtohill	Four test trenches were mechanically excavated in advance of a proposed residential development 60m to the southeast of Area 2. No features or finds of archaeological significance were revealed (Purcell & O’Leary, 2017b).
2018:517	Main Street, Carrigtohill	Archaeological monitoring was carried out in advance of construction of a car park extension for Centra supermarket, c. 180m to the southeast of Area 3. No features or finds of archaeological significance were revealed (Purcell & O’Leary, 2018).

10.3.6 Site Walkover Survey

The proposed development site was inspected in October 2021 in dry, bright weather. The primary purpose of a site inspection is to assess the physical environment in which the development will be undertaken and to identify any possible features of cultural heritage significance which have not been previously recorded. Current land use, local topography and environmental conditions are assessed to gain an overall picture of the area. The proposed development site is outlined on the aerial photograph below (**Fig. 10-7**) while photos of the site inspection are given in **Appendix 10-2**).

Fieldwork Results

The proposed development site (45.3 acres in extent) consists of seven individual areas of ground, situated between Station Road to the east and Castlflake Residential Development to the west on the western outskirts of Carrigtohill village. The proposed development site has been subject to varying degrees of ground disturbance since c. 2012 when it was utilized as a dumping area during construction of the residential developments that border it to the west and the south. Pockets of ground within the development site have also been stripped of topsoil and some site roads installed since that time. For the purposes of this EIAR, the seven areas which make up the proposed development site are numbered 1-7 and were inspected in October 2021 and the following observations made;

Area 1 Castlflake North Site (7.168Ha) comprises two fields (numbered 1a and 1b).

- Field 1a: This field is heavily overgrown with trees and scrub vegetation and is for the most part impenetrable. Aerial photographs depict the progression of this field from that under pasture in 2005-2012 to scrub vegetation in 2011-2013 and in 2013-2018. Pockets of ground disturbance are evident

throughout this field including a trackway running north to south through its centre and along the southern boundary. Overgrown raised mounds of soil which have been recolonized with vegetation are also evident in places.

- Field 1b: This field is undulating and uneven underfoot and under high rough pasture. It is heavily overgrown with gorse and briars in places.

Area 2 Blandcrest Site (7.247Ha) comprises two fields (numbered 2a and 2b)

- Field 2a: This field is undulating and uneven underfoot and under high rough pasture with numerous pockets of gorse and briars throughout. Ground disturbance is evident, particularly in the southern end of the field. At the northern end of the field a trackway provides access to an underpass (now blocked up) constructed under the Cork to Middleton railway line that borders it to the north.
- Field 2b: On the OS aerial photo (2011-2013) the northern end of Field 2b is shown as being stripped of topsoil. A stoney, rubble surface is evident on the ground which has been recolonized by shallow vegetation with a rough trackway running NE/SW in place. Much of the remainder of this field is very uneven and overgrown with dense briars and scrub vegetation and contains heaped overgrown mounds of soil and building rubble throughout.

Area 3 Station Road North Site (1.275Ha) consists of a long narrow section of a larger field, bordered to the east by Station Road and to the south by a culvert and newly constructed road. The northern half of this field is undulating and under medium rough pasture, while the southern half comprises ground which has been disturbed following construction of the concrete culvert bordering it to the south.

Area 4 Station Road South Site (0.522Ha) consists of a long narrow section of a larger field, bordered to the east by Station Road and to the south by a newly constructed road. This field is very undulating and uneven underfoot and is under medium rough pasture.

Area 5 Castlelake West Site (0.922Ha) is an overgrown grassy area entirely bordered by an existing road which provides access to various housing developments. Much of this site was stripped of topsoil during works associated with the housing developments which border it to the west (evident on aerial photograph 2005) with only a small area of ground at the east remaining intact.

Area 6 Castlelake South Site 02 (0.559Ha) and **Area 7 Castlelake South Site 01** (0.563Ha) are areas of hardstanding bordered to the north, east and west by roads accessing various housing developments.



Figure 10-7: Proposed development areas A1-A7 outlined in red on OS aerial 2013-2018 www.osi.ie

10.4 Assessment of Impacts and Effects

10.4.1 Construction Phase

10.4.1.1 Impact on Archaeology and Cultural Heritage

There are no recorded archaeological sites listed in the RMP for Cork or on the SMR database of the ASI within the proposed development site. There will be no direct or indirect effect on any known recorded archaeological site.

Areas 1, 2 3 and 4: These areas have been subjected to varying degrees of ground disturbance which was evident on both the aerial photographs and during the walkover survey. However, undisturbed ground survives in these areas where hitherto unknown subsurface archaeological remains may exist. Where extensive earthmoving is involved, there is always the possibility that archaeological material will be uncovered.

Area 5: Almost two thirds of this area has been stripped of topsoil with only a small area of ground at the east remaining intact. Given the previous ground disturbance within Area 5, no *in situ* archaeological deposits are likely to have survived in the western two thirds of the area. However, it is possible that undisturbed ground may survive in the eastern side. Where extensive earthmoving is involved, there is always the possibility that archaeological material will be uncovered.

Areas 6 and 7: These are areas of hardstanding. Given the previous ground disturbance within these areas, no *in situ* archaeological deposits will have survived. No likely significant effect on the archaeological environment is foreseen during construction works in Areas 6 and 7.

No features of cultural heritage were identified within the proposed development site. There will be no direct or indirect effect on any cultural heritage feature. The area surrounding the proposed development site has been transformed from agricultural land to a highly developed landscape comprising largescale residential, industrial and infrastructural elements. The proposed development will continue this trend and further alter this once rural hinterland to Carrigtohill village.

10.4.1.2 Impact on Architecture

There are no Protected Structures listed in the CCDP, no structures listed in the NIAH and no built structures within the proposed development site. There will be no direct or indirect effect on any structure of architectural merit or on any upstanding structure.

10.4.2 Operational Phase

10.4.2.1 Impact on Archaeology, Cultural Heritage and Architecture

The operational phase of the proposed development will have no direct effect on the archaeological, architectural or cultural heritage environment.

10.4.3 Do-Nothing

In a do-nothing scenario the landscape of the proposed development site would remain in its current condition with potential archaeological sites beneath the ground surface in Areas 1, 2, 3, 4 and 5.

10.4.4 Cumulative Impacts and Effects

The proposed development will not impact on any known recorded archaeological or architectural sites. Undisturbed ground survives within the proposed development site where subsurface archaeological remains may exist. Similarly, subsurface archaeological remains may be present within the adjacent proposed development, i.e. Carrigtohill Education Campus. The combination of both developments may have a cumulative effect on the archaeological landscape. The more extensive the area of ground to be disturbed, the greater the risk of negatively impacting on potential subsurface archaeological finds or features. If such features are preserved by record they will be permanently removed from the archaeological landscape.

10.5 Mitigation and Monitoring Measures

10.5.1 Mitigation Measures

10.5.1.1 Construction Phase

The proposed development site was inspected on the ground to determine its suitability for pre-development archaeological investigations such as geophysical survey and archaeological testing. The entire site was assessed to be wholly unsuitable to conduct a geophysical survey due to prevailing ground conditions and previous extensive ground disturbance throughout (Nicholls, **Appendix 10-3**). Similarly, it was determined that existing ground conditions meant that archaeological testing was also deemed to be unsuitable for much of the proposed development site. The following mitigation measures will be undertaken;

Areas 1, 2, 3, 4 and eastern side of Area 5

Licensed archaeological monitoring of all groundworks in these areas during construction. In the event of archaeological material being uncovered such material will be preserved *in situ*, where possible or preserved by record. Preservation *in situ* will require the relocation of the element of the development beyond the area of archaeological sensitivity. Preservation by record will require the excavation of the archaeological material and such material will be fully resolved to professional standards of archaeological practice (Policy Guidelines on Archaeological Excavation – Department of Arts, Heritage, Gaeltacht and the Islands). This work will be funded by the developer.

Areas 5, 6 and 7

No archaeological mitigation is proposed for the western two thirds of Area 5 and for the entirety of Areas 6 and 7.

10.5.1.2 Operational Phase

No mitigation is required during the operational phase of the proposed development.

10.5.2 Monitoring Measures (If relevant)

10.6 Residual Impacts and Effects

Impact (Pre-mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
Construction		
Archaeology	10.5.1.1	If previously unknown archaeological sites are identified during archaeological monitoring, they will be preserved in situ or preserved by record. If such sites are preserved by record, the effect will be permanent.
Operational		
	10.5.1.2	No residual effect on the archaeological, architectural and cultural heritage environment.

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- National Monuments Service (in progress) Sites and Monuments Database of the Archaeological Survey of Ireland www.archaeology.ie
- NUI Galway Landed Estates Database www.landedestates.ie
- Ordnance Survey aerial photographs dating to 1995, 2000 & 2005 www.map.geohive.ie
- Summary of archaeological excavation from 1970-2022 www.excavations.ie

10.8 Glossary of Terms

Archaeological heritage can be described as the study of past human societies through their material remains and artefactual assemblages. The Valetta Treaty (or the European Convention on the Protection of the Archaeological Heritage, 1992) defines archaeological heritage as “all remains and objects and any other traces of humankind from past times” this includes “structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water”.

Architectural heritage is defined in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 as structures and buildings together with their settings and attendant grounds, fixtures and fittings, groups of such structures and buildings, and sites, which are of architectural, historic, archaeological, artistic, cultural, scientific, social or technical interest.

Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation. This includes customs, practices, places, objects, artistic expressions and values. Cultural Heritage is often expressed as either Tangible or Intangible Cultural Heritage (ICOMOS, 2002). Environmental Protection Agency Guidelines (2015) define Tangible Cultural Heritage as movable cultural heritage (artefacts), immovable cultural heritage (monuments, archaeological sites and so on) and underwater cultural heritage (shipwrecks, underwater ruins and cities). Intangible cultural heritage encompasses oral traditions, folklore, history and language.

Geophysical Survey is a non-intrusive method to identify potential subsurface archaeological sites and features. The most widely used technique is magnetometry survey. Data is collected by a fluxgate gradiometer which detects subtle changes in the local magnetic field. Buried archaeological sites, such as kilns, hearths, pits, ditches, wall footings etc. exhibit different magnetic properties to the surrounding soil and can therefore be identified and mapped.

10.9 List of abbreviations

ACA Architectural Conservation Area
ASI Archaeological Survey of Ireland
CDP County Development Plan
NIAH National Inventory of Architectural Heritage
NMS National Monuments Service
RMP Record of Monuments and Places
RPS Record of Protected Structures
SMR Sites and Monuments Record

11. Landscape and Visual

11.1 Introduction

This chapter considers the potential effects on the landscape and visual resource in the area arising from the Proposed Development. A full description of the Proposed Development, development lands and all associated project elements is provided in Chapter 2 of this EIAR. The nature and probability of effects on the landscape and visual resource in the area arising from the overall project has been assessed. The assessment comprises:

- A review of the existing receiving environment.
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

The Proposed Development will consist of the construction of a strategic housing development of 716 no. units, a 2-no. storey creche, a neighbourhood park, various smaller public and communal open spaces and shared footpaths/cycle routes. The proposed development also provides for: hard and soft landscaping; boundary treatments; public realm works; SUDs scheme, car parking; bicycle stores and shelters; bin stores; lighting; plant rooms; and all ancillary site development works above and below ground

Key issues in relation to landscape and visual impact include:

- The change from semi-rural undeveloped field in a neglected and overgrown condition to extensive urban village close to the town centre of Carrigtwohill, from a green backdrop to a built form.
- The height/prominence /visibility of some blocks, up to 5 stories, and their impact locally as well as on wider sensitive visual receptors / LCA.

11.1.1 Competency of Assessor

This Landscape and Visual Impact Assessment was carried out by chartered landscape architect Ronan Finnegan, BSc, PG Dip, CMLI of Cunnane Stratton Reynolds. He has over thirteen years' experience as a landscape architect which has involved undertaking Landscape and Visual Impact Assessments (LVIA) for a broad range of development types including large residential, infrastructure and renewable energy projects located across Ireland and the UK. Oversight of the LVIA chapter was provided by Declan O'Leary, MLI, Director of Cunnane Stratton Reynolds.

11.1.2 Legislation

The importance of the role of landscape and protection of its character through establishing planning policies and designations as part of the decision making at national through to county council level is governed by the Planning and Development Act 2000-2022 (as amended).

The Planning and Development Act has applied the same meaning to landscape as in Article 1 of the European Landscape Convention (ELC) 2000, ratified by Ireland in 2004. Which states Landscape as being an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors. The Irish Government has produced the National Landscape Strategy 2014-2025 to implement the ELC which aims

to implement six core objectives through decision making including recognise landscape in law, national landscape character assessment, landscape policies, increased landscape awareness, education and public participation.

11.2 Methodology

The Landscape and Visual Assessment (LVIA) was informed by a desktop study and a survey of the site and receiving environment in October 2021. The assessment is in accordance with the methodology prescribed in the Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment and the relevant updates and Clarifications as issued by the Landscape Institute.

11.2.1 Definition of Landscape

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as ‘an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors’. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions.

As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

11.2.2 Forces of Landscape Change

Landscape is not unchanging. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement or townscape.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly

primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

11.2.3 Guidance

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is informed by the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- Guidelines on the Information to be Contained in Environmental Impact Reports (EIAR) 2022 , published by the Environmental Protection Agency
- Cork County Development Plan 2022-2028

Key Principles of the GLVIA

Use of the Term 'Effect' vs 'Impact'

The GLVIA advises that the terms 'impact' and 'effect' should be clearly distinguished and consistently used in the preparation of an LVIA.

'Impact' is defined as the action being taken. In the case of the proposed development, the impact would include the construction of the buildings and associated boundaries and external areas.

'Effect' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

Assessment of Both 'Landscape' and 'Visual' Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and 'visual amenity' refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

11.2.4 Methodology for Landscape Assessment

In Section 11.4.2 of this report the landscape effects of the development are assessed. The nature and scale of changes to the landscape elements and characteristics are identified, and the consequential effect on landscape character and value are discussed. Trends of change in the landscape are taken into account. The assessment of significance of the effects takes account of the sensitivity of the landscape resource and the magnitude of change to the landscape which resulted from the development.

Sensitivity of the Landscape Resource

The sensitivity of the landscape is a function of its land use, landscape patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the landscape. The nature and scale of the development in question is also taken into account. For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment.

Table 11-1 Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong or has evidence of alteration to / degradation / erosion of elements and characteristics. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principle management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as ‘landscape receptors’). Five categories are used to classify magnitude of landscape change.

Table 11-2 Categories of Landscape Change

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

Significance of Effects

In order to classify the significance of effects (both landscape and visual), the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide. There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 11-3 Guide to Classification of Significance of Landscape Effects

		Sensitivity of the Landscape Resource				
		Very High	High	Medium	Low	Negligible
Magnitude of Change	Very High	<i>Profound</i>	<i>Profound-Very Significant</i>	<i>Very Significant-Significant</i>	<i>Moderate</i>	<i>Slight</i>
	High	<i>Profound-Very Significant</i>	<i>Very Significant</i>	<i>Significant</i>	<i>Moderate-Slight</i>	<i>Slight-Not Significant</i>
	Medium	<i>Very Significant-Significant</i>	<i>Significant</i>	<i>Moderate</i>	<i>Slight</i>	<i>Not Significant</i>
	Low	<i>Moderate</i>	<i>Moderate-Slight</i>	<i>Slight</i>	<i>Not significant</i>	<i>Imperceptible</i>
	Negligible	<i>Slight</i>	<i>Slight-Not Significant</i>	<i>Not significant</i>	<i>Imperceptible</i>	<i>Imperceptible</i>

The matrix above is used as a guide only. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

Landscape effects are also classified as positive, neutral or negative/adverse (See definitions in Section 11.2.6). Development has the potential to improve the environment as well as damage it. In certain situations, there might

be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

11.2.5 Methodology for Visual Assessment

In Section 11.4.3 of this report the visual effects of the development are assessed. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the viewpoint sensitivity against the magnitude of change to the view resulting from the development.

Table 11-4 Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Viewers at iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of high value or national value. This may also include residential viewers who are focussed to a large extent on the view.
High	Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes.
Medium	Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.
Low	Viewers at viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, etc. The view may present an attractive backdrop to these activities but there is no evidence that the view is valued, and not regarded as an important element of these activities. Viewers travelling at high speeds (e.g. motorways) may also be generally considered of low susceptibility.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality and not valued.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also takes into account the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view:

Table 11-5 Categories of Viewpoint Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

As for landscape effects, in order to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 3 above.

11.2.6 Quality and Timescale

Qualitative Impacts

The predicted impacts are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors’ attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral - Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality;
- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Timescale of the Impacts

Impacts/effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;

- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

A statement is made as to the appropriateness of the proposed development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the proposed development based on objective assessment of its likely landscape and visual impacts.

11.2.7 Statement on Limitations and Difficulties Encountered

The site assessment has carried out from within the Proposed Development site and surrounding publicly accessible lands and routes only. As such it does not involve assessing directly from private lands e.g., a resident's garden or internal outward views from their house. Instead, professional judgement and experience has been used when considering the potential visual impacts on these affected receptors where no direct access is possible.

11.3 Baseline Environment

This section is divided into a review of landscape related Planning Policy as set out in the Cork Council Development Plan 2022-2028 and associated documents, and a description of the study areas informed by desktop assessment and field visit.

While the site forms one large parcel of lands to the south of the railway line (sub divided into two parcels) and five smaller nearby parcels of land it will collectively be referenced here in this section as the Proposed Development site. The following review of the planning policy will consider the policies and objectives relevant to landscape relating to the overall Proposed Development site but will note any variations which may relate specifically to only part of the Proposed Development site's lands e.g., zoning objective.

11.3.1 Planning Policy

11.3.1.1 Cork County Development Plan 2022-2028

The Cork County Development Plan 2022-2028 (hereafter referred to as the 'Plan'/CCDP) contains a range of policies relevant to establishing the landscape and visual values and sensitivities for the site and site environs. These are set out below.

It is stated the core strategy will through the plans' policies and objectives will deliver county wide a number of key aims.

This Development Plan sets out four main strategic planning areas in the county which include:

- County Metropolitan Cork Strategic Planning Area;
- Greater Cork Ring Strategic Planning Area;
- North Cork Strategic Planning Area and
- West Cork Strategic Planning Area.

The plan seeks to direct significant future growth within the Metropolitan Cork Area while protecting other settlements. The strategy sets out a number of key regional objectives including:

- Protection of existing regional assets,

- Facilitating the orderly provision of supporting infrastructure,
- Maximising benefits arising from infrastructure investment,
- Supporting the regions socioeconomic goals,
- Creating places capable of providing high quality of life,
- Protection of the environment including the protection, restoration and enhancement of water and biodiversity resources.

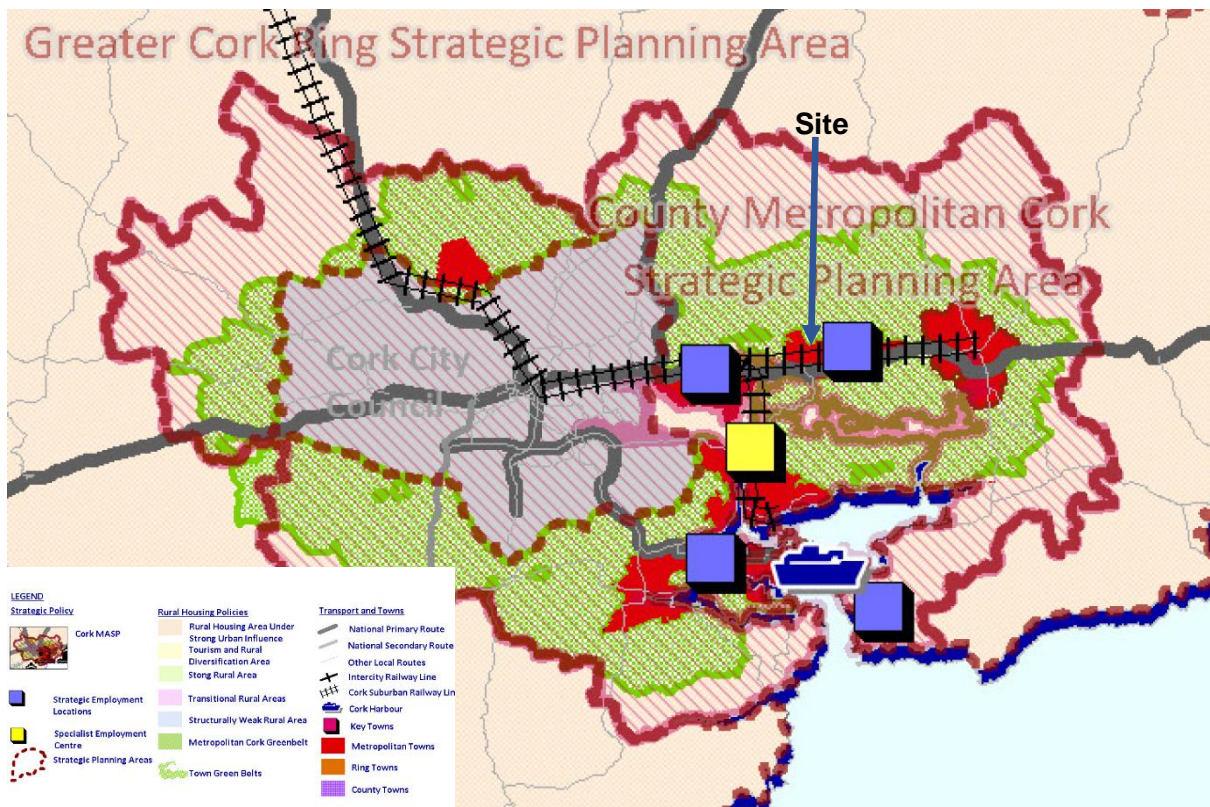


Figure 11-1: Core Strategy Diagrammatic Map for County Cork 2022-2028 (Source: Cork County Council)

The town of Carrigtwohill is identified as a “Metropolitan Town” in the County’s Network of Settlements hierarchy. The Metropolitan Towns are described as being; “Critical population growth, service and employment centres within the Cork “Gateway”, providing high levels of community facilities and amenities with infrastructure capacity high quality and integrated public transport connections should be the location of choice for most people especially those with an urban employment focus.”

11.3.1.1.1 CCDP Core Strategy Policies:

CS 2-3: County Metropolitan Cork Strategic Planning Area:

c); Maintain the principles of the Metropolitan Cork Greenbelt to protect the setting of the City and the Metropolitan Towns and to provide easy access to the countryside and facilities for sports and recreation;

j) Support the existing Strategic Employment Locations as important economic assets, particularly in terms of public transport provision and linkages to local residential populations

k) Maximise new development, for both jobs and housing, in the Metropolitan Towns served by the North and East Cork Rail Corridor (including the proposed new settlement at Monard) and to enhance the capacity of these towns to provide services and facilities to meet the needs of their population;

CS 2-8: Climate Change Adaption:

Promote sustainable settlement and transportation strategies in urban and rural areas, including the promotion of measures to;

a) Reduce energy demand in response to the likelihood of increases in energy and other costs due to long term decline in non-renewable resources,

b) Reduce anthropogenic greenhouse gas emissions, and address the necessity for adaptation

11.3.1.1.2 CCDP Green Infrastructure, Natural Heritage and Biodiversity and Built and Cultural Heritage Policies:

Natural Heritage

The site lies about 770m meters northeast of the designated Special Area of Conservation (SAC) - Great Island Channel and proposed Natural Heritage Areas (pNHA) – Great Island Channel (001058) and 708m northeast of a Special Protection Area (SPA) - Cork Harbour.

Policies of the Council’s Green Infrastructure, Natural Heritage and Biodiversity and Built and Cultural Heritage include;

Green Infrastructure and Recreation

Policies of the Council’s Green Infrastructure and the Environment (in relation to Landscape Recreation and Amenity) include:

GI 14-3: Green Infrastructure and Development

a) Require new development and redevelopment proposals, where considered appropriate, to contribute to the protection, management and enhancement of the existing green and blue infrastructure of the local area in terms of the design, layout and landscaping of development proposals.

b) Require all development to submit a green infrastructure statement outlining how the proposal contributes to green and blue infrastructure both within its environs as well as within the wider settlement. Larger developments (multiple residential developments including Part 8 applications, retail, industrial, mineral extraction, etc) will be expected to prepare a Landscape/Green (and Blue) Infrastructure Plan including a Landscape Design Rationale. This Plan should identify environmental assets and include proposals which protect, manage and develop green infrastructure resources in a sustainable manner.

c) Over the lifetime of the Plan the Council will consider the need to prepare a guidance note/update on best practice in integrating green and blue infrastructure/biodiversity within development proposals

GI 14-4 – Recreation and Amenity

a) Support the provision of recreation and amenity facilities in new developments and ensure that the widest range of facilities is provided at locations which can serve the wider community and intergenerational activities, which are accessible to members of the community of all ages and abilities, through initiatives in partnership with community groups and sporting organisations.

b) Seek opportunities to improve the quality and capacity of existing recreation and amenity facilities, through initiatives with both public and private sector (sports governing bodies, local community partnerships and private

development proposals) and where appropriate the Council will use its powers under Section 48 of the Planning and Development Act 2000 to require development levies to achieve the enhancement of these facilities.

c) Ensure the protection, and seek the enhancement and wise management of existing recreational facilities and public open space, and ensure that all new developments make adequate provision for recreational and amenity facilities in accordance with the requirements of the Councils Recreation and Amenity Policy (Interim) and any successor policy and having regard to the Councils policy regarding the management of Green Infrastructure assets

GI 14-6 – Public/Private Open Space Provision

a) Public Open Space within Residential Development shall be provided in accordance with the standards contained in Cork County Councils Interim Recreation & Amenity Policy (2019) and any successor policy, the “Guidelines on Sustainable Residential Development in Urban Areas” and “Making Places : a design guide for residential estate development. Cork County Council Planning Guidance and Standards Series Number 2”.

b) Promote the provision of high quality, accessible and suitably proportioned areas of public open space and promote linking of new open spaces with existing spaces to form a green infrastructure network. c) Apply the standards for private open space provision contained in the Guidelines on Sustainable Residential Development in Urban Areas and the Urban Design Manual (DoEHLG 2009) and Cork County Council’s Design Guidelines for Residential Estate Development. With regard to apartment developments, the guidelines on Sustainable Urban Housing: Design Standards for New Apartments will apply.

GI 14-12: General Views and Prospects

Preserve the character of all important views and prospects, particularly sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognized in the Draft Landscape Strategy. County Development Plan Objective

GI 14-13: Scenic Routes

Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this Plan. The scenic routes identified in this Plan are shown on the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Heritage and Amenity Chapter 5 Scenic Routes of this Plan.

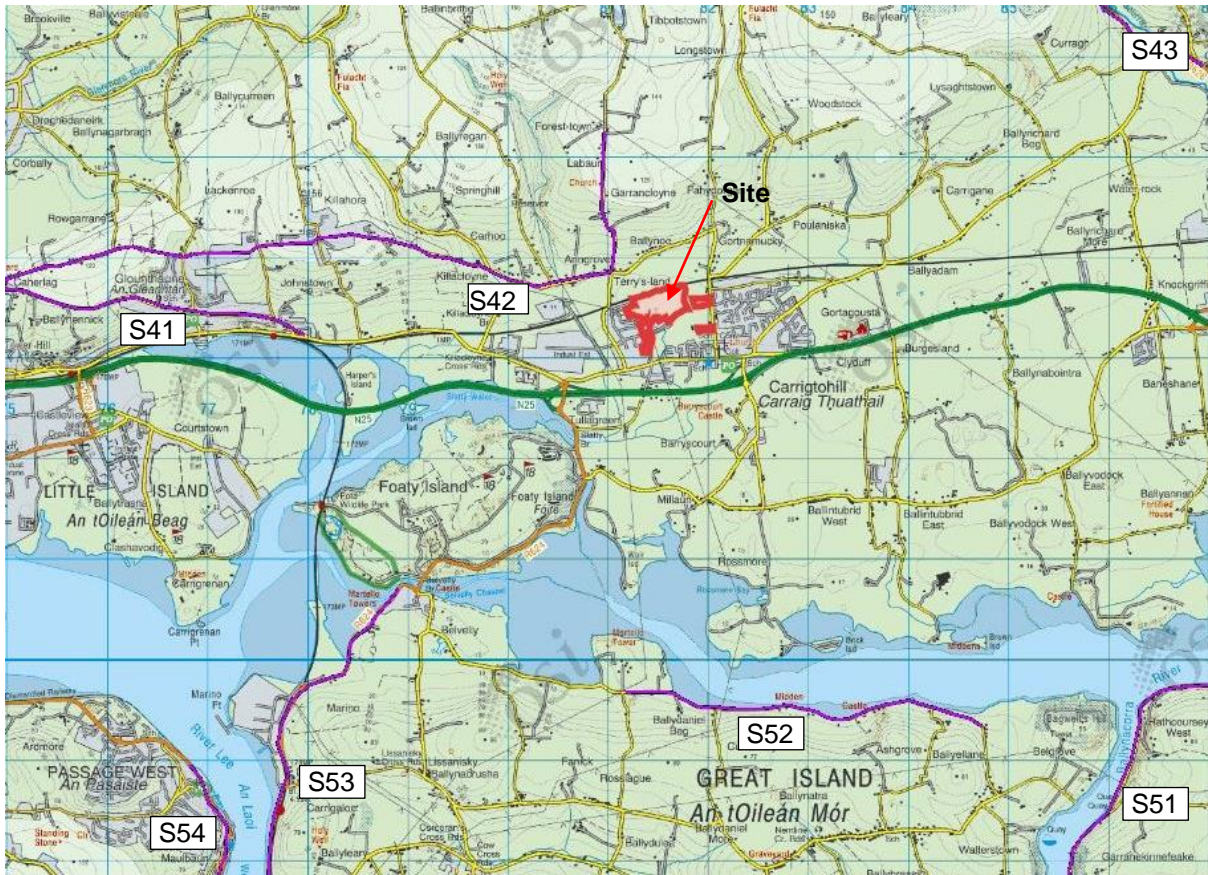


Figure 11-2: Scenic routes and viewpoints within the local environs (Source: Cork County Council)

Natural Heritage and Protection include:

BE 15-6 Biodiversity and New Development:

- b) Encouraging the retention and integration of existing trees, hedgerows and other features of high natural value within new developments;
- c) Encouraging the use of native tree and other plant species, particularly pollinator friendly species in the landscaping of new developments.

Ensuring that the implementation of appropriate mitigation (including habitat enhancement, new planting or other habitat creation initiatives)

County Development Plan Objective

BE 15-8 Trees and Woodlands

- a) Protect trees the subject of Tree Preservation Orders;
- b) Make use of Tree Preservation Orders to protect important trees or groups of trees which may be at risk or any tree(s) that warrants an order given its important amenity or historic value.
- c) Encourage the provision of trees for urban shading and cooling in developments in urban environments and as an integral part of the public realm

Built and Cultural Heritage

Protected Structures

There are five protected structure in the vicinity of the site all along Station Road. The Former Dispensary is to the north, to the east is the Parochial House, Rockville House is and St. Mary's Church to the southeast of the Site. These protected structures along with the nearby railway buildings and bridge, other parochial houses and other structures in the area are listed in the National Inventory of Architectural Heritage (NIAH) survey and illustrated in Figure 11-3.

Policies of the Council's Protected Structures (include);

HE 3-6: Archaeology and Infrastructure Schemes

Have regard to archaeological concerns when considering proposed service schemes (including electricity, sewerage, telecommunications, water supply) and proposed roadwork's (both realignments and new roads) located in close proximity to Recorded Monuments and Places and their known archaeological monuments.

HE 16-11: Record of Protected Structures

d) Ensure the protection of all structures (or parts of structures) contained in the Record of Protected Structures.

e) Protect the curtilage and attendant grounds of all structures included in the Record of Protected Structures.

f) Ensure that development proposals are appropriate in terms of architectural treatment, character, scale and form to the existing protected structure and not detrimental to the special character and integrity of the protected structure and its setting.

(g) Ensure high quality architectural design of all new developments relating to or which may impact on structures (and their settings) included in the Record of Protected Structures.

There are no protected structures within the Proposed Development site.

HE 16-18: Design and Landscaping of New Buildings

a) Encourage new buildings that respect the character, pattern and tradition of existing places, materials and built forms and that fit appropriately into the landscape.

b) Promote sustainable approaches to housing development by encouraging new building projects to be energy efficient in their design and layout.

c) Foster an innovative approach to design that acknowledges the diversity of suitable design solutions in most cases, safeguards the potential for exceptional innovative design in appropriate locations and promotes the added economic, amenity and environmental value of good design.

d) Require the appropriate landscaping and screen planting of proposed developments by using predominantly indigenous/local species and groupings and protecting existing hedgerows in rural areas.

HE 16-12 Protection of Structures on the NIAH

Protect where possible all structures which are included in the NIAH for County Cork, that are not currently included in the Record of Protected Structures, from adverse impacts as part of the development management functions of the County.

HE 16-20: Cultural Heritage

Protect and promote the cultural heritage of County Cork as an important economic asset and for its intrinsic value to identity of place and the well being of people within the County.

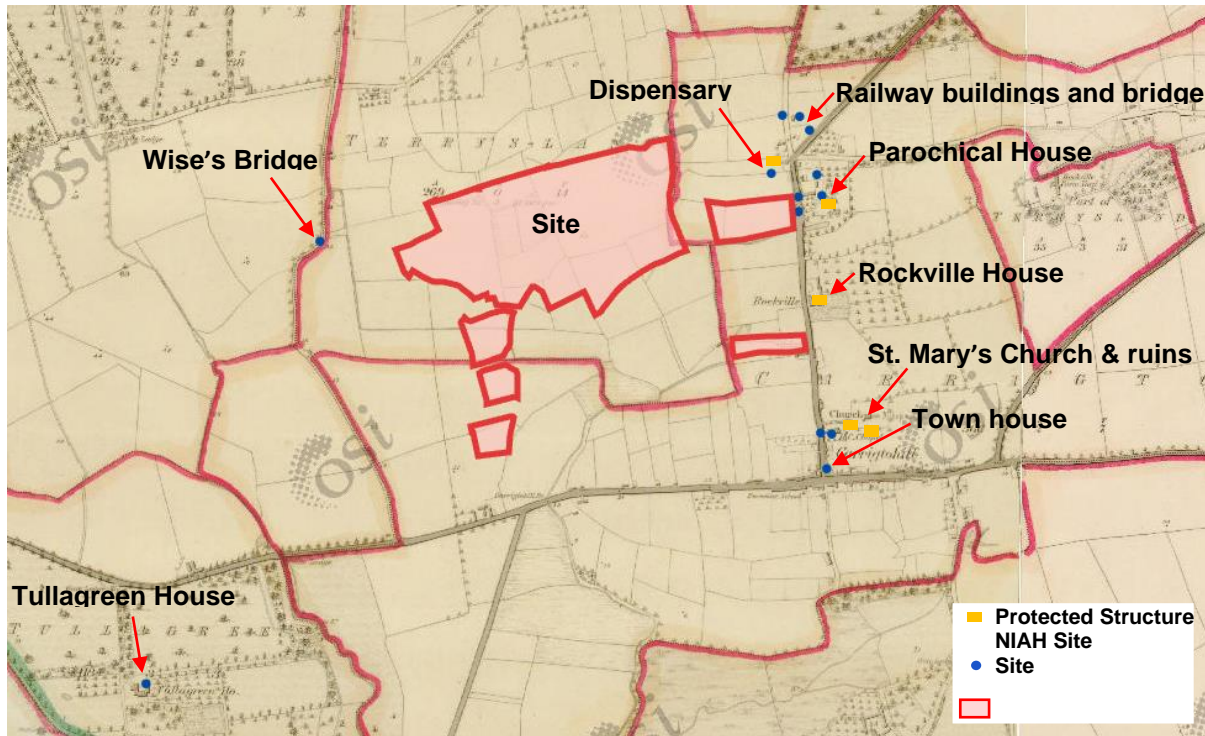


Figure 11-3: Protected Structures and NIAHs in the vicinity of the Site (Source: 6" Historic Map)

11.3.1.1.3 CCDP Landscape Policies:

GI 14-9: Landscape

- a) Protect the visual and scenic amenities of County Cork's built and natural environment.
- b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.
- c) Ensure that new development meets high standards of siting and design.
- d) Protect skylines and ridgelines from development.
- e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments

GI 14-10: Draft Landscape Strategy

Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.

Cork County Council produced a Draft Landscape Character Assessment in 2007 which divided the county into 16 landscape character types (LCT). These LCTs represent generic areas of distinctive character that makes one landscape different from another such as uplands or the coast.

The Draft Landscape Strategy study places a value on each landscape character type ranging from very high to low. Subsequent to the type and value being identified, the sensitivity of each character type is defined as the

ability to accommodate change or intervention without suffering unacceptable effects to its character and values. Sensitivity is evaluated using criteria ranging from very high to low. It should however be noted, that the GLVIA (2013) states that sensitivity of a landscape is linked directly to the proposed change. The landscape is further judged on its level of importance from a local, county to national scale.

Those LCTs with a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes and therefore are designated as High Value Landscapes (HVL).

The Site lies within the City Harbour and Estuary Landscape Character Type No.1 and High Value Landscape, as illustrated in Figures 4 and 5. This LCT has been deemed to have Very High landscape value, Very High landscape sensitivity and of National landscape importance.

Key characteristics of the City Harbour and Estuary include:

- Mix of rural and intensely urban areas, combined with a large expansive harbour.
- Large island and fertile shoreline
- Rich natural and built heritage including areas of wetlands and the unique Fota island
- City docks characterised by the various machinery and port facilities
- Narrow harbour mouth is defined by two hilltops with old military fortifications on their summits. Attractive towns such as Cobh and Passage West/Monkstown, which contain Architectural Conservation Areas.
- Rural areas around much of the greater harbour area are now characterised by a prevalence of infrastructure such as roads, bridges and electricity power lines and some urban sprawl.
- High quality vernacular built environment is portrayed by the high concentration of Protected Structures that are evident throughout the landscape.
- Strong urban character and diversity of economic activities.
- Large population centre of regional and national significance.
- Presence of large scale industrial/enterprise sites.

The recommendations for this LCT within the draft landscape study include promoting sustainable growth in the existing main settlements including Carrigtwohill and “encouraging new development, which respects the existing character of these settlements in terms of both scale and design.”

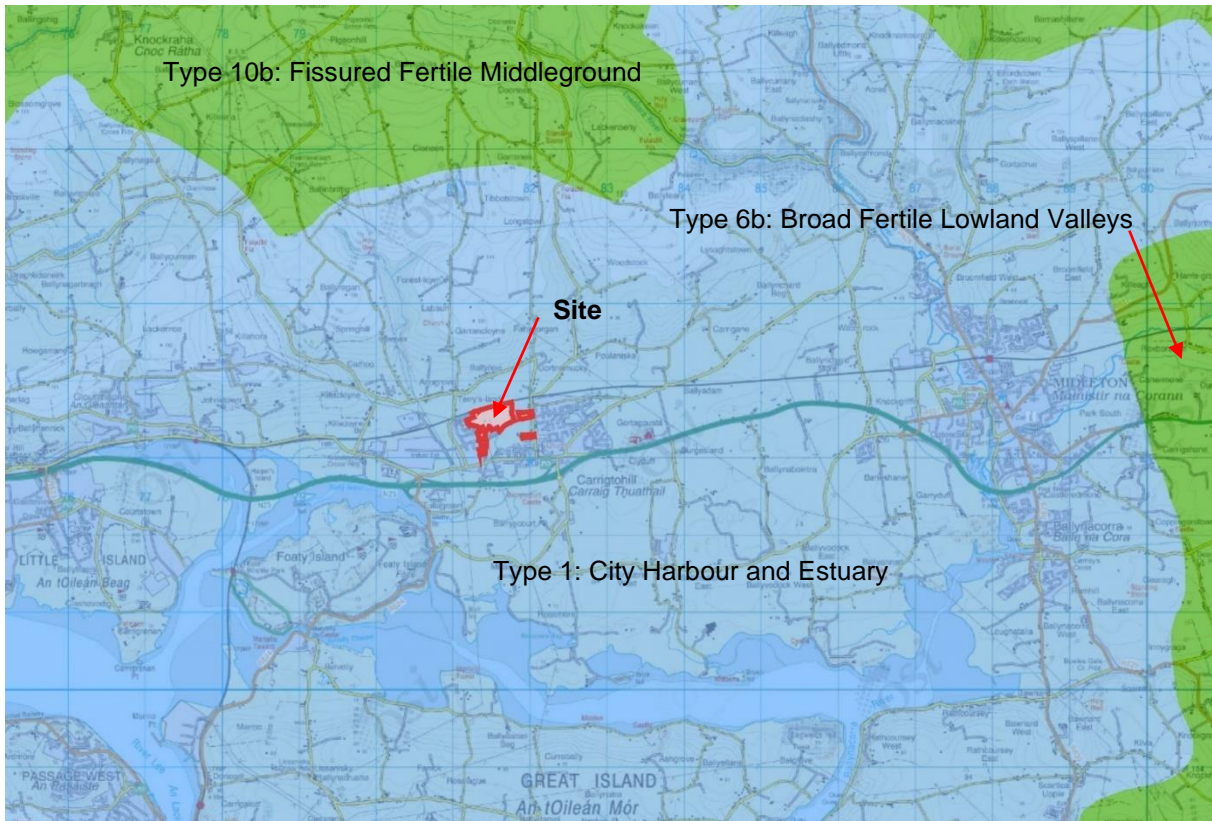


Figure 11-4: Landscape Character Types (Source: Cork County Council)

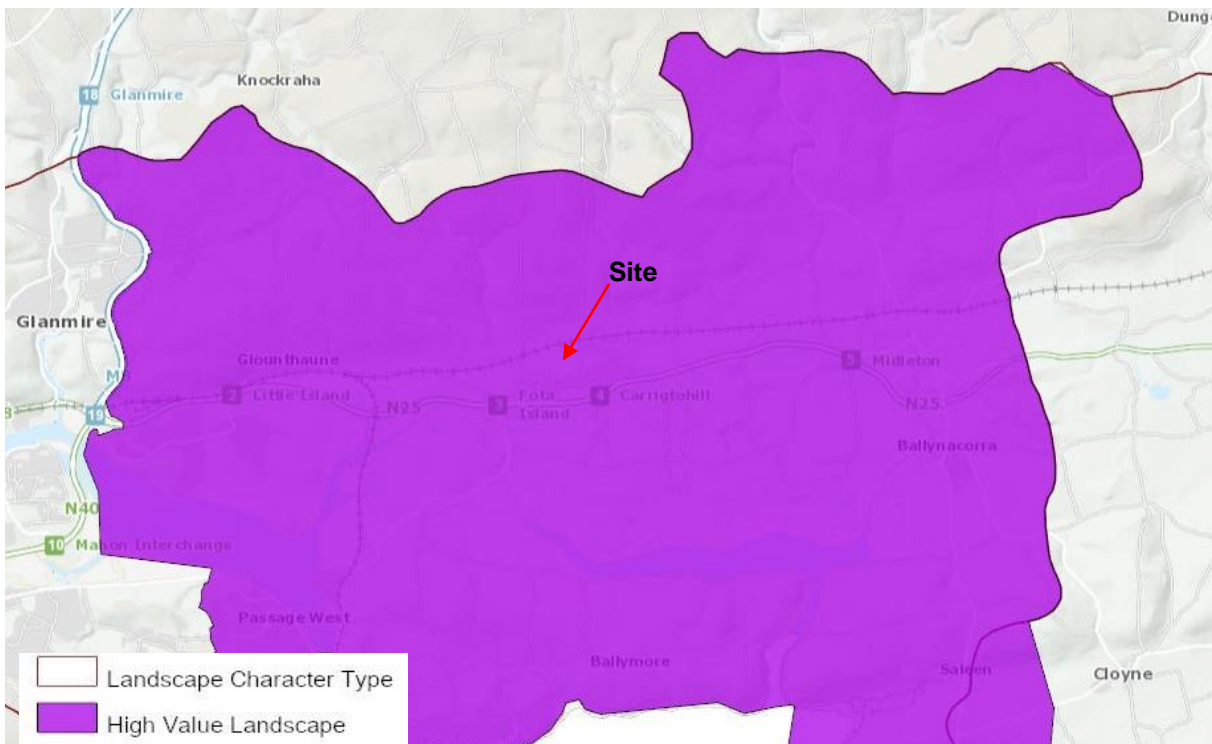


Figure 11-5: High Landscape Value (Source: Cork County Council)

11.3.1.2 Planning Permission

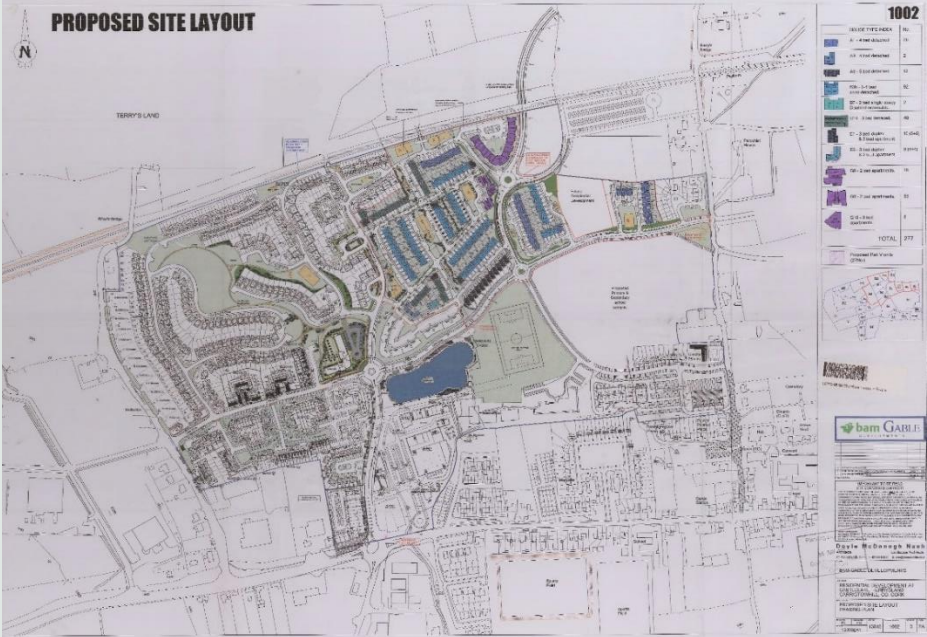

The various parcel of lands across the Proposed Development site have previously planning history for a range of housing types, apartments and creche facilities. Many of these application date from 2005 onwards which have been granted permission but which has since lapsed including some applications previously granted extended permissions. The most recent approved applications were in 2017 for a large scale housing development on lands south of the railway land which was later refused by An Bord Pleanála and in 2018 for a creche off the western side of Station Road, listed in the table below.

Other developments of note within the immediate landscape include the currently under construction roads of the Bury's Bridge to Carrigtwohill Greenway with a shared footpath/cycleway. The lands south of this new road are approved (not yet constructed) for a new Carrigtwohill educational campus with three 2-3 storey buildings. Planning permission is being sought for another footpath/cycleway known as the Carrigtwohill to Midleton InterUrban Cycleway Phase 1 on lands to the north and east of the Proposed Development Site. Also currently in planning is the proposed improvements to the public realm around Carrigtwohill town under the Carrigtwohill Urban Regeneration Development Fund initiative. This scheme includes upgrading the full length of Station Road which the eastern most parts of the Proposed Development Site will directly front onto the revised street layout.

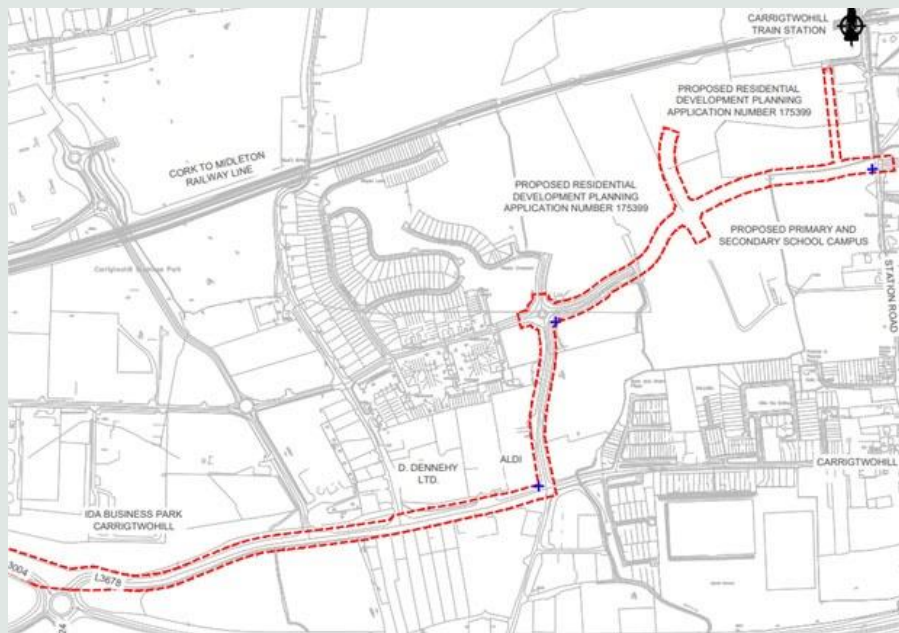
Figure 11-6: Planning Applications across the Site and surroundings (Source: Cork Council County)



Table 11-6 Planning History of the Proposed Development Site and within its vicinity

Planning Reference & Status	Description
<p>Ref: 175399</p> <p>Approved by CorkCoCo</p> <p>Refused by ABP</p>	<p>Construction of 277 no. residential units consisting of 43 no. detached houses, 94 no. semi-detached houses, 40 no. three storey terraced houses, 9 no. duplex houses, 9 no. duplex apartments and 82 no. 2 & 3 bedroom apartments arranged in three blocks of three stories and one block of four stories and associated site development works. The proposed development represents a change of layout and house types on part of the lands previously permitted under the overall 'Castlelake' development Ref:00/7674 (An Bord Pleanála Ref: PL.04.131129) extended under 12/5005 and Ref: 00/7607 (An Bord Pleanála Ref: PL.04/125446) extended under 11/4857.</p> 
<p>Ref: 184693</p> <p>Approved</p>	<p>Construction of a crèche of 581sq.m over one and two storeys, new entrance, carparking and boundaries, and all associated site development works.</p> 
<p>Ref: NA</p> <p>Approved</p>	<p>Greenway Pedestrian and Cycle Route from Bury's Bridge, Kilcoolishal to Carrigtwohill via Glounthaune:</p> <p>The Scheme involves the construction of a dedicated pedestrian and cycle route on the northern side of the L3004 (the former N25) road and includes the following:</p>

A general cross section of 3m wide shared pedestrian and cycle path with a 1m landscaped separation between the path and the public road where possible. Formalised parking and controlled (i.e. traffic signals) pedestrian crossings. New footpaths, ducting and LED public lighting.



Carrigtwohill Education Facility

Construction of 3 no. new school buildings and the construction of a main link road with a roundabout from Castlelake Housing Estate to Station Road and an additional link from the roundabout to Station Road. The development will include: School A, which comprises 1 No. 3 Storey Primary school building, School B which comprises 1 no. 2 storey primary school building, School C which comprises 1 no. 3 storey, 1000 pupil, post primary school building and each with provision of cycle spaces, bin store/external store, ball courts, playing field, secure special play area, landscaping and new entrance gates, boundary treatment and all other associated site development works



Ref: 19/5707

Dept. of
Education

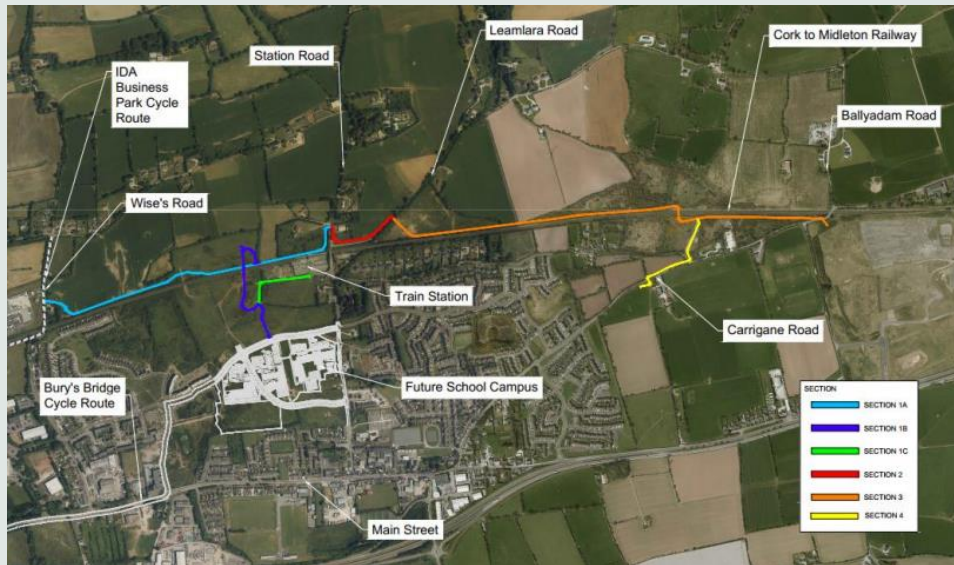
Approved

Carrigtwohill to Midleton InterUrban Cycleway Phase 1

Ref: NA
2021 -
Part 8

Cork County
Council

Pending
Decision

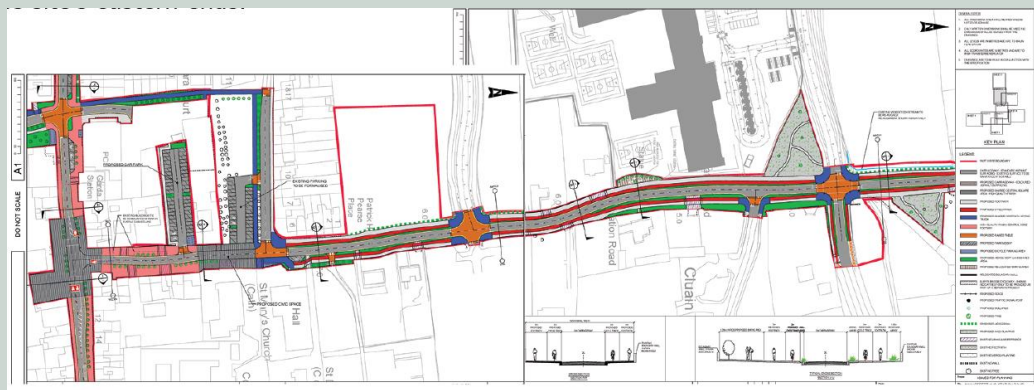


Carrigtwohill Urban Regeneration Development Fund (Station Road) -Public Realm

Ref: NA
2022 -
Part 8

Cork County
Council

Pending
Decision



11.3.2 Description of the Receiving Environment

11.3.2.1 Site and Immediate Environs

The subject Proposed Development site is described below in terms of:

- Location and overview;
- Site boundaries;
- Topography and drainage;
- Access;
- Vegetation and natural heritage;
- Built and cultural heritage;
- Character;
- Landscape and visual amenity.

11.3.2.1.1 Location and Overview

The Proposed Development site is situated 16km east of Cork city. It is a satellite town that has grown from a small village, Carráig Thuathail (Tuathal's Rock), (Tuath "meant originally as a 'population-group' defined as capable of maintaining 3000 soldiers in an emergency", (Irish Place Names, Flanagan, 2002), and is situated along the side of the N25 main road between Cork and Waterford cities. The trainline, running along the northern boundary of the site, has a new train station, improving Carrigtwohill's public transport access to Cork city.

The Proposed Development site sits within the townland of Terrysland and is between 0.5 & 1.2km from the town centre of Carrigtwohill. The train station is just 158m from the northeast boundary of the site.

The Proposed Development site consists of one large area consisting of several fields which is subdivided into two land parcels divided by a ditch and hedgerow through the centre, For the purpose of this LVIA assessment the two land parcels will be combined and collectively referred as Site A. There are another five other individual areas in close proximity but disconnected from the main development area by fields (to the east) and roads (to the west and south). The total site area is 18.256ha.

For the purposes of this report and descriptions we have labelled these sites A-F in the diagram below.



Figure 11-7: Aerial view of the Proposed Development site within context of Carrigtwohill and environs.
(Source: Imagery @2020 Google)

The individual areas referenced through this report and their corresponding Proposed Development site names and sizes are as follows:

- Site A: 14.415ha (Castlelake North Site 7.168ha and Blandcrest Site 7.247ha)
- Site B : 1.275ha (Station Road North Site)
- Site C : 0.522ha (Station Road South Site)
- Site D : 0.563ha (Castelake South Site 01)

- Site E : 0.559ha (Castelake South Site 02)
- Site F : 0.922ha (Castlelake West Site)

11.3.2.1.2 **Site boundaries**

Proposed Development site A, consisting of several fields or parts of fields, is irregular in shape and extends from Maple Close in the west to the Railway Station in the east, approximately 650 lin.m at its widest. The boundary to the west is bounded by buildings/rear gardens or temporary fencing pending development. To the east the site is bounded by hedgerow reinforced with fencing. The north of Proposed Development site A is bounded by the Cork to Waterford rail line and security fencing along the entire length. The southern boundary is general open to lands to the south where a new east west road has been constructed.



Plate 11-1 Northern boundary to railway and blocked underpass



Plate 11-2 Southern boundary – new road corridor

Proposed Development site B is roughly rectangular in shape and abuts Station Road to the east where the boundary is formed by an existing hedgerow. The boundary to the north is also formed by a hedgerow. The southern and western boundaries are open to adjacent lands and the new east west link road to the south. Site B is approximately 245m long X 85m wide.



Plate 11-3 Southern boundary – new road corridor

Proposed Development site B at Station Road / New link road

Proposed Development site C lies further south along Station Road towards the Main Street. It is narrow and approximately rectangular in shape approximately 37m wide X 157m long. To the east it has a low stone wall boundary to Station Road. The northern boundary is shared with an adjacent cottage. Elsewhere boundaries are undefined.



Plate 11-4 Site C from Station Road

Proposed Development site D lies in a quadrangular shaped area of land just north of the Aldi supermarket at the corner of Main Street and the new link road to the Cascade Apartments and wider site and environs. It is currently occupied by a builder's compound and surrounded by paladin style security fencing. This site is approximately 75m X 65m.



Plate 11-5 Site D above left and Site E above right

Proposed Development site E is of a similar character and scale to Proposed Development site D and lies further north along the new link road between Castlelake and Oakbrook with road frontage to three sides. It too is secured by paladin style security fencing. It is approximately 65m X 68m in size.

Proposed Development site F lies north, across the road from Proposed Development site E to the south and the Cascade Apartment complex to the east. It is unbounded by fencing and grassed, roughly in places and open to public access. As well as roads to the east and south, it is enclosed by a residential street Pine Court, to the west. The existing green area connects to wider green open space to the northwest between Bramble Close and Maple Close.



Plate 11-6 Site F with Cascade Apartment visible in the background

11.3.2.1.3 Topography & Drainage

The various Proposed Development sites are part of a wider land parcel partly developed in recent years bounded by the railway to the north, Station Road to the east Main Street to the south and Chestnut Close / Maple Lane to the west. The individual sites appear generally flat however they are gently but evenly rising from south to north as part of the wider landscape character area around Cork Harbour. Levels are around 3.0 OD at Main St near Aldi and between 8 and 9m OD along the boundary with the railway line. The individual sites A-F accommodate part of this gentle level change with the larger level change occurring across Site A which accommodates a level change of approximately 4m from south to north

Drainage reflects the above topography and drainage. Sites C-F reflect little remaining natural systems, however Proposed Development sites A and B still have a number of active streams and field boundary ditches draining water across the site. The recently constructed new link road from east to west to the south of Proposed Development sites A and B has a substantial new open culvert constructed to intercept water running off the site. The culvert is constructed in an engineered manner with little landscape or biodiversity value.



Plate 11-7 Above left – Natural site stream



Above right – culverted engineered interceptor channel.

11.3.2.1.4 **Access**

Proposed Development sites A, D, E and F are close to or accessed off the new link road to Main Street at Aldi. Proposed Development sites S, E and F in particular are bounded by existing roads and are discrete urban blocks awaiting development. Site A is also connected to this road as well as having frontage to the new east west link road. Future connections are planned centrally through Proposed Development site A linking north across the rail line.



Plate 11-8 Above left – new east west link road



Above right – new access road by Cascade Apartments.

11.3.2.1.5 **Vegetation and natural heritage**

Proposed Development site D, E and F are devoid of any upstanding vegetation. Proposed Development sites E and D are brownfield sites. Proposed Development sites F has been grassed over for presentational purposes

whilst awaiting development. There are some scattered trees mostly along the perimeter-maintained grass areas with adjacent streets.

Proposed Development site A is a substantial area of undeveloped land with its former field pattern still evident. The field boundaries consist predominantly of hedgerows with some mature trees of stature. There are two main hedgerows running north south with significant tree lines. The land has been left disused for some time with extensive scrub developing as the field revert to nature making access difficult. This is likely to have encouraged wildlife due to the lack of disturbance. This is discussed in Chapter 5 Biodiversity.



Plate 11-9 Mature hedgerow in Site A

Proposed Development site B has little upstanding vegetation other than a short hedgerow boundary with Station Road.

Proposed Development sites C is just in grass.

11.3.2.1.6 Built and cultural heritage

There are no protected structures on the Proposed Development site and no built structures. Station Road however contains a range of protected structures from the railway bridge south to Main Street. See Figure 11-3 above.

11.3.2.1.7 Character

The general character of the lands proposed for development is of an area in transition. Sites D, E and F are clearly undeveloped areas or land parcels associated with the recently developed residential areas to the west of the link road to Main Street at Aldi. They have little inherent landscape character or value in themselves other than their potential.

Proposed Development sites A, B and C to the east are also clearly in transition and urban fringe in character. The unfinished Cascades Apartment Complex next to Castlake amenity area and the nearing completion east west link road indicate change underway. Nonetheless Site A in particular and Site B to a lesser extent both retain

legible elements of their former rural functions in field boundaries, tree lines and drainage channels / streams. These can contribute value and continuity in any new development. Overall, the character of Proposed Development sites A, B and C is poor, unkempt and overgrown.



Plate 11-10 Site A viewed from Railway pedestrian bridge showing overgrown character

11.3.2.1.8 ***Landscape and visual amenity.***

Other than stands of trees and field boundaries / ditches, the lands contribute little landscape or visual amenity, other than existing vegetated interfaces with surrounding areas. They do enjoy views, particularly Proposed Development sites A, B and C south towards the town and north towards the low hills beyond the railway.

The Proposed Development sites enjoy a wider mature landscape setting formed by the landscape character of the setting of Carrigtwohill.



Plate 11-11 View north from site A to northern hills

11.3.2.2 Wider Environs

As described in Section 11.3.1.1.3 above the Proposed Development site lies within the City Harbour and Estuary Landscape Character Type No.1 and High Value Landscape, as illustrated in Figures 11.4 and 11.5. This LCT has been deemed to have Very High landscape value, Very High landscape sensitivity and of National landscape importance.

The Draft landscape character assessment describes the attractive relationship between rural and intensely urban areas, the prevalence of infrastructure and roads as well as industry, and the overall relationship with the harbour, coast and islands. It acknowledges some urban sprawl and the

11.3.2.2.1 *Geology, topography & drainage*

Carrigtwohill is located approximately 2km north of the Belvelly Channel separating Great Island (and Cobh) from mainland Cork to the north. The underlying geology is primarily Carboniferous Limestone creating a landscape of undulating lowlands around the harbour area of Cork. From sea level at Belvelly lands rise to low hills of 150 – 160 m approximately 5 km inland and north. Whilst there are no significant rivers in the immediate environs of Carrigtwohill many streams follow the gradient south to the sea. The Owncorra River is found several km to the west at Midleton.

11.3.2.2.2 *Landcover, field patterns and vegetation*

The landscape is well drained and when not urbanised or forming industrial areas the lands are primarily in pasture with some tillage. Hedgerows are mature particularly in low lying lands with often significant mature tree lines, small woods or copses creating attractive green tunnels along rural roads interspersed with views across the adjacent countryside where vegetation is lower. More elevated locations tend to have smaller hedgerows and enclosure.



Plate 11-11 Above left – enclosed local roads



Above right – Fields, woods, housing

11.3.2.2.3 *Built and cultural heritage*

The landscape is well provided for with buildings of heritage interest creating a distinctive character when traveling around rural roads. These tend to be of local significance – domestic, school, and civic buildings of a small scale but offering a richness to the landscape. Fota House and its demesne would be a nearby variation to this.



Plate 11-12 Above left Parochial House Station Road



Above right St Mary's Church old & new

11.3.2.2.4 ***Settlements, Landscape Character and Visual Amenity***

Carrigtwohill, Middleton and areas running west towards Cork city are part of expanding urban and economic development of Cork City. There are extensive business parks west of Carrigtwohill and several kilometres west lies the industrial areas of Little Island and Cork Harbour.

Carrigtwohill itself has seen significant expansion in recent years around a low key/small scale urban core, and more is planned which will see an evolving larger urban centre and population.

Nonetheless the landscape has a high amenity value and a distinctive Harbour and Estuary character with an attractive mix of the industrial, functional, urban, and rural backdrop – agriculture and woodlands on nearby hills but in places such as Fota sweeping down to the sea.

Recent expansion of urban areas whilst locally transformational has not impacted on this wider balance and setting.



Plate 11-12 Carrigtwohill Main St



Plate 11-13 New Housing developments – Carrigtwohill

11.3.3 Summary of Landscape Characteristics and Values

The conservation and enhancement values of the site are set out in this section.

11.3.3.1 Conservation Values

These include:

- Cork Harbour / Estuary and Fota Island
- Conserving trees/treelines and hedgerows across the site
- Station Road interface – character and setting of protected structures
- Visual amenity of the wider harbour area and rolling hillside setting
- Scenic routes
- Carrigtwohill town.

11.3.3.2 Enhancement Values

These include:

- Zoning Objectives for Carrigtwohill as an expanding urban centre
- Zoning of lands for residential development.
- Proximity to the town centre.
- Existing permission for residential development
- Landscape and environs clearly in transition from rural to urban
- Partial development already in place – needs completion and consolidation
- Poor landscape condition of existing sites.

11.4 Assessment of Impacts and Effects

11.4.1 Potential Impacts of the Proposed Development

11.4.1.1 Construction Phase

The construction phase is expected to be phased over a number of years, due to the disruptive nature of development effects will generally be adverse where experienced but temporary.

11.4.1.2 Operational Phase

The potential operational impacts include the:

- Potential changes to the Very High Value of the Landscape Character Area
- Potential impacts on scenic routes
- Complete transformation from neglected rural to urban / suburban landscape / built-up area
- Loss of hedgerows / trees
- Introduction of an extensive range of residential buildings into the landscape / view
- Introduction of new infrastructure – roads, cycle paths and pedestrian paths into the view
- Potential change in the skyline
- Potential screening / closure of more expansive views
- Introduction of a more designed or urban landscape/townscape
- Establishment of new elevations and/or vegetation and planting in the streets, open spaces, gardens and along sections of the site boundary – Station Road.

11.4.2 Predicted Landscape Impacts

11.4.2.1 Construction Phase

The Construction Phase will be programmed over a number of years resulting in ongoing infrastructure, building and related works for some period of time. These are generally disruptive and visually adverse in nature.

The landscape sensitivity is described in Section 11.2.4 above i.e. Medium. The magnitude of change is described below and at Construction Phase would also affect the wider landscape setting. Change, involves the development of fields currently neglected and overgrown for an urban development of scale. Therefore the magnitude of change is **Medium**.

The significance of this change is **Moderate**.

Qualitatively this change would be **Neutral** ... Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality, in the Construction Phase or Temporarily. NB. The landscape is already heavily disturbed at this location, further construction would be more of the same disturbance and could be seen as the beginning of an improvement

11.4.2.2 Operational Phase

The site's 'Enhancement Values' reflect a significant body of policy that is supportive of major landscape change at this location to a new residential community. The site currently presents a temporary urban fringe, neglected and overgrown landscape. Surrounding infrastructure, roads, partial developments and the area plans support the development of the site and set out a framework for that development.

The site's 'Conservation Values' predominantly reflect the distinctive wider setting of the site within a High Value Landscape Character Area. However the site and immediate environs and the wider Carrigtwohill built-up and urban area are not typical qualitatively of this landscape. There are existing vegetation; tree lines and hedgerows of merit on the site that can contribute to the evolving urban landscape and to the east a relationship with the Station Road corridor and to the north rural hills and scenic routes.

The 'Impact' of the development is the change of the site from an undeveloped and neglected / abandoned character, with a partially constructed development and infrastructure, to a new residential area of scale close to the town centre of Carrigtwohill and the adjacent railway station. Whilst some trees and hedgerows will be affected, the new development has been laid out to incorporate existing landscape features where feasible. The proposed development has been prepared in accordance with best practice urban design guidelines.

The 'Effects' of this in terms of alteration of the landscape character are assessed below.

Landscape 'Sensitivity' is Medium – Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong or has evidence of alteration to / degradation / erosion of elements and characteristics. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.

(This is different to the County Development Plan classification of the wider Landscape Character Area as being in the City Harbour and Estuary Landscape Character Type No.1 and High Value Landscape, as illustrated in Figures 4 and 5. This LCT has been deemed to have Very High landscape value, Very High landscape sensitivity and of National landscape importance. This reduced sensitivity reflects the Enhancement values associated with the receiving environment and the degraded condition of the site.

The 'Magnitude of Change' is **Medium** – Change that is moderate in extent, resulting in partial loss or alteration to key elements features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.

(This reflects the Development Plan zoning, existing permissions on the site and current degraded condition)

The effect is of **Moderate Significance** .

Qualitatively the landscape effect is **Beneficial** - fits with the scale, landform and pattern or repairs / removes damage caused by existing land uses.

This recognises that, whilst the change in character from disused and overgrown field to urban is important, it reflects land use policy for the site and has been applied to the site as per the best practice in terms of urban design, open space development and Green Infrastructure policy i.e. the change is from disused, abandoned fields to a quality urban townscape, consolidating the urban area of Carrigtwohill.

This effect would be **Permanent**.

This reflects change to the areas landscape character. Changes to views and visual amenity are assessed for individual viewpoints below.

11.4.3 Predicted Visual Impacts

11.4.3.1 Zone of Visual Influence and Potential Visual Receptors

Based on the assessment of the landscape characteristics, values and sensitivities a number of viewpoints located along the local road network were selected for the assessment of visual effects of the proposed development. The onsite site survey concluded that due to screening effects of surrounding topography and existing vegetation visual effects in views from many areas around the subject site will be none to negligible. On this basis the following representative viewpoints were selected for assessment and photomontages.

Figure 11-8: Proposed Viewpoints (Source Digital Dimensions 2022)



The figure indicates the selected 19 viewpoint locations (red circle/arrows) considered in the below assessment and photomontages production for this LVIA. Also indicated are 4 Computer Generated Images (CGI) locations used to produce representative internal visuals of the Proposed Development which can be found in the application’s architectural design and landscape design rationale statements but are not considered here.

Table 11-7 Proposed Viewpoints

No.	Receptor and views	Rationale for selection	Approx. distance and direction from site boundary
VP01	Looking west from Station Road Bridge	Existing street, elevated location, protected structure, local residences	166m north
VP02	Looking south west from Station Road, outside Parochial House	Existing street, protected structure, local residences	20m north northeast
VP03	Station Road opposite New Road junction – looking north west	Existing street, protected structure, local residences	32m south south east
VP04	Looking north west from Station Road outside No 1 Patrick Pearse Place	Existing street, protected structure, local residences	104m south southeast
VP05	Looking north west on Station Road from St Mary's Church	Existing street, protected structure, local residences	183m south southeast
VP06	Looking north from Patrick Pearse Place	Local residences	115m south
VP07	Looking west north west from Castle Avenue / Castle Close green	Local residences	221m east
VP08	Looking north from local green at Bana Greine	Local residences	188m south
VP09	Looking north from local green at Maryville	Local residences	216m south
VP10	Looking north from Main St adjacent ALDI.	Approach Road to Carrigtwohill	132m south
VP11	Looking south along Oakbrook	Local residences	12m northwest
VP12	Looking east from Bramble Lane	Local Residences	22m west
VP13	Looking south from Anns Grove	Local road / scenic route	334m northwest
VP14	View south from local road	Local road	394m north
VP15	View south from local road (Outside warehouse structure near cross roads)	Local road	682m northeast
VP16	Rail Station pedestrian bridge	Station	178m east
VP17	Elevated view from local road at Springhill	Wider landscape / elevated location	1.780km west northwest
VP18	Elevated view from local road between Killahora and Killacloyne	Scenic Road	1.881km northwest
VP19	Local road south of N25	Local Residences	1.408km southeast

11.4.3.2 Photography and presentation of viewpoints

Each Viewpoint is illustrated by a photograph showing the existing view and the photomontage showing the proposed development.

Photomontages have been produced by Digital Dimensions and are presented in **Volume 4 of the EIAR** with a map of their locations. Verified photographs and photomontages have been taken with a wide-angle focal length (FL) and prime lens to allow representation of the development within its context. In all visualisations, the extent of the 50mm FL view has been indicated for reference, which is broadly equivalent to the c.40-degree Horizontal

Field of View (HfoV) and is representative of what the human eye perceives and reflects the requirements of the Landscape Institute Technical Guidance Note on Visual Representation 2019.

To correctly view the photomontage at the correct scale the extents of the 50mm lens or 40-degree angle of view should be extended to A3 in size and viewed at arm's length. This can be done by printing a hard copy or, more easily, digitally on screen, allowing reference back to the wider angle to understand the context.

The viewpoint images were captured in the winter months and the photomontages were modelled with vegetation in leaf to indicate the fuller screening provided by the proposed planting.

Viewpoint Descriptions

Each viewpoint is described below in its existing condition and the effects of the proposed development. The descriptions, including of the change / effects, focus primarily on the extent of the 50mm image, but refer to the wider context, as appropriate, to inform analysis.

Temporary effects at Construction Phase are briefly described.

Effects at Operational Phase are described in more detail.

11.4.3.3 Description of Viewpoints

11.4.3.3.1 Viewpoint 1 - Looking west from Station Road Bridge

Existing View

The view is located on the bridge over the railway on Station Road. The viewpoint is located approximately 166m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road receptors and nearby protected structure

The various security railings and other street furniture add clutter to the foreground view of the old railway bridge. The nearest house, partially visible, is that of the Former Dispensary a protected structure and mature trees of the old rectory on the opposite side of the road, both adding to the historic setting of this view. A small number of houses within the town of Carrigtwohill are partially visible with the middleground which are not screened by surrounding vegetation. In the distance the crest of the hill near to Cobh to the far south extends across the background view.

The Proposed Development site is heavily screened by the intervening vegetation and buildings. The roadside hedgerow boundary of the Proposed Development site B eastern end is visible.

The viewpoint sensitivity is Medium - *Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.*

Visual Impacts and Effects

Construction Phase

The Construction Phase would be visible within in the view Proposed Development site B although hoarding would obscure ground level activities and some higher-level views partially obscured by the adjoining boundary trees. The Magnitude of change would be **High**, the significant of effect would be **Slight Adverse Temporary**.

Operational Phase

Views of the Proposed Development will be limited to partial views of the upper floors and rooflines of the 3-storey duplex and 2 storey houses within the Proposed Development site B and to a lesser extent of some within Proposed Development site C. The intervening boundary vegetation helps to filter such views with the buildings nearest Station Road being the most prominent of all and read alongside other existing housing. The hedgerow along the railway station's roadside boundary obscures views of the 4-5 storey apartments rooflines profiles or small portions of upper floors within the far eastern end of Proposed Development site A. All potential views of these buildings will be further heavily filtered by the existing surrounding trees and hedgerows particularly when these are in full leaf coverage.

The **magnitude of change would be Medium**– *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of effect is **Moderate in the Short Term, Medium and Long Term.**

Qualitatively the impact would be Neutral i.e., *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*

Cumulative Views

The Proposed Development will be viewed along with a small portion of the 3-storey building on the eastern end of the Carrigtwohill Education Campus building, where visible between breaks in the proposed buildings. The Proposed Development will also be viewed with the Carrigtwohill URDF public realm improvement scheme along Station Road. These developments will collectively create a new urban frontage to this part of the town.

11.4.3.3.2 Viewpoint 2 - Looking southwest from Station Road, outside Parochial House

Existing View

The view is from Station Road looking southeast towards Proposed Development site B roadside boundary The viewpoint is located approximately 20m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road receptors and nearby protected structure

The view looks across the road to the dense tree line with scrub field boundary of Proposed Development site B and the adjoining dispensary's low boundary wall and railings. In the middleground is the new road under construction exit onto Station Road from the adjoining field directly south of the site. A very faint outline of the distance hills near Cobh are visible through the trees during the winter months.

The viewpoint sensitivity is Medium...Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.

Visual Impacts and Effects

Construction Phase

The Construction Phase would be visible within the view of the adjacent Proposed Development site B although hoarding would obscure ground level activities and some higher-level views partially obscured by the adjoining

boundary trees. Some construction activity from upper floors visible within sections of Proposed Development site C further off of Station Road. The Magnitude of change would be **Medium**, The significance of effect would be **Moderate Adverse Temporary**.

Operational Phase

The existing roadside mature hedgerow boundary will be retained and trimmed helping to enclose the duplex gardens and screen views of the lower floors of the 3 storey duplexes of Proposed Development site B and proposed open space fronting Station Road. Other housing within this part of the Proposed Development is obscured by the retained northern hedgerow boundary. Some limited distant views of the duplexes upper floor and roofs within Proposed Development site C further south, although these views are partially screened by intervening hedgerows or buildings.

The magnitude of change would be Medium – *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of the effect is **Moderate in the Short, Medium and Long Term**.

Qualitatively the impact would be to Adverse:- *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished*

Cumulative Views

The Proposed Development will be viewed alongside the immediate Station Road section of the proposed Carrigtwohill UDRF public realm improvement scheme. This section includes a new footpath/cycle path directly in front of the Proposed Development and an open space directly opposite the Proposed Development's open space by the end of the Station Road and East/West Connection Road. Some views towards the Proposed Development site C's duplexes will be reduced by the approved Carrigtwohill Education Campus buildings and planting. These developments will collectively create a new urban frontage to this part of the town.

11.4.3.3 Viewpoint 3 - Station Road opposite New Road junction – looking northwest

Existing View

The view is from Station Road looking southeast towards Proposed Development site B roadside boundary. The viewpoint is located approximately 32m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road receptors and nearby protected structure

Currently the view is partially obstructed by the temporary construction fencing at the edges of the road. In the foreground is the road and its elements in the foreground directly beyond which is part of the farmland of Proposed Development site B and its roadside boundary. In the middleground amongst the rural lands and dwellings are partial views of the Stryker factory and Castlake apartment block. The lands rise further in the background to form distinct outline of small hills and valley side in the direction of Viewpoint 17.

The outlook from the road has changed with the recent introduction of the new road and cycleway allowing more open views.

The viewpoint sensitivity is Medium...Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some

valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be contained by the hoarding next to the road with views limited to activity on the upper levels within Proposed Development site B with some distance views of works occur on parts of Proposed Development site A, but spaced over different phases. The Magnitude of change would be **Medium**, the significance of effect would be **Moderate Adverse Temporary**.

Operational Phase

The view looks directly across the tree lined East-West connection road/shared path and cycle route (currently under construction) into the transformation of the land to the 3 storey duplexes and 2 storey houses within the Proposed Development site B. These buildings are offset from the road and will include a small open amenity space on the corner and be framed by tree lines along the boundaries and the retained Station Road roadside hedgerow which all soften the built appearance. The proximity of the new housing will block views towards the hills in the distance from this point.

The magnitude of change would be High – *Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.*

The significance of the effect is **Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be to Neutral:- *Scheme maintains landscape quality;*

Cumulative Views

The Proposed Development will be viewed alongside the immediate Station Road section of the proposed Carrigtwohill UDRF public realm improvement scheme. This section includes a new footpath/cycle path directly in front of the Proposed Development and an open space directly opposite the Proposed Development's open space by the end of the Station Road and East/West Connection Road, the paths are indicated on the photomontage.

11.4.3.3.4 Viewpoint 4 - Looking northwest from Station Road outside No 1 Patrick Pearse Place

Existing View

The view is from along Station Road by the roadside entrance to the graveyard looking northwest towards Proposed Development site C boundary. The viewpoint is located approximately 104m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road receptors and nearby residents.

The view looks directly across the road with the house opposite and a number small hedgerow planting and telegraph poles occupying the foreground view. The street lighting and green fencing of the new road are partially visible in the middleground. The rural lands sharply rise in the background to form, two small hills by the townlands of Garrancloyne and Ballyregan,

The viewpoint sensitivity is High... Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be contained by the hoarding next to the road with views limited to activity on the upper levels within Proposed Development site C with some distance views of works occur on parts of Proposed Development site A and B, but spaced over different phases. The Magnitude of change would be **Medium**, the significance of effect would be **Moderate Adverse Temporary**.

Operational Phase

The change would result in a transformation from the unkept roadside boundary and agricultural lands to a new housing development alongside the new North/South Connection Road currently under construction. The Proposed Development site C's 3 storey duplex and supporting landscaping will be the most prevalent within the view. Which partially obscure views to the distance hills with their rooflines slightly protruding against the skyline. More distant partial views of 2 to 5 storey buildings across parts of Proposed Development site A and B are possible but filtered by the tree lined East/West Connection Road and proposed landscaping throughout. The change would introduce an extension to the urban limits of the town of Carrigtwohill which is inline with the planning policy for this area of the town.

The magnitude of change would be High Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity

The significance of the effect is **Very Significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to Adverse:- Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished.

Cumulative Views

The Proposed Development will also be viewed alongside the proposed Carrigtwohill UDRF street improvements on Station Road, as indicated on the photomontage, and approved 3 storey Carrigtwohill Education Campus with all further altering the existing roadside boundary and collectively adding a new urban character to this part of Station Road. Some limited potential views of future development within the Carrigtwohill North lands may be possible, dependent on future proposals, where not otherwise obscured by trees or the Proposed Development.

11.4.3.3.5 Viewpoint 5 - Looking northwest on Station Road from St Mary's Church

Existing View

The view is located along Station Road next to St. Mary's Church looking northwest towards Proposed Development site C boundary. The viewpoint is located approximately 183m south southeast from the nearest

boundary of the development. The location is representative of views experienced by road receptors and nearby residents.

In the foreground is the established housing estate at Patrick H Pearse Place. The green fencing and streetlight along the new road are visible in the middle ground either side of the houses. The small group of evergreen trees next to the house are next to the northern boundary of the Proposed Development site C, its lands is screened by the temporary earth mounds from the road's construction and low roadside hedgerow. The background view is dominant by the hill by the townland of Garranclloyne

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be contained by the hoarding next to the road with views limited to activity on the upper levels within Proposed Development site C with some distance partial views of works occur on parts of Proposed Development site B. The Magnitude of change would be **Low**, the significance of effect would be Moderate-**Slight Adverse Temporary**.

Operational Phase

The eastern boundary of the road would change with the removal of the scrub and replacement with the 3 storey duplexes within Proposed Development site C set back from the road. Of which only the nearest block will be prominent and viewed as an extension to the town's existing established housing on this side of the road. Views of Proposed Development site B duplexes further north are limited to the upper floors and roof of the block nearest the road peering above the existing single house and boundary hedgerow. Additional tree planting will be added along the edges helping to reinstate some of the lost vegetation. Further back off from Station Road some of the new housing will be visible in the gap between the groups of existing established housing. The under construction adjoining north/south connection road will also be visible directly south of the nearest houses further altering the existing roadside field boundary and character of the urban-rural edge.

The magnitude of change would be Medium... *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of is **Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be to Neutral:- *Scheme maintains landscape quality;*

Cumulative Views

The Proposed Development will also be viewed alongside the proposed Carrigtwohill UDRF street improvements on Station Road, as shown on the photomontage, and approved 3 storey Carrigtwohill Education Campus with all further altering the existing roadside boundary and collectively adding a new urban character to this part of Station Road. Some limited potential views of future development within the Carrigtwohill North lands may be possible, dependent on future proposals, where not otherwise obscured by trees or the Proposed Development.

11.4.3.3.6 **Viewpoint 6 - Looking north from Patrick H Pearse Place**

Existing View

The view is from within Patrick H Pearse Place looking north to towards Proposed Development site C and B boundaries. The viewpoint is located approximately 115m south from the nearest boundary of the Proposed Development site. The location is representative of views experienced by nearby residents.

The existing foreground view look through the palisade fence across into the adjoining fields which will form part of the proposed school of which the connecting new road under construction and its lighting and fencing are visible. The road elements demark the southern boundary of the Proposed Development site C which due to its flat is flat makes it hard to view within the middleground. Some neighbouring boundary trees along this site area's northern boundary are visible next to the group of two houses off Station Road. Further in the middleground Proposed Development site B lands are barely visible. Its southern boundary are defined by the other new fence and lighting of the other new road and its northern boundary by the line of trees including those on the edge of the old and current dispensary buildings, Beyond this the lift tower and pedestrian bridge at Carrigtwohill railway station are clearly visible. The background is framed by the distinct local hills.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be contained by the hoarding along the Proposed Development site boundaries with views limited to activity on the upper levels within Proposed Development site C the nearest and A and B further to the north, but spaced over different phases. The Magnitude of change would be **Medium**, the significance of effect would be **Significant Adverse Temporary**.

Operational Phase

The open ground will be replaced by several groups of housing types across the Proposed Development. Tree planting through the Proposed Development will help to break up views of the more distance proposed built structures. The group of 3 storey duplexes within Proposed Development site C will be the most prominent as they are the closest to this viewpoint. The rooflines of this group will protrude against the skyline partially obscuring views of the surrounding hillside. The adjoining under-construction North/South Connection Road will be visible directly south of this group and which further helps to buffer the new housing from receptors around this viewpoint.

The change would be transformational but occurs within an area already supported by planning policy and undergoing change with the current installation of the two connection roads.

The magnitude of change would be Medium –*Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance the effect is **Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be to Adverse:- *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished.*

Cumulative Views

The approved 2 and 3 storey Carrigtwohill Education Campus buildings will be located directly north and west of Proposed Development site C. The school buildings will screen out many of the proposed views of the Proposed Development buildings further north and northwest of them. Both will collectively be read together as a new urban character area on the northern end of the town. There may be some limited future views of the development within the Carrigtwohill North lands further to the north, dependent on future proposals, where they are not otherwise obscured by the Proposed Development or school buildings and both schemes proposed planting.

11.4.3.3.7 Viewpoint 7 - Looking west north west from Castle Avenue / Castle Close green

Existing View

The view from the edge of the open space within this estate looking west towards Proposed Development site C boundary. The viewpoint is located approximately 221m from the nearest boundary of the development. The location is representative of views experienced by nearby residents.

The view is framed by the housing which extends along the western and northern end of the open spaces. Very limited outward view are possible through the gaps in the housing to the west. These include partial views of duplex within the existing Castlelake estate, industrial factories, and pylons all within the middleground. A faint outline of the surrounding hills are visible through the same gap and when the mature trees are not in leave.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be very limited to some elevated activity across the Proposed Development site through gaps between the houses and trees when lacking leaf coverage. but spaced over different phases. The Magnitude of change would be **Negligible**, the significance of effect would be **Slight-Not Significant Neutral Temporary**.

Operational Phase

The Proposed Development will have very limited visibility due the block of existing houses and trees along the edges of this open space. Limited views include small portion of duplex at Proposed Development Site E through a gap in the existing houses opposite and heavily filtered views through the trees towards the proposed housing within part of Proposed Development Site A.

The magnitude of change would be Negligible - *Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.*

The significance of the effect is **Slight-Not Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be to Neutral:- *Scheme maintains landscape quality;*

11.4.3.3.8 **Viewpoint 8 - Looking north from local green at Ban na Greine**

Existing View

The view from the edge of the open space within this estate looking west towards towards Proposed Development site C and B boundaries. The viewpoint is located approximately 188m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by nearby residents.

Similar to the previous view the houses on the opposite side of the green restrict outward views in the direction of the Proposed Development site. Beyond these houses are views in the middleground to background of the rising agricultural lands form a collection of local hills peaking at a point within the townland of Garrancloyne

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be very limited to some elevated activity across the Proposed Development site through gaps between the houses and above their rooflines. The Magnitude of change would be **Low**, the significance of effect would be **Not Significant Neutral Temporary**.

Operational Phase

The Proposed Development will have very limited visibility due to being screened by the block of existing houses and trees along the edges of this open space. Limited views include a small portion of the nearest duplexes within Proposed Development Site C peering between the rooflines of the existing houses and upper floors of apartment block no. 7 within Proposed Development Site A above the tall boundary hedgerow to the rear of these houses.

The magnitude of change would be Low – *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.*

The significance of the effect is **Moderate in the Short, Medium and Long Term**.

Qualitatively the impact would be to Neutral:- *Scheme maintains landscape quality;*

11.4.3.3.9 **Viewpoint 9 - Looking north from local green at Maryville**

Existing View

The view from the edge of the open space within this estate looking north and northeast towards Proposed Development site A and B boundaries. The viewpoint is located approximately 216m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by nearby residents.

The foreground view looks onto the green which is framed by some hedgerow and metal fencing. Beyond this boundary are partial views into the surround lands which will form the proposed school. The middleground view is one under construction of the new road with views possible through gaps in the open space boundary hedgerow. The new road and lighting columns help to demark the boundary of Proposed Development site B however its lands are largely screened from the view with some of the vegetation on the northern boundary

visible. Views across to the larger Proposed Development site A are similarly hindered by the same boundary hedgerow with gaps allow views into this portion of land which extends from the new road to the railway boundary. Other elements within this portion of the view include partial view of the railway station lift tower/pedestrian and some rural houses. The agricultural land then steeply rises to form the local hill set against the background.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to some elevated activity across the Proposed Development site through gaps between the open space's boundary hedgerow. The Magnitude of change would be **Low**, the significance of effect would be **Moderate-Slight Adverse Temporary**.

Operational Phase

Gaps in the boundary hedgerow allow partial views across to the Proposed Development which will include the 4-5 storey apartments within Proposed Development site A and 3 storey duplexes within Proposed Development site B on lands north of the East/West Connection Road. Creating a new urban edge to the town on lands already earmarked for change through local planning policy. These views will be greatest during the winter months when the hedgerow is lacking leaf coverage. All buildings will be set well below the higher hill further north helping to contain the Proposed Development.

The magnitude of change would be Medium... *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of the effect is **Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be to Neutral:- *Scheme maintains landscape quality;*

Cumulative Views

Some views of the lower portions of the Proposed Development will be reduced when the approved 2-3 storey Carrigtwohill Educational Campus is built on the lands directly to its south of the Proposed Development site and bounding the existing open space. All new buildings being collectively read together as a new urban character area on the northern end of the town.

11.4.3.3.10 Viewpoint 10 - Looking north from Main St adjacent ALDI.

Existing View

The view from the edge of the main road junction looking north and northeast towards Proposed Development site A, B, D, E and F boundaries. The viewpoint is located approximately 132m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road users.

The flow of road traffic and activity around the Aldi store is prevalent within the foreground view. To the right is a fenced off area of development lands. The existing apartment Castlake apartment block is prominent within

the middleground view. To the right of the apartments are partial views of a portion of the Proposed Development site A nearest the railway line. Such views are broken up by the fencing opposite the junction and along the new road next to the site. The eastern end of Proposed Development site D is visible containing a cluster of green and orange storage containers. Views of the other Proposed Development site areas are screened by the intervening-built elements or scrub vegetation. The Carrigtwohill railway station boundary fence and lift towers/pedestrian bridge is visible located between Proposed Development site A and B. All backdropped by the local hills.

The view is one of a busy junction and an area under development.

The viewpoint sensitivity is Low- *Viewers at viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, etc. The view may present an attractive backdrop to these activities but there is no evidence that the view is valued, and not regarded as an important element of these activities. Viewers travelling at high speeds (e.g. motorways) may also be generally considered of low susceptibility.*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to some elevated activity across the Proposed Development site with ground level views screened by hoarding along the boundary. The Magnitude of change would be **Low**, the significance of effect would be **Not Significant Neutral Temporary**.

Operational Phase

The Proposed Development view change the existing views of a partially developed residential area with undeveloped lands to a completed residential area.

Views will contain partial views of the 4-5 storey apartment of Proposed Development sites E and A and 3 storey duplexes within western end of Proposed Development site B. Proposed tree lines adjoining the roads breaking up the built form. Buildings are backdropped by the higher hill further north helping to contain the Proposed Development.

The magnitude of change would be Low – *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.*

The significance of the effect is **Not Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be to Beneficial:- *improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.;*

Cumulative Views

The approved Carrigtwohill Educational Campus buildings and planting will be partial visible from the junction reducing some views of the Proposed Development site B housing. Both collectively read as part of the intended urban development of these lands as outlined within the planning policy. Some potential future views of buildings within the Carrigtwohill North development lands above the rooflines of the Proposed Development dependent on these lands final proposals.

11.4.3.3.11 **Viewpoint 11 - Looking south along Oakbrook**

Existing View

The view from the junction of the existing estate looking south towards Proposed Development site E, and D. The viewpoint is located approximately 12m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by residents.

The foreground view contains the fenced off partially constructed land of Proposed Development site E and the duplexes complex Oakbrook directly opposite. The apartment and Aldi store building are prominent within the middleground. The Proposed Development site D lies between the two buildings although it is fully screened by the boundary wall and apartment building, A continuous line of houses off the West End are visible to the left (east) of the apartment block. A small portion of hill is visible in the distance between the buildings.

The view is one of an area under development.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to some elevated activity across the Proposed Development site D and E with ground level views screened by hoarding along the boundaries. The Magnitude of change would be **Medium**, the significance of effect would be **Significant Adverse Temporary**.

Operational Phase

The Proposed Development view change the existing views looking onto a partially developed construction site to completed new 4-5 storey apartments with landscaped opens space that complement the other surrounding existing apartments.

The magnitude of change would be Medium... *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of the effect is **Significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to Beneficial:- *improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.*

11.4.3.3.12 **Viewpoint 12 - Looking east from Bramble Lane**

Existing View

The view is from Bramble Lane at the end of residential estate looking southeast towards Proposed Development site F and A. The viewpoint is located approximately 22m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by residents.

The foreground view looks onto the wide-open space with some cars parked around the corner by Pine Court. The area of long grass with some scrub and electricity line is the Proposed Development site F while the fence line on the left (north) defines the southern boundary of Proposed Development site A. The existing Castl lake apartment block is a prominent feature within the middleground. Intervening trees and scrub partially screen views of the various housing estate visible against the background view.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to some elevated activity across the Proposed Development site with ground level views screened by hoarding along the boundaries. The Magnitude of change would be **High**, the significance of effect would be **Very Significant Adverse Temporary**.

Operational Phase

The main change will be the replacing of an open area of rough grassland with the 3 storey duplexes and new landscaped open space within the Proposed Development site F. Being particularly notable from the adjoining residences on Pine Court and Maple Crescent where the Proposed Development encloses the existing open space opposite. There will also be views of the edge of the proposed neighbourhood park and housing within Proposed Development site F to the left (north) of the existing apartment block. The new housing and amenity spaces will be viewed as an extension to the existing housing estate.

The magnitude of change would be High. *Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.*

The significance of the effect is **Very Significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to Adverse:- *Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished.*

Neutral:- *i.e. Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*

11.4.3.3.13 Viewpoint 13 - Looking south from Anns Grove

Existing View

The view is from crossroad along a protected scenic route looking southeast towards Proposed Development site A. The viewpoint is located approximately 682m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road users.

The view is contained by the hedgerow and scrub on the opposite side of the road. The upper roofline of houses within Maple Lane part of the existing Castl lake housing estate are visible above the roadside scrub. Above these roofs are distance views of elevated hills by Great Island the background.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to some elevated activity above the rooflines of the Proposed Development site as all other views are screened by the roadside hedgerows opposite. The Magnitude of change would be **Negligible**, the significance of effect would be **Not Significant NeutralTemporary**.

Operational Phase

Views of the Proposed Development rooflines will be barely visible through the hedgerow and further reduced when this vegetation is in full leaf coverage. The Proposed Development will have no change to the overall composition, character and quality of the protected scenic route view.

The magnitude of change would be Negligible... *Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity..*

The significance of the effect is **Moderate** in the Short, Medium and Long Term.

Qualitatively the impact would be to Neutral:- *i.e. Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*

Cumulative Views

Potential for the predicted limited views of the Proposed Development to be screened by future development within the Carrigtwohill North lands opposite dependent on these lands future proposals.

11.4.3.3.14 Viewpoint 14 - View south from local road

Existing View

The view is from local road looking south towards a wide portion of the Proposed Development site. The viewpoint is located approximately 394m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by group of rural residents.

The low roadside boundary allow open view across the surrounding open farmland. In the middleground is the Proposed Development site and surrounding development lands of the proposed schools and two under construction roads. Views of the different areas of the Proposed Development site are partially screened by the intervening field hedgerow, scrub alongside the railway line and other smaller groups of trees and scrub. Views are limited to small area of Proposed Development site A, western end of C and eastern end of E.

Housing is prominent feature within the middleground view include the Castlake apartments and houses, housing estates off West End and Station Road. Other features include St.Mary's Church, the old dispensary and the railway station infrastructure.

Background views are of the distance hills around Great Island and Cobh and a water tower at Cobh.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to the elevated levels of works as the ground level views will be screened by the site hoarding and existing hedgerows alongside the railway line. The works across the Proposed Development will be spaced over different phases. The Magnitude of change would be **Medium**, the significance of effect would be **Significant Adverse Temporary**.

Operational Phase

The open ground will be replaced by several groups of housing across the extent of the Proposed Development. The main change will be the continuation of new housing across the Proposed Development stretching from the existing mix of houses and apartment within Castlflake development to the west towards the housing estates off Station Road to the east of this view. The proposed housing will reduce the existing views of the new roads (under construction). the northern residential parts of Carrigtwohill town and St Marys Church. The proposed view will contain a mix of 2 storey, 3 storey duplex and 4-5 storeys apartments with those located nearest to the railway line being the most visual prevalent. The retained boundary hedgerow and scrub next to the railway line along with proposed trees through the scheme will help to buffer the boundary and building edges.

The change would be transformational but occurs within an area already supported by planning policy and undergoing change with the current installation of the two connector roads.

The magnitude of change would be Medium... *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of the effect is **Significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to Neutral:- Scheme maintains landscape quality;

Cumulative Views

Partial views of the Carrigtwohill Educational Campus towards Station Road which will reduce the visibility of the duplexes across Proposed Development site C.

The immediate agricultural lands have been zoned for residential use under the Carrigtwohill North UEA masterplan. There are no proposals to date but any future proposals on these lands will greatly reduce the level of predicted views of the Proposed Development from this point.

11.4.3.3.15 Viewpoint 15 - View south from local road (Outside warehouse structure near cross roads)

Existing View

The view is from local road looking southwest towards a wide portion of the Proposed Development site. The viewpoint is located approximately 682m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by group of rural residents.

The foreground view is partially contained by the hedgerow opposite. Beyond which the various tree lined hedgerows and scrub alongside the railway line help to limit the visibility of the Proposed Development site and the under-construction road. Only a small portion of Proposed Development site A being clearly visible. The Castl lake apartments and housing are clearly visible along with varying views of other housing estates either side of the West End along with some industrial sheds within the middleground. The view is contained by the backdrop of hills near Cobh.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to the elevated levels of works as the ground level views will be screened by the site hoarding and existing hedgerows alongside the railway line. The Magnitude of change would be **Low**, the significance of effect would be **Moderate-Slight Adverse Temporary**.

Operational Phase

The main change to the view will be the continuation of new housing across the Proposed Development stretching from the existing Castl lake development to the west towards Station Road to the east. The buildings across the northern ends of Proposed Development site A and B which include 2 storeys houses to 5 storeys apartments will be the most prevalent. The nearest building edges being buffered by the retained boundary hedgerow and scrub along with proposed trees. Most views being of the upper floors and rooflines with the apartment blocks being the most visual prominent of these buildings. The low topographical setting of the various proposed buildings will ensure no change to the band of hills in the distant.

The magnitude of change would be Medium... *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of the effect is **Significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to Neutral:- Scheme maintains landscape quality;

Cumulative Views

The predicted views and effects of the Proposed Development could potentially be notable reduced by any future development occurring within the adjacent zoned Carrigtwohill North UEA lands dependent on the final proposals.

11.4.3.3.16 Viewpoint 16 - Rail Station pedestrian bridge

Existing View

The view is from local road looking west towards Proposed Development site A and B. The viewpoint is located approximately 178m from the nearest boundary of the Proposed Development site. The location is representative of views experienced by rail users and in the context of the railway line.

The pedestrian bridge provides open elevated views across the surroundings, In the foreground are the station carpark, farmland and railway line. The new road construction is clearly visible across the lands next to the Proposed Development site A and B although views of either land are hindered by the intervening field hedgerows, scrub and drop in elevation. Much of the views of the larger Proposed Development site A consist of the various scrub across its lands. Which also block any distance views of the railway line.

Also contained within the middleground are varying views of the apartments, housing and factories across the western and southern ends of Carrigtwohill. These are backdropped by the distance hills around Cobh in the background.

The viewpoint sensitivity is Medium... *Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to the elevated levels of works as the ground level views will be screened by the site hoarding and existing hedgerows alongside the Proposed Development site boundaries. The works across this part of the Proposed Development will be spaced over different phases. The Magnitude of change would be **Medium**, the significance of effect would be **Moderate Adverse Temporary**.

Operational Phase

The elevated view looks down onto the north-eastern end of the Proposed Development with views of 2 storey houses, 3 storey duplexes and 5 storey apartments within Proposed Development site A and B. The housing is partially buffered by the retained hedgerow and proposed boundary tree and open space planting while suitably set back from the railway line. The nearest apartment block no.7 is prevalent and protrudes against the skyline, due to its proximity, with the affected screened views consisting only of existing housing and large industrial units in the background.

The Proposed Development will be viewed as a transition from the current partially developed lands to one of new high quality residential area in keeping with the planning policy for this part of the town.

The magnitude of change would be Medium... *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.*

The significance of the effect is **Moderate** in the Short, Medium and Long Term.

Qualitatively the impact would be to Neutral:- Scheme maintains landscape quality;

Cumulative Views

Some partial views with the grounds of the adjoining approved Carrigtwohill Education Campus through breaks in the Proposed Development's buildings and tree lines within the Proposed Development and along the East/West Connection Road. The similar scale and form will mean both are read collectively as urban expansion within the same area. There are also potential for the predicted view to be reduced were any future development to occur on the neighbouring lands directly west of the station carpark which are zoned residential. Views will also be altered by future developments of the Carrigtwohill North UEA lands on the northern side of the railway line.

11.4.3.3.17 **Viewpoint 17 - Elevated view from local road at Springhill**

Existing View

The elevated view is from local road looking southeast towards Proposed Development site including portions of open land of A,C, F. The viewpoint is located approximately 1.780km from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road users.

The low roadside ditch on the left (east) allows extended view across the immediate agricultural lands down to the town of Carrigtwohill in the middleground and backdropped by the hills around Great Island and Cobh in the background. The view of the town contains various housing estates, St. Marks Church, commercial and industrial site within and on the edge of the town. The visible parts of the Proposed Development Site includes lands either side of the Castl lake Apartments, which are themselves centrally located within the view of the town. Also visible is some of the under-construction road works on lands next to the Proposed Development Site.

The viewpoint sensitivity is Medium... *Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to the elevated levels of works but at this distance from the Proposed Development will be barely discernible. The Magnitude of change would be **Negligible**, the significance of effect would be **Not Significant Neutral Temporary**.

Operational Phase

The visible Proposed Development's 2 storeys to 5 storeys housing across parts of the Proposed Development site's A, C, D, E and F will add a new housing area onto the northern end of the town of Carrigtwohill. The new buildings are contained within the view by the intervening field hedgerows and town's existing buildings including those within the adjoining Castl lake housing development. The Proposed Development's setting ensures much of the town's existing built elements visible with this view will remain unaltered. At this distance the Proposed Development will only occupy an exceedingly small portion of the overall view.

The magnitude of change would be Low – *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.*

The significance of the effect is **Slight** in the Short, Medium and Long Term.

Qualitatively the impact would be Neutral i.e. *Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality*

Cumulative Views

Some partial views of the adjoining approved Carrigtwohill Education Campus buildings through lower sections of the Proposed Development. The similar scale and form will mean both are read collectively as urban expansion within the same area. Also potential for some reduced predicted views of the Proposed Development due to the zoned Carrigtwohill North UEA lands depending on the final proposals for this land.

11.4.3.3.18 **Viewpoint 18 - Elevated view from local road between Killahora and Killacloyne**

Existing View

The elevated view is from a protected view from local road looking southeast towards Proposed Development site including portions of open land of A,C, E. The viewpoint is located approximately 1.881km from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road users. This location is a of short length on this route where views looking in the direction of the Proposed Development site are not fully screened by the high roadside hedgerows.

The foreground view is contained by the high roadside hedgerow and tree. The view in the middleground is dominated by several large industrial units on the edges of Carrigtwohill town. Beyond these structures are the various housing spread across the town. The nearest housing being apartment blocks and houses within the Castllake development, which are partially screened by the intervening hedgerows and trees. All backdropped by the hills around Great Island and Cobh the background.

Views of the Proposed Development Site in the middleground include a small portion of lands within site A to the left (east) of the Castllake apartment block and lands of site F next to another apartment block. The western end of Site C is visible next to the large grassland area which will form the adjoining proposed school development land. The green fencing around the edges of the two under-construction roads are also partially visible within the same area.

The viewpoint sensitivity is High... *Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community. This may also include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes*

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to the elevated levels of works but at this distance from the Proposed Development will be barely discernible. The Magnitude of change would be **Negligible**, the significance of effect would be **Not Significant Neutral Temporary**.

Operational Phase

The Proposed Development will add a new area of housing within the northern end of the town of Carrigtwohill. However, views of the Proposed Development will be limited to the rooflines and some upper floors of the duplexes and apartments which are set low down in the receiving landscape. At this distance these new buildings will be barely discernible from other existing housing across the town and do not affect views of other built elements across the town including historic churches.

The Proposed Development will have no change to the overall composition, character and quality of the protected scenic route view.

The magnitude of change would be Negligible... *Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity..*

The significance of the effect is **Slight-Not Significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to Neutral- i.e. Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality

Cumulative Views

There will be partial to clear views of the adjoining approved Carrigtwohill Education Campus behind the existing Castlelake apartment block. The similar scale and form of this development with the Proposed Development will mean both are read collectively as urban expansion within the same area. Also potential for some reduced predicted views of the Proposed Development due to the zoned Carrigtwohill North UEA lands depending on the final proposals for this land.

11.4.3.3.19 Viewpoint 19 – Local road south of N25

Existing View

The view is from a local road looking north-northeast towards Proposed Development site including portions of open land of A,C, E. The viewpoint is located approximately 1.408km from the nearest boundary of the Proposed Development site. The location is representative of views experienced by road users.

The foreground view looks across the road onto the surrounding agricultural lands. In the middleground views towards the town of Carrigtwohill are largely contained by agricultural sheds, hedgerows or trees. Some of various industrial units on the edges of the town are visible through gaps in this vegetation cover. A small portion of the Aldi store building. CastleLake apartment block are visible and lighting columns along the N25 road slipway. The background is framed by the rolling local hills.

There are no views of the Proposed Development site as it is screened by the intervening vegetation and buildings.

The viewpoint sensitivity is Medium... Viewers considered of medium susceptibility, such as locations where viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.

Visual Impacts and Effects

Construction Phase

During the Construction Phase views will be limited to the elevated levels of works but these are often heavily filtered by the intervening hedgerows. The Magnitude of change would be **Negligible**, the significance of effect would be **Not Significant Neutral Temporary**.

Operational Phase

Visibility of the 2 to 5 storey buildings across the Proposed Development site A, D, E, F areas are greatly hindered by the intervening hedgerows, particularly when in full leaf coverage, and surrounding buildings. Small gaps in this screening allow some limited views of the Proposed Development's upper buildings or rooflines, which will be barely discernible amongst other built elements partial visible around the town's edges.

The magnitude of change would be Negligible... Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity..

The significance of the effect is **Not significant** in the Short, Medium and Long Term.

Qualitatively the impact would be to **Neutral**:- i.e. Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality

Cumulative Views

Any potential cumulative views will be limited only to any future development within the zoned Carrigtwohill North UEA lands depending on the final proposals for this land.

11.4.3.4 Summary of Visual Effects

The following table summarises the results of the assessment of the effects of the Proposed Development on the visual resource in the construction and operational phase.

Table 11-8 Summary of Visual Effects - Construction Phase

VPNo.	Location	Sensitivity	Degree of Change	Significance and Qualitatively
				Construction Phase
VP01	Looking west from Station Road Bridge	Medium	Low	Slight and Neutral
VP02	Looking south west from Station Road, outside Parochial House	Medium	Medium	Moderate and Adverse
VP03	Station Road opposite New Road junction – looking north west	Medium	Medium	Moderate and Adverse
VP04	Looking north west from Station Road outside No 1 Patrick Pearse Place	High	Medium	Moderate and Adverse
VP05	Looking north west on Station Road from St Mary’s Church	High	Low	Moderate-Slight and Neutral
VP06	Looking north from Patrick Pearse Place	High	Medium	Significant and Adverse
VP07	Looking west north west from Castle Avenue / Castle Close green	High	Negligible	Slight-Not Significant and Neutral
VP08	Looking north from local green at Ban na Greine	High	Low	Moderate-Slight and Adverse
VP09	Looking north from local green at Maryville	High	Low	Moderate-Slight and Adverse
VP10	Looking north from Main St adjacent ALDI.	Low	Low	Not Significant and Neutral
VP11	Looking south along Oakbrook	High	Medium	Significant and Adverse
VP12	Looking east from Bramble Lane	High	High	Very Significant and Adverse
VP13	Looking south from Anns Grove	High	Negligible	Not Significant and Neutral
VP14	View south from local road	High	Medium	Significant and Adverse

VP15	View south from local road (Outside warehouse structure near cross roads)	High	Low	Moderate-Slight and Adverse
VP16	Rail Station pedestrian bridge	Medium	Medium	Moderate and Adverse
VP17	Elevated view from local road at Springhill	Medium	Negligible	Not Significant and Neutral
VP18	Elevated view from local road between Killahora and Killacloyne	High	Negligible	Not Significant and Neutral
VP19	Local road south of N25	Medium	Negligible	Not Significant and Neutral

Table 11-9 Summary of Visual Effects - Operational Phase

VPNo.	Location	Sensitivity	Degree of Change	Significance and Qualitatively		
				Short	Medium	Long
VP01	Looking west from Station Road Bridge	Medium	Medium	Moderate and Neutral		
VP02	Looking south west from Station Road, outside Parochial House	Medium	Medium	Moderate and Adverse		
VP03	Station Road opposite New Road junction – looking north west	Medium	High	Significant and Neutral		
VP04	Looking north west from Station Road outside No 1 Patrick Pearse Place	High	High	Very Significant and Adverse		
VP05	Looking north west on Station Road from St Mary's Church	High	Medium	Significant and Neutral		
VP06	Looking north from Patrick Pearse Place	High	Medium	Significant and Adverse		
VP07	Looking west north west from Castle Avenue / Castle Close green	High	Negligible	Slight-Not Significant and Neutral		
VP08	Looking north from local green at Ban na Greine	High	Low	Moderate-Slight and Neutral		
VP09	Looking north from local green at Maryville	High	Medium	Significant and Neutral		
VP10	Looking north from Main St adjacent ALDI.	Low	Low	Not Significant and Neutral		
VP11	Looking south along Oakbrook	High	Medium	Significant and Beneficial		
VP12	Looking east from Bramble Lane	High	High	Very Significant and Adverse		
VP13	Looking south from Anns Grove	High	Negligible	Not Significant and Neutral		
VP14	View south from local road	High	Medium	Significant and Neutral		

VP15	View south from local road (Outside warehouse structure near cross roads)	High	Medium	Significant and Neutral
VP16	Rail Station pedestrian bridge	Medium	Medium	Moderate and Neutral
VP17	Elevated view from local road at Springhill	Medium	Low	Slight and Neutral
VP18	Elevated view from local road between Killahora and Killacloyne	High	Negligible	Slight-Not Significant and Neutral
VP19	Local road south of N25	Medium	Negligible	Not Significant and Neutral

11.4.4 Do-Nothing

Were the Proposed Development not to go ahead the existing lands would remain in a degraded state with the further establishment of scrub cover over the lands. The lands appearance would remain a visual detraction upon the views of existing residents of Castl lake and surrounding areas. While also potentially detracting from this area of the town’s evolving urban character and upon views across from approved developments e.g Carrigtwohill Educational Campus, pending developments e.g. Carrigtwohill Public Realm and Carrigtwohill to Middleton InterUrban Cycleway Phase 1 or any future developments on neighbouring zoned lands.

Given that all of the Proposed Development site is strategically zoned for residential use it is envisaged that some form of this development type would occur on these lands overtime resulting in a similar change to landscape character and visual amenity as that predicted for this application.

11.4.5 Cumulative Effects

The immediate lands around the Proposed Development site shows an area already undergoing change with the current construction of the East/West and North/South Connection Road. Other relevant development which falls fully or partially within this area include:

- Carrigtwohill Education Campus
- Carrigtwohill Urban Regeneration Development Fund (URDF) – Station Road section
- Greenway Pedestrian and Cycle Route from Bury’s Bridge to Carrigtwohill
- Carrigtwohill to Middleton Inter-Urban Cycle Route
- Carrigtwohill North Urban Expansion Area (UEA)

Cumulative landscape effects of the Proposed Development along with the other approved and pending development will introduce a more urban character to the landscape and result in the removal of landscape elements such as hedgerows and vegetation on the urban periphery. The Proposed Development would result in added loss of some boundary hedgerow, trees, and alternation to some agricultural drainage. The scale of the loss of landscape elements and patterns because of the Proposed Development would be larger than the other proposals due to it covering a larger area within the immediate lands south of the railway line.

Greater future landscape changes will occur within the zoned Carrigtwohill North (UEA) to the north of the railway line which will include a mix of residential, business, community and open spaces uses. To date no proposals have been submitted for these lands.

A landscape plan is prepared for the Proposed Development, see **Appendix 11.1**, which takes account of the various adjoining cycle/footpath schemes and the new educational facilities to help integrate the housing development with these other forms of development into the new urban landscape while retaining and enhancing existing landscape features. The Proposed Development will also provide a new population to serve the educational facilities and using the cycle routes/streets improvements providing an active engagement with these other developments.

The cumulative landscape effects as a result of the Proposed Development in addition to the approved educational facilities and proposed footpaths/cycleways are considered **Slight to Moderate, and Neutral to Beneficial in quality**.

Cumulative views of the Proposed Development with the educational facilities, new routes and street improvements will result in a notable change from semi-rural of the abandoned agricultural lands and field boundaries to a new urban character and urban edge. The larger scale of the Proposed Development will mean it being more prominent than the other developments from most of the assessed viewpoints. The educational facility will provide some screening of the northern end of the Proposed Development from receptors within housing estates to the south e.g., from Viewpoint 6. The Proposed Development has been designed to fit neatly in with the adjacent street improvements to Station Road and the footpath/cycleways, e.g., Viewpoint 1-4 to provide a complimentary visual urban edge to reflect the changes to a more urban character. Also, potential future development within the Carrigtwohill North UEA lands is likely to notably reduce the visibility of the Proposed Development from rural views north of the railway line e.g. Viewpoint 14-15.

The cumulative visual effects in areas represented by the viewpoints are considered **Not Significant to Moderate Slight** except for Viewpoints 4 and 6 which will be **Moderate and neutral quality**

11.4.6 Mitigation and Enhancement

Mitigation by design and avoidance was carried out with the preparation of a Landscape Masterplan for the Proposed Development site. The landscape masterplan has influenced the overall site layout through the Proposed Development design evolution, see **Appendix 11.1** and supporting planning documents (LMP drawings 21642-2-100-107, section drawings 21642-2-201-203 and the Landscape Design Rationale Report) for further information on the proposals.

11.4.6.1 Construction Phase

The landscape proposals for the Proposed Development site include retaining existing landscape features wherever possible including areas of scrub, hedgerows and trees and drainage ditches and stream.

The works around the existing vegetation to be cleared and retained will be supervised by the clerk of works ecologist and project arborist. Protection measures will be outlined in the Environmental Management Plan which will help protect these features. Retained trees and hedgerows will be protected by installation of fencing in accordance with *BS5837:2012: Trees in Relation to Construction* around the root protection areas (RPAs) as per the arborists Arboricultural Impact Assessment (AIA) report. Similarly, the retained waterways and ditches will be protected from the siteworks by slit fencing and waterways by the culvert drains with sedimats where required by the clerk of works ecologist. Areas of soil outside the main site works will be fenced off to prevent compaction. Where the soil will be disturbed by the site works it will be removed and stored elsewhere on site and reused across the Proposed Development for landscaping including use as a seedbank for wildflowers.

Visual impacts will be mitigated through the appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish. Works will be carried at agreed hours with the council.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. Similarly, other structures including the site compound and scaffolding will be temporary in nature and contained with the works area.

11.4.6.2 Operational Phase

The retained landscape features will be incorporated into the overall landscape proposal which will bolster the existing green and blue infrastructure of the existing Proposed Development site and immediate surroundings. An existing hedge and ditch through the central part of the Proposed Development site will be incorporated as a key feature within the new neighbourhood park. The revitalised ditch along with another stream to the eastern boundary end will serve as valuable functioning SUD features. Planting across the Proposed Development will include trees, hedges, shrubs, wildflower meadow, amenity/private grassland. The planting will consist of a range of suitable native and non-native non-invasive species which across the various open spaces and gardens will help to soften the appearance of the buildings and act as a visual barrier to reduce potential visual impacts. The existing hedgerow against the northern boundary of the Proposed Development site A acts an importance physical and visual barrier to the railway and lands to north. Short hedgerows border the adjoining lands to northern ends of Proposed Development site B and C. Tree lines are proposed across the Proposed Development to add structure and act as vertical screens. The retained and enhanced hedgerows and new planting will help to connect with the existing landscape features within the surroundings and strength the green infrastructure.

Habitat housing will include the placement of log piles (created from felled trees within the Proposed Development site), bird (min. 25no. swift boxes) and bat boxes (min. 20no.) at locations through the Proposed Development as determined by the ecologist clerk of works.

Pathways are designed to allow good legibility for all abilities users across the Proposed Development and to directly connect into the adjoining under construction shared pedestrian/cycle paths along the connection road to the south and the proposed inter urban cycleway to the east. Providing users unfettered access through the Proposed Development and direct connections with other adjoining approved/pending developments, town of Carrigtwohill and wider local area.

The lighting across the Proposed Development will be designed to prevent light spillage pollution into the surrounding urban and rural areas.

11.4.7 Monitoring Measures

The landscape mitigation and enhancement measures are incorporated into the Proposed Development's landscape masterplan, see **Appendix 11-1**. The masterplan proposals include a range of hard and soft landscaping. The soft landscape measures include the retainment of existing hedgerows and trees, suds drainage and planting of grasses, wildflowers, shrubs and trees. The successful establishment of the planting will be key to helping to fully integrate the Proposed Development's built structure into the surrounding landscape and provide a visual buffering of the Proposed Development's built elements from surrounding visual receptors. The mitigating effects of which have been considered when determining the predicted landscape and visual effects in the assessment above.

In order to ensure the success of the proposed landscape planting and retained vegetation, implemented during the construction phase, the appointed landscape contractor will be required to undertake and maintain the

planting in accordance with the proposed landscape maintenance and management plans. There will be a minimum 18 months defects period on all soft landscape works implemented. Thereafter the landscaping will be maintained in perpetuity consecutive 12 months periods. This regular maintenance/inspection of the planting across the Proposed Development helps to ensure the planting becomes established over the initial years and that any failed planting is duly replaced.

11.4.8 Residual Effects

The landscape impact during the construction phase will result in a disruption from construction activity e.g. machinery, site compounds across the Proposed Development site bringing about a permanent change to the landuse. The mitigation measures will seek to minimise the impacts e.g. through implementing the CEMP and protecting retained vegetation, but the resulting residual effects as assessed above will have a significance of effect of **Moderate Adverse Temporary**.

At the operational phase there will be a permanent change in character from the existing abandoned lands to one of housing across the Proposed Development site. This change in character is reflective of the current transition from a rural to urban landscape occurring within this part of Carrigtwohill. As assessed above this will result in a significance of the effect of **Moderate Beneficial Long Term**

The visual impact during the construction phase will occur due to the visibility of certain construction activity across the Proposed Development e.g. workers, machinery and lighting. Although these impacts can be reduced by implementing the CEMP they can't be fully mitigated out. As outlined above this activity will have a significance of effect as **Moderate Adverse Temporary**

Once complete the Proposed Development will at the operational phase result in a permanent change to views and visual amenity of the existing landscape use to a new housing development. Mitigation and avoidance measures through the design process seek to reduce the potential visual impacts. However, elements of the Proposed Development will still be visible from the above assessed receptors and local area after such measures are implemented including the growth overtime of planting. As assessed above the visual effects on these receptors range will have a significance of effect ranging from **Significant adverse, neutral or beneficial qualities to Very Significant adverse quality and all Long Term**

11.5 Conclusion

This report has assessed the landscape and visual effects of the proposed residential development at the Proposed Development site of Castl lake SHD 18.3 Ha Site, Carrigtwohill. The subject lands are zoned for New Residential use and the proposed application meets that need. The proposed design reflects a considered form and materiality of development that is sensitive to its context and although some existing rural landscape features are lost, an appropriate new urban character is created that contributes positively to local place-making.

11.5.1 Landscape Effects

The Landscape 'Sensitivity' is assessed as **Medium**.

The 'Magnitude of Change' is **Medium**

The Significance of the effect is **Moderate**

Qualitatively the landscape effect is **Beneficial**

This recognises that, whilst the change in character from disused and overgrown field to urban is important, it reflects land use policy for the site and has been applied to the site as per the best practice in terms of urban design, open space development and Green Infrastructure policy i.e. the change is from disused, abandoned fields to a quality urban townscape, consolidating the urban area of Carrigtwohill.

Cumulatively the Proposed Development will be read with the approved Carrigtwohill educational facility and pending shared cycle/footpath routes which reflect these lands change of character to a new urban area.

11.5.2 Visual Effects

The predicted visual effects of the Proposed Development will have a significance ranging from **Not Significant to Very Significant and neutral quality** depending on location. The greatest level of visual effects is **Significant and of neutral quality for 6 of the 19 viewpoints, 1no. Significant adverse quality and 2no. Very Significant adverse quality and 1no. Significant beneficial quality**. The visual effects will be greatest from the nearest receptors within the adjoining Castlelake housing estate of the Proposed Development site's A, D, E and F. While receptors located closer to Station Road will have greater views of the Proposed Development site's B and C. The Proposed Development was found to have negligible change to the existing valued views of the CorK County Council scenic route at Viewpoints 13 and 18

Cumulatively, the Proposed Development will be viewed along with other developments within the immediate area which reflect the expanding urban area and qualitatively the change is complementary.

11.5.3 Summary

The Proposed Development will be well integrated within a landscape undergoing change through sensitive place-making. The proposals will be in keeping with change proposed in local planning policy for the Proposed Development site lands and surrounding lands which supports the sustainable expansion of the northern end of Carrigtwohill town.

11.6 References

Cork County Council (2022) *Cork County Development Plan 2022-2028* Cork: Cork County Council. <https://www.corkcoco.ie/en/cork-county-development-plan-2022-2028>

Cork County Council (2007) *Cork County Council Draft Landscape Character Assessment* Cork: Cork County Council. <http://corkcocoplans.ie/wp-content/uploads/bsk-pdf-manager/2016/07/Draft-Landscape-Strategy-2007.pdf>

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Department of Housing, Local Government and Heritage (DHLGH) (2021) *National Landscape Strategy 2014-2025* Dublin: DHLGH. <https://www.gov.ie/en/publication/8a59b-national-landscape-strategy/>

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Landscape Institute and the Institute of Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, London: Routledge.

Landscape Institute (2015) *GLVIA3 – Statements of clarification*, London: Landscape Institute. <https://www.landscapeinstitute.org/technical-resource/glvia3-clarifications/>

Landscape Institute (2019) *Visualisation of development*, London: Landscape Institute. <https://www.landscapeinstitute.org/visualisation/>

Glossary and Abbreviations

Characterisation: The process of identifying areas of similar landscape character, classifying and mapping them and describing their character.

Characteristics: Elements, or combinations of elements, which make a contribution to distinctive landscape character.

Designated landscape: Areas of landscape identified as being of importance at international, national or county levels, either defined by statute or identified in development plans or other documents.

Elements: Individual parts which make up the landscape, such as, for example, trees, hedges and buildings.

Feature: Particularly prominent or eye-catching elements in the landscape, such as tree clumps, church towers or wooded skylines OR a particular aspect of the project proposal.

Green Infrastructure (GI): Networks of green spaces and watercourses and water bodies that connect rural areas, villages, towns and cities.

Landscape: An area, as perceived by people, the character of which is the result of the action and interaction of natural and/or human factors.

Landscape and Visual impact Assessment (LVIA): A tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.

Landscape character: A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.

Landscape Character Types (LCTs) These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.

Landscape Character Assessment (LCA) The process of identifying and describing variation in the character of the landscape and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscapes distinctive. The process results in the production of a Landscape Character Assessment.

Landscape Effects: Effects on the landscape as a resource in its own right.

Landscape Receptors: Defined aspects of the landscape resource that have the potential to be affected by a proposal.

Photomontage: A visualisation which superimposes an image of a proposed development upon a photograph or series of photographs.

Visual Amenity: The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.

Visual Effects: Effects on specific views and on the general visual amenity experienced by people.

Visual Receptors: Individuals and/or defined groups of people who have the potential to be affected by a proposal.

Abbreviations

ABP – An Bord Pleanála

CCDP – Cork County Development Plan

ELC – European Landscape Convention

GLVIA – Guidelines for Landscape and Visual Impact Assessment

LCT – Landscape Character Assessment

LCT – Landscape Character Type

LVIA – Landscape and Visual Impact Assessment

SUDS- Sustainable Urban Drainage System

VP - Viewpoint

12. Noise and Vibration

12.1 Introduction

This chapter of the EIAR has been prepared to identify and assess the potential noise and vibration impacts associated with the proposed Strategic Housing Development at Carrigtwohill, Co. Cork. The construction and operational phases of the development have been assessed.

This chapter describes and characterises the existing noise environment and assesses the potential impact the proposed development will have on the receiving environment. Given the proximity of the proposed development to the Cork to Midleton commuter rail line an inward noise and vibration assessment on the proposed development residential units was also undertaken.

Where appropriate mitigation measures are detailed for both operational and construction phases of the proposed development to ensure noise levels are kept to acceptable levels, thereby minimising the impact on the receiving environment.

12.1.1 Competency of Assessor

This chapter has been prepared by Peter Barry, BSc. MSc. CEnv. Peter is Principal and Chartered Environmental Scientist with MWP, and a member of the Institute of Acoustic (IOA). Peter has over 20 years' experience in the measurement, prediction, assessment, and control of environmental noise. Peter has presented evidence as expert witness on noise at oral hearing and in court.

12.2 Methodology

The methodology included the following activities:

- An environmental noise survey has been undertaken at the proposed development site to characterise the existing baseline noise environment (refer to **Section 12.3.1.5**).
- Vibration monitoring of train movements was undertaken to understand potential vibration impacts on the proposed development (refer to **Section 12.2.4.4**).
- 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 (refer to **Section 12.2.1**).
- Predicted noise levels have been assessed against relevant noise limit criteria for both the operational and construction phases at the nearest noise sensitive receptors (refer to **Section 12.4**).
- The impact of measured vibration levels on humans and structures has been assessed against the relevant vibration level criteria (refer to **Section 12.4**).
- Where necessary mitigation measures to reduce noise and vibration impacts are detailed (refer to **Section 12.5**).

12.2.1 Guidelines and Best Practice

This chapter has been prepared with cognisance to the following best practice and guidance documents related to noise and vibration impact assessment:

- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration.
- BS 6472 Guide to evaluation of human exposure to vibration in buildings (2008): Part 1 - Vibration sources other than blasting.
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.
- BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings
- Design Manual for Roads and Bridges, 2011.
- Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes (NRA, 2014).
- Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (EPA, 2016).
- Highways Agency Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration.
- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, (IEMA 2014).
- ISO 1996: 2017: Acoustics – Description, measurement, and assessment of environmental noise.
- Professional Guidance on Planning & Noise (ProPG) (Association of Noise Consultants, the Institute of Acoustics, and the Chartered Institute of Environmental Health, 2017).
- Technical Guidance Document E – Sound (DoH/LGH 2014).

12.2.2 Study Area

The study area comprised of the proposed development site and its immediate environs. Noise sensitive receptors that could potentially be impacted by noise and vibrations as a result of the proposed development were identified. These were identified primarily as existing housing developments adjoining the proposed development site. A detailed description of the proposed development site including maps and figures is provided in **Chapter 2**. A description of the existing environment and noise sensitive receptors is given in **Section 12.3** of this chapter of the EIAR.

12.2.3 Scope of Assessment

The **assessment** concentrates on characteristics of the proposed development which have the potential for significant adverse impacts.

Table 12-1 outlines the main noise and vibration issues which has been assessed within this chapter. The

Topic Area	Potential Issues Construction Phase	Potential Issues Operational Phase
Daytime Noise	Construction Machinery	Additional Traffic generated by new development/ Inward rail noise
Sensitive receptors	Existing Residential Developments	Existing and proposed residential developments
Night-time Noise	None	Additional traffic generated by new development
Sensitive receptors	Not Applicable	Existing residential developments
Daytime Vibration	Construction Machinery	Commuter rail line vibration
Sensitive receptors	Existing Residential Developments	Proposed Residential Developments
Night-time Vibration	None	None
Sensitive receptors	Not Applicable	Not Applicable

assessment concentrates on characteristics of the proposed development which have the potential for significant adverse impacts.

Topic Area	Potential Issues Construction Phase	Potential Issues Operational Phase
Daytime Noise	Construction Machinery	Additional Traffic generated by new development/ Inward rail noise
Sensitive receptors	Existing Residential Developments	Existing and proposed residential developments
Night-time Noise	None	Additional traffic generated by new development
Sensitive receptors	Not Applicable	Existing residential developments
Daytime Vibration	Construction Machinery	Commuter rail line vibration
Sensitive receptors	Existing Residential Developments	Proposed Residential Developments
Night-time Vibration	None	None
Sensitive receptors	Not Applicable	Not Applicable

Table 12-1: Issues relevant to Noise and Vibration

12.2.4 Assessment Criteria

12.2.4.1 Construction Phase – Noise Impacts

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in the British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control

on Construction and Open Sites - Noise has been adopted in this assessment, as they are recognised by the expert community as the most appropriate in the assessment of construction noise. The noise levels, which are reproduced in **Table 12-2**, are typically deemed acceptable.

Assessment category and threshold value period (T)	Threshold values, L_{AeqT} dB		
	Category A ^{Note A}	Category B ^{Note B}	Category C ^{Note C}
Night-time (23:00 to 07:00hrs)	45	50	55
Evening and Weekends ^{Note D}	55	60	65
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 -13:00hrs)	65	70	75

Table 12-2: Construction Stage Noise Level Thresholds

Note A: Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B: Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C: Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

The noise levels measured during the baseline noise survey (refer to **Section 12.3.5**), determine that all properties will be afforded a Category A designation. Therefore, if the predicted construction noise exceeds 65dB $L_{Aeq}(T)$ then this is assessed as a potentially significant impact.

12.2.4.2 Construction Phase – Vibration Impacts

According to NRA’s 2014 Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, there are two separate considerations for vibration during the construction phase namely 1) that which affects human comfort and 2) that which affects cosmetic or structural damage to buildings.

The guidelines suggest that human tolerance for daytime blasting and piling, two of the primary sources of construction vibration, limits vibration levels to a peak particle velocity (ppv) of 12mm/s and 2.5mm/s respectively. Blasting is not required during this project. If poor ground conditions are encountered during excavation and a significant depth to sub-formation is required, a piled foundation may be considered.

To avoid the risk of even cosmetic damage to buildings, the guidelines suggest that vibration levels should be limited to 8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above.

12.2.4.3 Operational Phase – Noise Impacts

The proposed development has no operational phase as such, as would be immediately recognised with an industrial facility for example. The housing units themselves are not inherently noisy nor do they generate noise once constructed. There are no noise limits specific to housing developments or their residents. While there may be the potential for noisy neighbours this is outside the scope of this assessment.

There are no noise or vibration limits on any aspect of the surrounding housing developments, associated traffic, or residential activities or on any housing development in the country for that matter to the authors knowledge.

However, the proposed development will generate additional traffic on the local road network and these vehicles will generate noise. The additional vehicles once considered in the context of the existing traffic volumes is not expected to be noticeable. The potential impact of additional traffic is considered in the **section 12.2.4.3.1**.

The impact of the existing rail commuter line has also been assessed. This a potential inward noise and vibration impact on the proposed development as the train passes the development site.

It should be noted that there is already a mature housing development on Maple Lane (adjoining the site development western boundary) with residential facades as close as 12m to the rail line, similar as to what is proposed. Similarly, Ashbrook, another mature and well-established development to the east of the proposed development boundary has residential facades as close as 35m to the rail line. The rail line is a commuter service. Cargo trains do not use this track. The service is not in use after 11 pm. Carrigtwohill commuter train station will be only a few minutes' walk for most of the proposed development. It is likely this will reduce car dependency and car journey for many of the residents and therefore car related noise and air emissions.

12.2.4.3.1 Traffic Noise

There are no specific guidelines or limits relating for existing local traffic sources along the local or surrounding road network. As traffic from the proposed development will make use of these existing roads already carrying traffic volumes it is appropriate to assess the calculated increase in traffic noise levels that will arise because of vehicular movements associated with the development.

Table 12.3 describes effect descriptors and corresponding changes in noise levels. They have been sourced from the Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, 2014. The corresponding terminology as published in the EPA's Guidelines on the Information to be contained in Environmental Impact Assessment Reports, 2022 are also included.

IEMA Terminology	EPA Terminology	Description
Very Substantial	Very Significant to Profound	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise.
Substantial	Significant	Greater than 5 dB L_{Aeq} change in sound level at a noise sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a receptor or great sensitivity to noise.
Moderate	Moderate	A 3 to 4.9 L_{Aeq} change in sound level at a sensitive or highly sensitive receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity.
Slight	Slight	A 3 to 4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity.
None/ Not Significant	Not Significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitive to noise or marginal to the zone of influence of the proposals.

Table 12-3: Significance of Effect Descriptors and Thresholds

The guidance outlined in **Table 12.3** will be used to assess the predicted increases in traffic levels on public roads associated with the proposed development.

12.2.4.3.2 Inward Noise Impact Assessment – Rail Noise

The Professional Practice Guidance on Planning and Noise (ProPG), published in May 2017, has been produced to provide guidance on a recommended approach to the management of noise within the planning system in England. In the absence of an equivalent document in Ireland, ProPG has been adopted by local authorities when considering the potential impact of transportation noise on new residential development. . The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a UK or Irish government document, since it's publication it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG describes a risk based 2 stage approach. The two stages of the overall approach are:

- Stage 1 – An initial risk based assessment of the proposed development site; and
- Stage 2 – A systematic consideration of four elements

The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 Demonstrating a “Good Acoustic Design Process”
- Element 2 Observing internal “Noise Level Guidelines”
- Element 3 Undertaking an “External Amenity Area Noise Assessment”; and
- Element 4 Consideration of “Other Relevant Issues”

Following the outcome of the initial risk assessment it may be necessary to prepare an “Acoustic Design Statement” (ADS). The level of detail required in the design statement will depend on the level of risk. A site assessed as high risk will require more detail than a site assessed as low risk. The following figure illustrates the overall ProPG approach and has been extracted from the document.

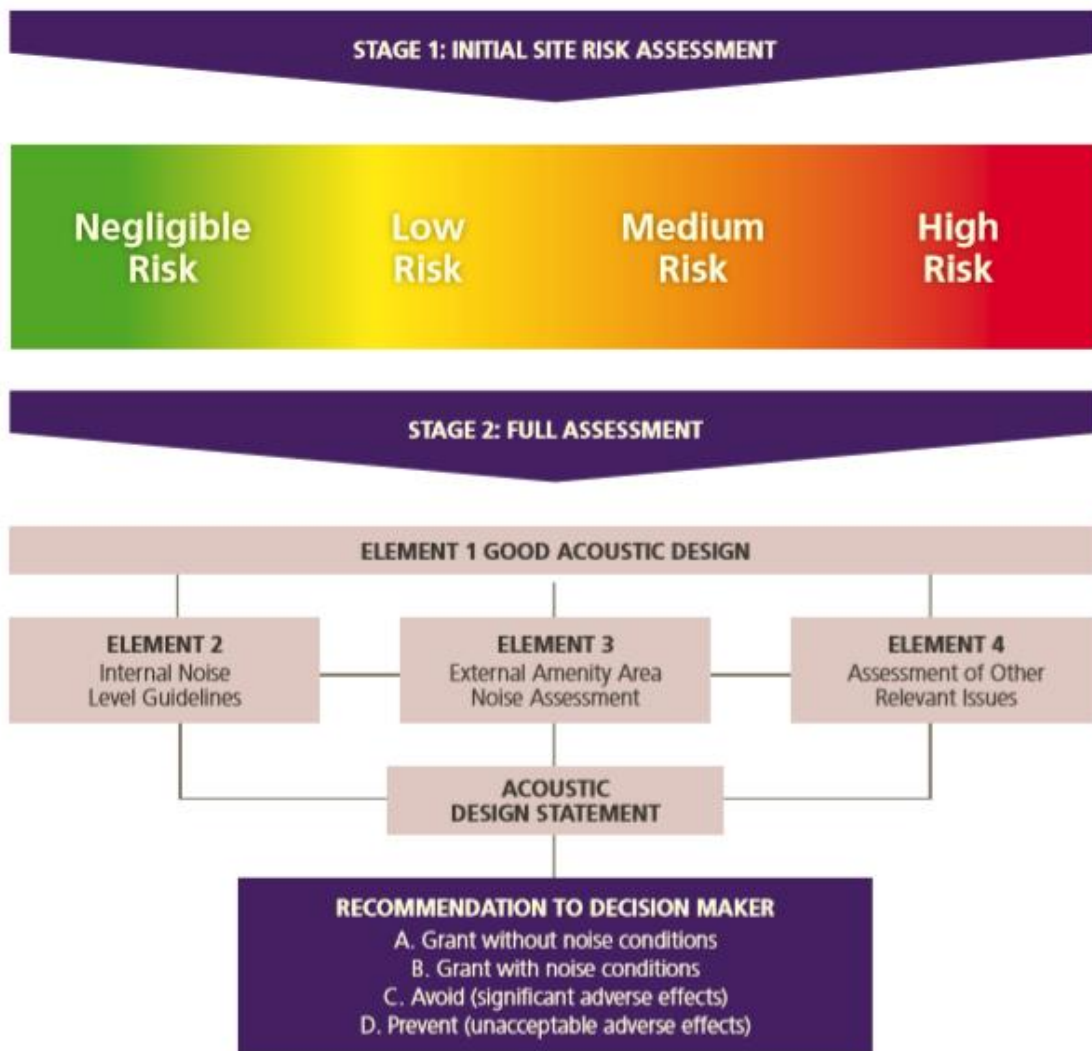


Figure 12-1 The ProPG Approach (ProPG)

The ProPG guidance characterises the risk level of a development site based on the existing noise levels. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment.

The purpose of the risk assessment is to give an early indication of the acoustic issues and to flag early the need for good acoustic design in sites presenting more acoustic challenges. The risk outcome is not a pass/ fail scenario, rather highlights the need for good acoustic design to minimise the impact on residential amenity, particularly in sites of medium to high risk.

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.

It should be noted that a site should not be considered a negligible risk if more than 10 LAFmax events exceed 60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

Paragraph 2.9 of ProPG states that, “The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a “typical worst case” 24 hour day either now or in the foreseeable future.”

12.2.4.3.3 Other Noise Sources

The proposed development area is split up into 7 sections, fitting in and around the existing built development and the road infrastructure currently being built.

The development comprises new public open spaces including 2 large neighbourhood parks; 8 local parks, a ‘Village Green/Plaza’ area; communal amenity space for the apartments; incidental open space; and streetscape planting.

There will be a restricted speed limit through the residential areas, this is expected to be around 20 kmph. Within the proposed development, as with all residential housing developments there will be sounds generated by everyday domestic activities including waste collection activities, pedestrians, children, and adults using the open spaces. These activities are not considered noise in the sense of potential nuisance, rather a part of the soundscape of such areas, as they are in any other housing development and urban soundscape. These activity noises would not have any potential for impact beyond the boundaries of the site and are scoped out from further assessment.

12.2.4.4 Operational Phase – Vibration Impacts

Considering the expected activities associated with the operational phase of the proposed development, it is not anticipated that there will be any outward impact associated with vibration. However, as the site is bound to the north by the Cork to Midleton commuter railway line, the inward impact of vibration is considered as part of the assessment. Guidance relating to human response to vibration is contained within BS 6472 Guide to evaluation of human exposure to vibration in buildings (2008): Part 1 - Vibration sources other than blasting.

BS 6472 uses the Vibration Dose Value (VDV) which is measured or forecast over the day or night-time periods in terms of $m/s^{1.75}$. The VDV parameter takes into account how people respond to vibration in terms of frequency content, vibration magnitude and the number of vibration events during an assessment period. **Table 12.4**, as set out in the standard, details the values of VDV where various comments from occupiers are possible.

The standard notes that the values are applicable for both vertical and horizontal vibration with the appropriate weighting applied.

Building Type	Low Probability of adverse comment	Adverse Comment possible	Adverse comment probable
Residential building - Day	0.2 to 0.4	0.4 – 0.8	0.8 to 1.6
Residential building - Night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 12-4: VDV ($m/s^{1.75}$) above which various degree of adverse comment

12.2.5 Statement on Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of this chapter.

12.3 Baseline Receiving Environment

There are no major dominant noise sources at or near the development site. The Cork to Midleton commuter train line runs parallel to the northern boundary of the site. The ambient noise is generally characterised by low level background traffic noise from the N25 and occasional identifiable industrial noise from the Fota Retail and Business Park.

A 24-hour noise monitoring survey was undertaken at the site, near the train line, to 1) measure the existing noise levels at the site and 2) measure the sound of trains where the nearest development to the train line is proposed.

The survey was conducted in general accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise. Additionally, vibration measurements were carried out at the same location to establish baseline vibration levels and potential impacts from vibrations from passing commuter trains on both proposed buildings and their occupants.

Physical observations by the author of this report noted that in general the passing trains were subjectively quiet as they slowed to approach the Carrigtwohill train station at low speeds. The trains did not contribute significantly to the ambient noise levels as one two trains per hour passed during off-peak times and 4 trains per hour during peak hours of 6 to 9 am and 6 to 7 PM. There are no trains timetabled between 11 pm and 6 am. Likewise, no vibrations underfoot were observed at the monitoring location as trains passed.

A vibration survey using a vibrometer was also undertaken at the same location to capture vibrations levels, even at very low levels, as trains passed. The objective was to understand existing vibration levels and their potential impact on the proposed development.

12.3.1 Baseline Noise and Vibration Survey

12.3.1.1 Noise and Vibration Survey Location

A representative noise measurement location was chosen at a distance of approximately 10m from the boundary of the rail line. This is the approximate closest distance from a proposed residential façade to the train line. This was also representative of noise levels of the wider area.

A noise meter was set up at location marked as NM1 in **Figure 12-2**. This location represented the closest potential development to the rail line. The vibration meter was also set up at the same location. Readings from the noise meter were observed throughout the day in particular as trains passed. The noise meter was left unattended to measure noise levels through the night. Noise levels over a full day and night were measured.

Vibration measurements concentrated on passing trains. Vibration levels were observed and logged by the vibration meter.

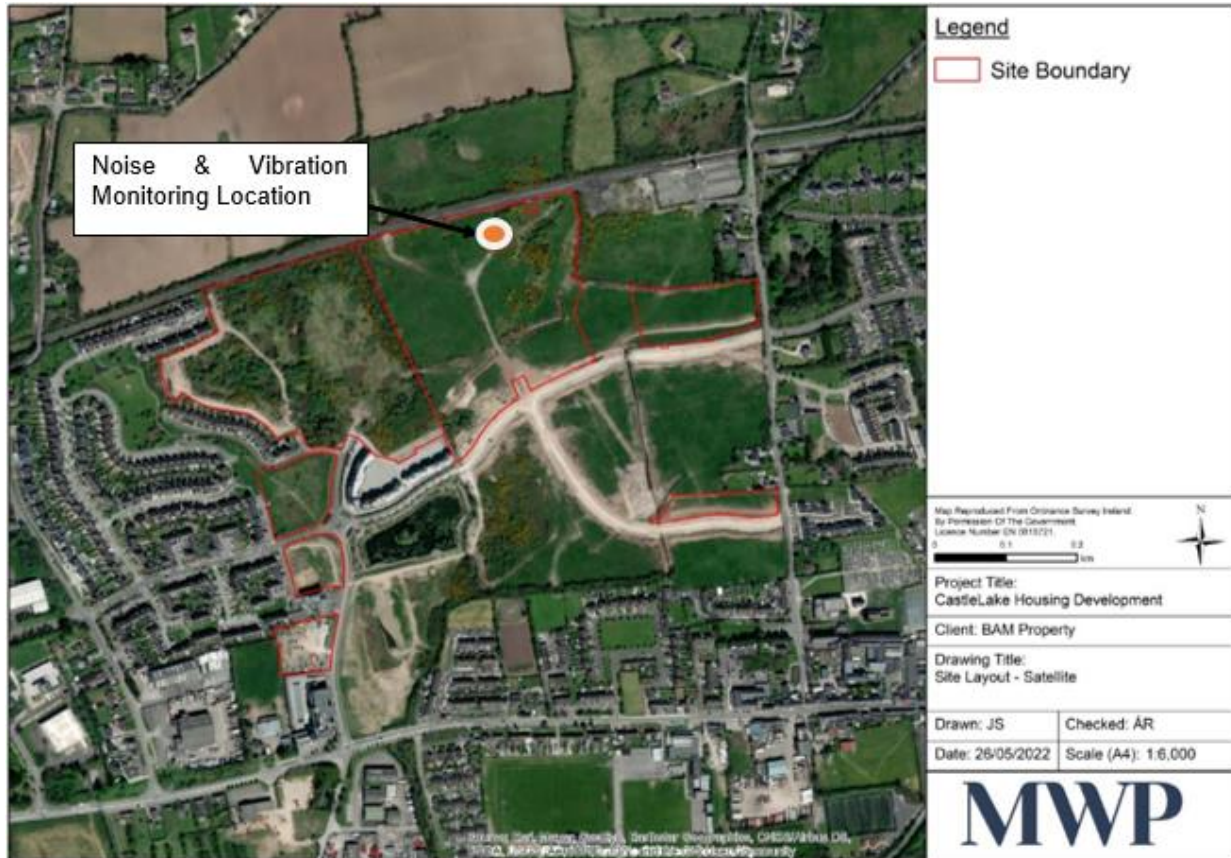


Figure 12-2 Noise and Vibration Monitoring Location

12.3.1.2 Survey Period

The noise survey was carried out over the 28th and 29th September 2021 between 1 pm on the 28th and 1 pm on the 29th. Noise levels were measured in 5-minute increments concurrently over the monitoring period. This allowed for the identification of train movements during the monitoring period. Noise levels were also physically observed during daytime hours.

Weather conditions during the survey were ideal with little to no wind and no rain. Meteorological conditions did not adversely impact the measured noise levels.

The vibration monitoring was carried out on the 12th of April 2022 between 11.30 am and 1.30 pm. Several trains passed during this measurement period.

12.3.1.3 Personnel and Instrumentation

The noise monitoring was undertaken by Peter Barry of MWP. The vibration monitoring was undertaken by David Courtney of Enfonc. Enfonc are specialists in noise and vibration and were contracted to carry out the vibration measurements and supply the results for assessment. Details of equipment used to carry out the surveys are detailed in **Table 12-5**. All equipment used is fully traceable.

Manufacturer	Equipment Model	Serial Number	Microphone
Brüel & Kjaer Sound Level Meter	2250	2654709	½" Type 4950 S/N 2657422
Brüel & Kjaer Sound Level Meter Calibrator	4231	2665058	n/a
Brüel & Kjaer Vibration Meter	4450 VMT	3102247	n/a

Table 12-5 : Noise and Vibration Monitoring Equipment Details

The sound level meter microphone was protected using a proprietary Brüel and Kjaer windshield. Before and after the survey the measurement apparatus was check calibrated.

12.3.1.4 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. This parameter is representative of the specific noise from plant when plant is the dominant noise source, i.e. there is no extraneous noise from sources such as traffic.

L₁₀ is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

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. This parameter generally describes the underlying level of sound that is experienced when specific events are not taking place.

L_{Max} is the maximum sound pressure level measured over a measurement period.

All these parameters are time weighted. They are fast (F) weighted rather than slow weighted. This means the sound level meter is sampling over a number of discrete 1/8 (125 ms) second periods. All parameters are calculated from these 1/8 second measurements. A 5-minute measurement is 144,000 individual measurements.

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2×10^{-5} Pa.

The vibration survey results are presented in terms of the following parameters:

VDV is the vibration dose value in $m/s^{1.75}$. VDV measures human exposure to vibration in buildings and the effects of vibration on human annoyance. VDV is a way to quantify vibrations as an exposure dose based on frequency (up to 80 Hz), amplitude and regularity.

12.3.1.5 Noise Survey Results

The results of the daytime survey period are summarised in **Table 12-6** and the night-time period in **Table 12-7**.

Monitoring Period		Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)			
		L _{Aeq}	L _{AFmax}	L _{A10}	L _{A90}
Tuesday 28 th September	Highest	63	93	51	46
	Lowest	41	45	42	39
	Average	46	56	46	43
Wednesday 29 th September	Highest	41	47	53	39
	Lowest	56	76	43	49
	Average	47	58	47	44

Table 12-6: Daytime Noise Survey Results

Monitoring Period		Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)			
		L _{Aeq}	L _{AFmax}	L _{A10}	L _{A90}
Tuesday 28 th to Wednesday 29 th September	Highest	56	72	50	33
	Lowest	34	38	36	47
	Average	40	47	42	30

Table 12-7: Night-time Noise Survey Results

The average daytime noise level was 47dB(A) and the night time noise level was 40dB(A). The frequency distribution of the L_{AFmax}, 5 min values in **Figure 12-3** shows there were fewer than 10 values greater than 51dB(A). There are no train movements between 11 pm and 6 am.

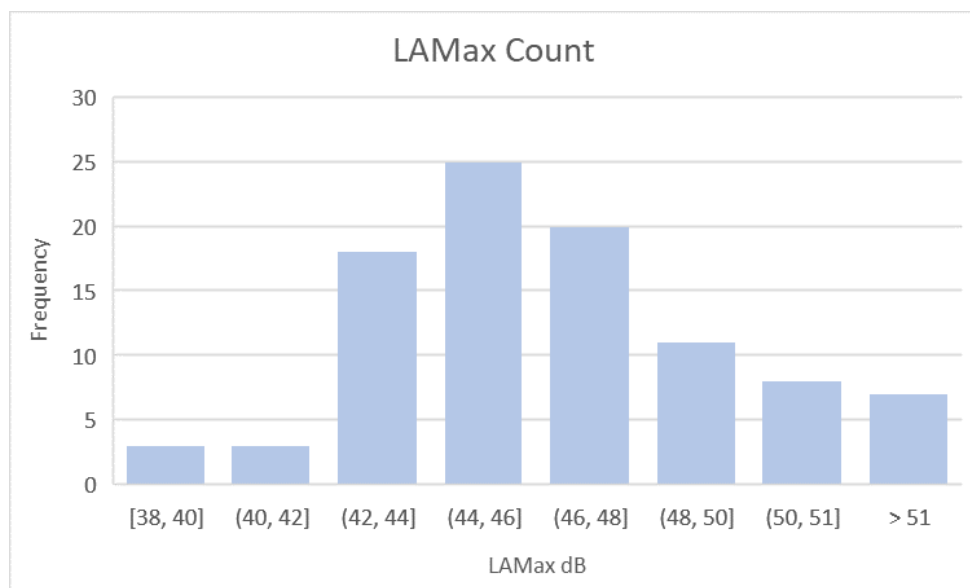


Figure 12-3 Distribution of L_{AFMax} Values

12.3.1.6 Vibration Survey Results

Measurement of vibration dose value was also undertaken over the survey period. The results are summarised in **Table 12.8**. The day and night VDV values are calculated taking account of the maximum VDV measured and number of passing trains over day and night-time periods as taken from Irish Rail timetable information.

Monitoring Period		Vibration Dose Value in the Z-Direction, $m/s^{1.75}$
12 th April 2022	Highest	0.23
	Average	0.07

Table 12-8: Measured VDV Values of Passing Trains

These values are below a value where a low probability of adverse comment would be expected within a building as defined within BS 6472-1 (2008) (refer to **Table 12-4**). These are greenfield levels it is anticipated that levels within the building would be lower again.

12.4 Assessment of Impacts and Effects

The proposed development is to be constructed in Phases (refer to **Chapter 2** for details). The construction impact assessment in **Section 12.4.1** represents the worst-case impact regardless of the development phase. The same plant and machinery will be employed for each phase of the development and the closest receptor to any of the phases has been adopted for the construction noise impact assessment.

12.4.1 Construction Phase - Noise

The construction phase entails the building of the development infrastructure including, roads, foundations, and the structures themselves. The main noise sources during the construction works will include heavy machinery and support equipment used to construct the various elements. This typically means heavy earth moving machinery, generators, and material transport trucks.

The noise levels described in the following sections for the various construction phases are indicative only and are based on theoretical worst-case assumptions in order to demonstrate that it will be possible to undertake the works without significant noise impacts. By their nature the works are short term and will only potentially impact on a small number of receptors at any one time. Construction works are intermittent, mobile and vary in intensity from phase to phase and accordingly are difficult to accurately predict for any given time in the future. As the development progresses structures themselves can act to screen noise levels depending on the receiving receptors. Best practice is to adopt worst case assumptions using typical sources which tends to overestimate the effect.

The exact equipment to be used is not known at this stage, but the plant and machinery outlined in **Table 12-9** are typical of plant commonly used and can provide an accurate assessment of construction noise emissions.

The associated noise levels have been sourced from BS 5228 Noise and Vibration from open and construction sites, totalled, and extrapolated to the nearest noise sensitive location. Only attenuation due to distance is accounted for in the prediction of resultant noise levels at different distances. The resultant noise level is then compared against the relevant noise threshold (refer to **Table 12-2**).

The result is a theoretical worst case, as it assumes all machinery will be operating simultaneously which will not be the case and accounts for attenuation due to distance only. In reality there will be further noise attenuation due to atmospheric absorption, ground absorption, and landform screening. Therefore, the noise levels presented herein are an overestimate.

Using the following equation, noise emissions from the construction site are extrapolated to different distances, in this case 10m, 20m, 40m, 80m and 160m.

$$SPL2 = SPL1 - 20\log(r2/r1)$$

Where:

- Sound Pressure Level 1 (SPL1) = Known noise level at 10m from construction site
- Sound Pressure Level 2 (SPL2) = Unknown noise level at nearest receptor
- r2 = Distance between noise sensitive receptor and construction site
- r1 = 10 m

Activity	ITEM BS5228 Ref	Predicted Sound Pressure Level (@10m (r ₁) Leq dB(A)	Predicted Sound Pressure Level @ 20 m (r ₂), Leq dB(A).	Predicted Sound Pressure Level @ 40 m (r ₂), Leq dB(A).	Predicted Sound Pressure Level @ 80 m (r ₂), Leq dB(A).	Predicted Sound Pressure Level @ 160 m (r ₂), Leq dB(A).
Site Clearance/ Demolition	Tracked Excavator (C2.21)	71	65	59	53	47
	Dump Truck (tipping fill) (C2.30)	79	73	67	61	55
	Diesel Generator (C4.76)	61	55	49	43	37
Total		80	74	68	62	56
General Construction	Dump Truck (tipping fill) (C2.30)	79	73	67	61	55
	Tracked excavator (C2.21)	71	65	59	53	47
	Compressor (D7.8)	70	64	58	52	46
	Telescopic Handler (C4.54)	79	73	67	61	55
	Hand-held Circular Saw (C4.72)	79	73	67	61	55
	Diesel Generator (C4.76)	61	55	49	43	37
Total		84	78	72	66	60
Road Works / Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	75	69	63	57	51
	Electric Water Pump (C5.40)	68	62	56	50	44
	Vibratory Roller (C5.20)	75	69	63	57	51
Total		78	72	66	60	54

Table 12-9: Typical Plant and Machinery and associated noise levels to be used during construction

The theoretical worst case predicted noise levels show that where works are taking place within 40m of an existing noise sensitive receptor there is the potential for the guideline construction noise thresholds to be exceeded. This

would mean all the items of plant identified in **Table 12-9 (General Construction Heading)** to be in operation simultaneously and continuously over the course of an 10-hour day. At distances beyond 40m noise levels are predicted to be within acceptable guideline values.

These results indicate that noise reduction measures, construction works planning, and community liaison needs to be taken into consideration when heavy construction works are taking place within 40m of sensitive receptors. Such measures are described in more detail in **Section 12.5**.

The associated construction phase noise impact is dependent on a multitude of variables and is predicted to range from a **temporary significant adverse impact to not significant**. Mitigation measures described in **Section 12.5** will reduce the potential for significant adverse impact.

12.4.2 Construction Phase – Vibration

In terms of construction vibration, it is anticipated that excavations will be made using standard excavation machinery, which typically do not generate appreciable levels of vibration close to the source. Blasting or piling are not expected. Taking this into account and considering the distance that these properties are from the works and the attenuation of vibration levels over distance, the resultant vibration levels are expected to be well below a level that would cause damage to structure or disturbance to building occupants. The associated impact is considered **neutral, imperceptible, and short-term**.

The use of a vibratory roller during the construction of the internal roads has the potential to generate vibrations which may be perceived depending on the distance between the source and the receiver and the intervening ground conditions. However, these vibrations are not of a level which will cause structural damage to sound buildings. Should a vibratory roller be in operation in close proximity to an existing dwelling there is potential for **temporary moderate adverse impact** to affected residents.

12.4.3 Operational Phase – Noise

12.4.3.1 Additional Traffic on Public Roads

The main potential for impacting on the existing noise environment once the development is operational is from the additional traffic the development will generate, that is new residents using the new and existing road network. The main link roads to be affected include:

- L3678 at N25 Junction 3 Northern Roundabout
- Castlake Access Road
- Station Road (Church Lane)
- L3612 North

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1dBA change in traffic noise levels. A 100% increase in traffic volumes would result in a 3dB increase in noise levels (at receptors close to the impacted road network). A review of **Chapter 13** of the EIAR, the Traffic and Transport Impact Assessment shows that traffic associated with the proposed development will be considerably less than 100%, therefore an increase of 3dB will not occur. The proposed development predicted generated junction traffic volumes would be up to 18.0%, 12.2% and 6.3% at the Castlake Access Road/Main Street, Station Road/Main Street and N25 Junction 3 Northern Roundabout

junctions. These % increases indicate a traffic noise increase of less than 1dB which would not be perceptible to the human ear (refer to **Table 12-3**)

In the context of the existing noise environment the effects from the noise contribution of increased traffic on the receiving noise environment is a **neutral, negligible, and long-term impact**.

12.4.3.2 Inward Noise Impact Assessment

The baseline or existing average daytime noise level was 47dB(A) and the average night-time noise level was 40dB(A). The frequency distribution of the L_{AFmax} , 5 min values in **Figure 12-3** shows there were fewer than 10 values greater than 51dB(A). There are no train movements after 11 pm.

Therefore, in accordance with criteria set out in the Stage 1 Site Risk Assessment in the ProPG document (refer to **Figure 12-4**) the site is characterised as being of negligible risk and a Stage 2 inward noise impact assessment is not required for this development.

However good acoustic design has been incorporated into the development in particular for those properties nearest the train line. This will future proof these properties against any future intensification of the train line. For example, the noise is mitigated by the omission of apertures in the north and west facades of all the houses nearest the train line and by the high walls enclosing the private open spaces.

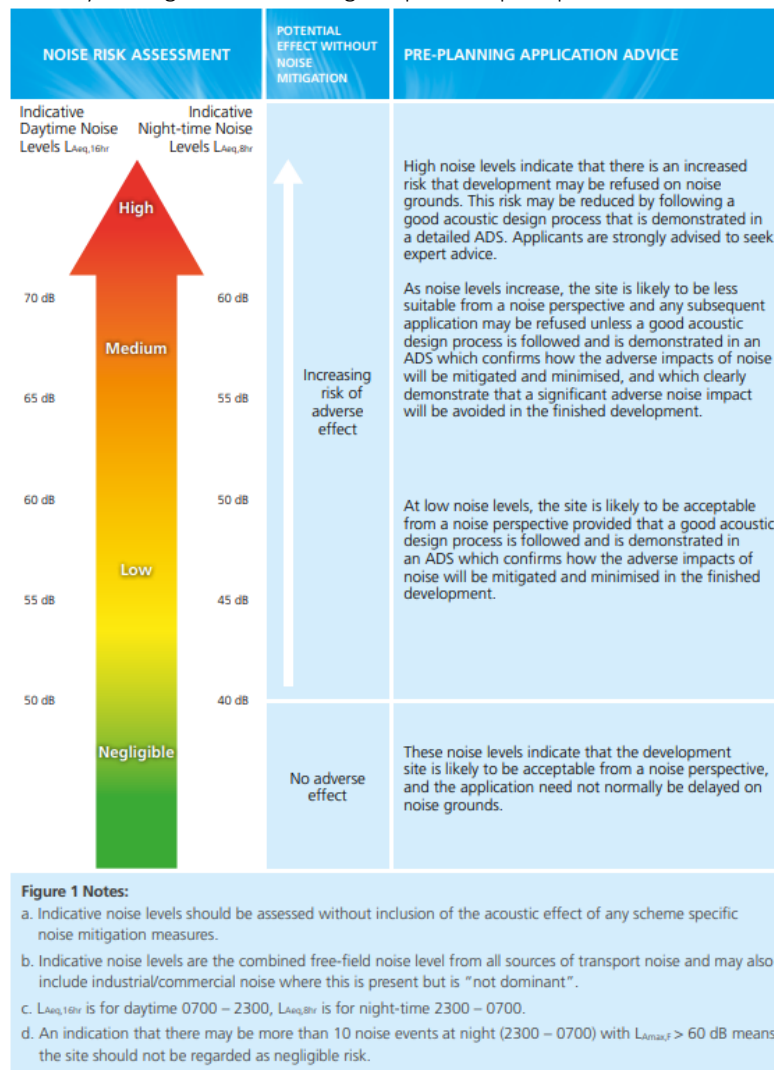


Figure 12-4 Initial Stage 1 Risk Assessment

12.4.3.3 Inward Vibration Impact Assessment

Measurements of actual vibrations from passing trains indicate that there will be no significant impact from vibrations to residents within the proposed development. Measured values are below those with a low probability for adverse comment (refer to **Table 12.8**).

12.4.4 Do-Nothing

Should the proposed development not proceed it is expected that the existing noise environment would not change for the foreseeable future, and this is characterised as a **long-term neutral impact**.

12.4.5 Cumulative Impacts and Effects

A number of planning applications and planning permissions which are relevant to this proposed development are currently underway or at design stage. These are described in **Section 2.7.1 of Chapter 2**.

Because of the scale and geographical distance between the proposed and permitted developments the internal road upgrades of the IDA business park is not considered a source of significant cumulative noise and vibration. The construction phase is complete so there will be no overlap in construction activities.

The permitted Station Road Schools Campus has the potential for cumulative impact during the construction phase, should the construction phases overlap. The timelines for both projects are not finalised at this stage but it is likely there will be some overlap. The potential impacts are discussed in the following sections.

12.4.5.1 Construction Phase Cumulative Impacts

Should the construction phases overlap there may be potential for cumulative construction noise impacts. However, if the mitigation measures proposed herein are adhered to, this is not expected to be significant due to the separation distance between the permitted school development and existing noise receptors which may be impacted by Castllake construction works. Obviously if the construction of the two developments does not coincide there will be no cumulative impact.

12.4.5.2 Construction Phase Cumulative Impacts

Once operational given the nature of the school development significant impact on the proposed Castllake development and vice versa is unlikely as the school will be perceived as providing a vital service to the area and part of the natural soundscape for an urban environment. The Castllake housing development will not adversely impact on the permitted school development.

12.5 Mitigation and Monitoring Measures

12.5.1 Mitigation Measures

12.5.1.1 Construction Phase

Best practice mitigation techniques as specified in BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites shall be implemented during the construction phase. Contractors will be familiar with the measures in this document,

There is the potential for construction noise to exceed guideline construction noise thresholds at receptors close to works areas during periods of intense construction activity.

Solid 3 m high perimeter timber hoarding will be erected at the west and southern construction perimeters to protect receptors at Maple Lane, Maple Close and Cascade Apartment Complex.

To prevent construction noise thresholds being exceeded, noise screens shall be utilised around noisy plant and machinery such as generators, cutting stations, and pneumatic rock breakers.

Noise stationary equipment will be located away from sensitive boundaries as far as practicable.

The use of inherently quiet plant is required where appropriate – all compressors and generators will be “sound reduced” or “super silent” models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.

Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.

A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events.

In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, Cork County Council shall be immediately notified prior to the works commencing.

12.5.1.2 Operational Phase

No mitigation measures additional to the inherent design as proposed as required.

12.5.2 Monitoring Measures

12.5.2.1 Construction Phase

Subject to the implementation of the mitigation measures set out in **Section 12.5.1.1** construction noise and vibration monitoring is not deemed necessary. However, should complaints arise the appointed contractor will respond appropriately, and the response may include noise and vibration to determine the validity of complaints and the effectiveness of the noise and vibration control measures put in place.

12.5.2.2 Operational Phase

No noise and vibration monitoring are required as there will be no significant noise and vibration emissions.

12.6 Residual Impacts and Effects

The residual impacts and effects are set out in **Table 12-10** below.

Impact (Pre-mitigation)	Mitigation Measures	Residual Effect (Post-Mitigation)
Construction		
Potential Temporary Significant Adverse Impact	Refer to Section 12.5.1.1	Noise levels within typical tolerable construction noise guideline thresholds
Operational		
Not Significant	None	Not Significant

Table 12-10: Noise and Vibration Residual Impacts and Effects

12.7 References

BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound.

BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.

BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration.

BS 6472 Guide to evaluation of human exposure to vibration in buildings (2008): Part 1 - Vibration sources other than blasting.

BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.

BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings

Design Manual for Roads and Bridges, 2011.

Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes (NRA, 2014).

Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (EPA, 2016).

Highways Agency Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration.

Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, (IEMA 2014).

ISO 1996: 2017: Acoustics – Description, measurement, and assessment of environmental noise.

Professional Guidance on Planning & Noise (ProPG) (Association of Noise Consultants, the Institute of Acoustics, and the Chartered Institute of Environmental Health, 2017).

Technical Guidance Document E – Sound (DoHGLH 2014).

12.8 Glossary of Terms

Term	Definition
Acceleration	The rate of change of velocity, measured in millimetres per second per second (mm/s^2)
A-Weighting	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).
Criterion Noise Level	Criterion Noise Level The long-term mean value of the noise level that must not be exceeded.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micropascals ($20 \mu\text{Pa}$).
Hertz	The unit of sound frequency in cycles per second.
$L_{Aeq,T}$	This 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 (T).
LAN	The A-weighted noise level exceeded for N% of the sampling interval.
LA90	Refers to the A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It is commonly used to describe the background noise level.
LA10	Refers to the A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period.
L _{Amax}	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
LpA (dB)	An ‘A-weighted decibel’ - a measure of the overall level of sound across the audible frequency range (20Hz – 20kHz) with A-frequency weighting, known as ‘A-weighting’, to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Noise Sensitive Receptor (NSR)	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Peak Particle Velocity (PPV)	This is the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.
RMS	The RMS (Root Mean Square) value of a set of numbers is the square root of the average of their squares.
Sound Pressure Level	Sound pressure refers to the fluctuations in air pressure caused by the passage of a sound wave. It may be expressed in terms of sound pressure level at a point.
Sound Power Level (L_w)	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2

12.9 List of abbreviations

Term	Definition
A-Weighting	A-weighted Decibel
dB	Decibel
$L_{Aeq,T}$	Equivalent continuous sound level over the sample period (T).
L_{AN}	The A-weighted noise level exceeded for N% of the sampling interval.
L_{A90}	Refers to the A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It is commonly used to describe the background noise level.
L_{A10}	Refers to the A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period.
L_{Amax}	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
LpA (dB)	An 'A-weighted decibel
NSR	Noise Sensitive Receptor
PPV	Peak Particle Velocity
RMS	Root Mean Square
SPL	Sound Pressure Level
T	Sample Period
L_w	Sound Power Level

13. Traffic and Transportation

13.1 Introduction

This chapter of the EIAR quantifies and assesses the impact of traffic generated by the proposed SHD on the existing and proposed local road and transport network, and recommends mitigation measures, as appropriate.

13.1.1 Scope of Assessment

The scope of the traffic and transportation assessment includes consideration of the following:

- Existing and expected future road and transport network;
- Existing and predicted future baseline traffic volumes on the surrounding local road network;
- Predicted construction traffic volumes associated with the proposed development and likely impacts;
- Proposed construction mitigation measures;
- Predicted operational traffic volumes associated with the proposed development and likely impacts; and
- Proposed operational mitigation measures.

This Traffic and Transportation Assessment chapter has been prepared following pre planning consultation with the Traffic and Transport Section of the Planning and Development Directorate of Cork County Council and Transport Infrastructure Ireland (TII).

13.2 Assessment Methodology

This EIAR Traffic and Transportation Assessment has been prepared in the context of the following:

- Cork County Council's Cork County Development Plan 2022;
- Cork County Council's Cobh Municipal District Local Area Plan 21st August 2017;
- The Transport Infrastructure Ireland (TII) Traffic and Transport Assessment Guidelines May 2014;
- The National Transport Authority (NTA) Cork Metropolitan Area Transport Strategy (CMATS), in collaboration with TII, Cork City Council and Cork County Council;
- The Chartered Institution of Highways and Transportation (CIHT) Trip Rate Information Computer System (TRICS);
- The CIHT Guidelines For Providing Journeys On Foot 2000;
- The Environmental Protection Agency (EPA) Guidelines on The Information to be Contained in Environmental Impact Assessment Reports May 2022 (EPA EIAR Guidelines); and
- Other existing permitted and proposed developments in the vicinity of the proposed development site, including the Department of Education permitted relocated schools campus (Cork County Council planning file reference number: 19/5707).

13.2.1 Assessment Criteria

Existing, pre Covid-19, traffic volumes on the proposed development existing road network have been established on the basis of traffic data provided in the public planning file for the permitted relocated schools campus (19/5706).

Future traffic volumes have been established on the basis of future traffic data provided by Cork County Council from their Housing Infrastructure Implementation Team's (HIIT) Carrigtwohill Strategic Transport Assessment Report and Micro Simulation Modelling Report to consider the optimum approach for development in Carrigtwohill. Cork County Council's HIIT assessment includes development within the Carrigtwohill Urban Expansion Area (UEA) and elsewhere within Carrigtwohill, including the subject site lands, and associated proposed new infrastructure, including as part of the Carrigtwohill Urban Regeneration Development Fund (URDF) Initiative.

In their submitted Opinion to An Bord Pleanála as part of pre planning consultation for the subject proposed development (ABP-311855-21), Cork County Council's Planning and Development Traffic and Transportation Section identified HIIT's Carrigtwohill Strategic Transport Assessment and Micro Simulation Modelling as the "best" basis "to confirm the traffic/transport impact of" the subject proposed development. During pre-planning consultations with MWP, Cork County Council's Planning and Development Traffic and Transportation Section identified the Phase 1A 2025 Do Minimum and Do Something scenarios as the appropriate scenarios to include the order of proposed new residential units, similar to the subject proposed development. Phase 1A includes up to 605 proposed new residential units, including 250 Carrigtwohill UEA units and 355 other units, in addition to permitted expected other developments.

The CIHT Guidelines For Providing Journeys On Foot suggested acceptable walking distances, for pedestrians without a mobility impairment for some common facilities were used to assess walking distances and trips generated by the proposed development.

The definitions of the significance of impacts and the durations of impacts have been identified on the basis of the EPA EIS Guidelines.

13.2.2 Statement of Limitations and Difficulties Encountered

There were no limitations and difficulties encountered in establishing future traffic volumes, as these have been established on the basis of future traffic data provided by Cork County Council from their Housing Infrastructure Implementation Team's (HIIT) Carrigtwohill Strategic Transport Assessment Report and Micro Simulation Modelling Report.

This assessment was undertaken in March and April 2021, during the Government's Coronavirus (Covid-19) recommendations and measures, and ongoing remote working from home by workers. This restricted on-site traffic surveys to record typical existing peak hour traffic volumes. Accordingly, pre Covid-19, traffic volumes on the proposed development existing road network have been established on the basis of traffic data provided in the public planning file for the permitted relocated schools campus (19/5706).

13.2.3 Competency of Assessor

This Traffic and Transportation chapter was prepared by Seamus Quigley BE CEng MIEI MCIHT of MWP.

Seamus Quigley has over 31 years' experience in transport planning and traffic engineering projects, including EIS/EIAR traffic and transportation chapters, traffic impact assessments, traffic management studies, mobility management plans, traffic modelling studies, feasibility studies and road safety audits. He is a Chartered Engineer

with Engineers Ireland, and also a member of the Chartered Institution of Highways and Transportation. He joined Malachy Walsh and Partners in 2007, having spent over sixteen years with Atkins.

13.3 Existing Environment

13.3.1 Existing Road Network

The Carrigtwohill Road network, in the vicinity of the proposed development site, is shown on Figure 13-1. The road network local to the site is shown on Figure 13-2.

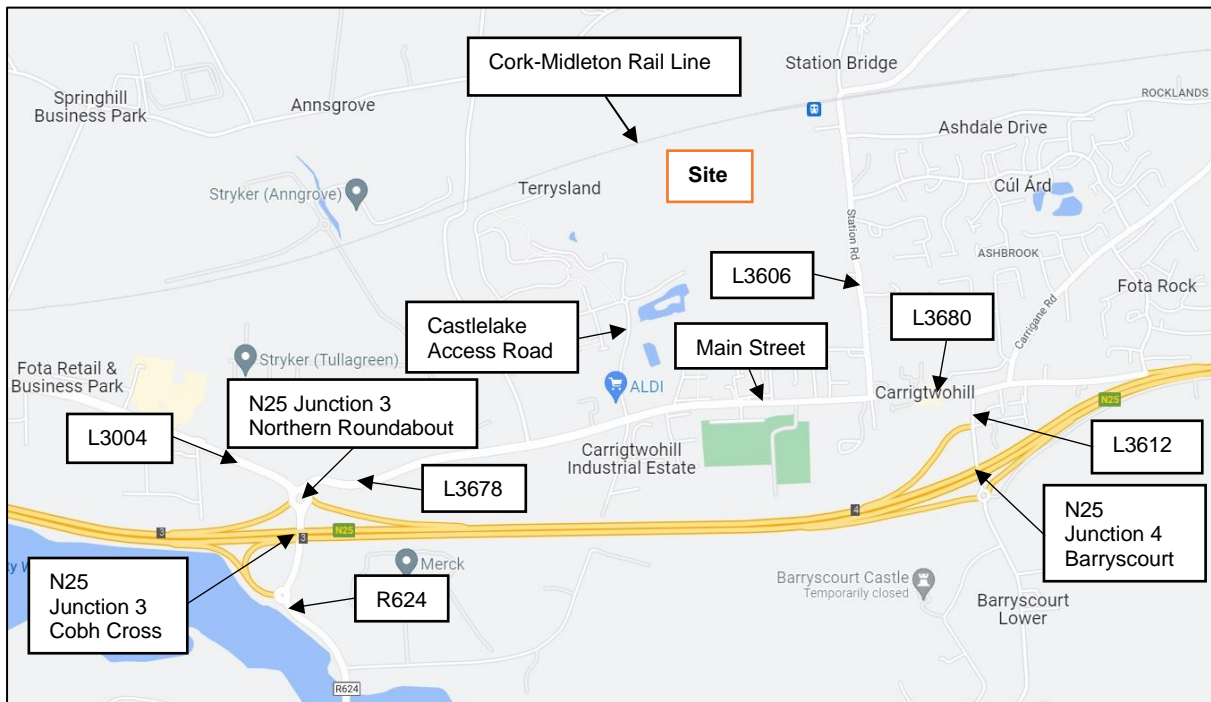


Figure 13-1 Carrigtwohill Road Network Map



Figure 13-2 Site Local Road Network Map

Station Road extends south/north from Main Street, on the east side of the site and overpasses the Cork-Midleton Rail Line, immediately east of Carrigtwohill Train Station, at Barry's Bridge. Station Road extends to Church Lane immediately at its junction with Main Street. Station Road and Church Lane are part of the L3606 Local Road. Station Road has a traffic signal controlled T-junction with the Carrigtwohill Train Station access road, on the south side of Barry's Bridge.

Main Street extends west/east, south of the site, as part of the L3678 and L3680 Local Roads.

The Castlelake Access Road extends south/north from Main Street and links with the recently constructed Castlelake Link Road, which extends west/east to Station Road at its An Guagán junction.

The Castlelake Access Road forms a priority crossroads at its junction with the L3678 Main Street and Carrigtwohill Industrial Estate, with dedicated right-turn lanes on the L3678 Main Street. West of the junction, the L3678 includes priority T-junctions with Wisers Road and the IDA Ireland Business and Technology Park Access Road, with dedicated right-turn lanes on the L3678.

The Station Road, Main Street and Castlelake Access Road network is located within the Carrigtwohill 50 km/hour urban speed limit zone.

The L3678 links Main Street, on the west side of Carrigtwohill, with the N25 Junction 3 (Cobh Cross) Northern Roundabout.

The L3680 links Main Street, on the east side of Carrigtwohill, with the N25 Junction 4 (Barryscourt), via the Main Street/L3612 priority T-junction. The N25 Junction 4 includes a priority crossroads at the junction of the L3612/N25 Eastbound Off-Ramp/East Link Business Park; and a roundabout at the junction of the L3612/N25 Westbound Off-Ramp/Local Cul-de-Sac Road/N25 Westbound On-Ramp. The N25 Junction 4 Eastbound On-Ramp is located at the east end of the L3680, at the east end of Carrigtwohill.

13.3.2 Existing Pedestrian and Cyclist Facilities

Station Road has an existing footway along its east side, which has a restricted width locally on Church Lane at its Main Street junction. The east side footway ends south of the Carrigtwohill Train Station access road. Station Road has an intermittent west side footway at its southern end; and locally at its northern end, north of the end of the east side footway.

The Castlelake Access Road includes a continuous footway along its east side, and an east side off-carriageway cycle lane along its north section.

The recently constructed Castlelake Link Road, between the Castlelake Access Road and Station Road, includes continuous footways and off-carriageway cycle lanes along both sides.

The Station Road traffic signal controlled T-junction with the Carrigtwohill Train Station access road, on the south side of Barry's Bridge, includes controlled crossing facilities for pedestrians.

Main Street includes footways on both sides. West of Main Street, the L3678 has a continuous footway along its north side that links with the L3004 north side footway, on the west side of the N25 Junction 3 Northern Roundabout.

The IDA Ireland Business and Technology Park road network has recently been upgraded to include a shared footway and cycleway throughout the scheme. At its northern end, the shared footway and cycleway continues offline east of the Park and north along the east side of the L3615. The upgraded IDA facilities link with the L3678, Wisers Road and L3615, as shown on Figure 13-3.

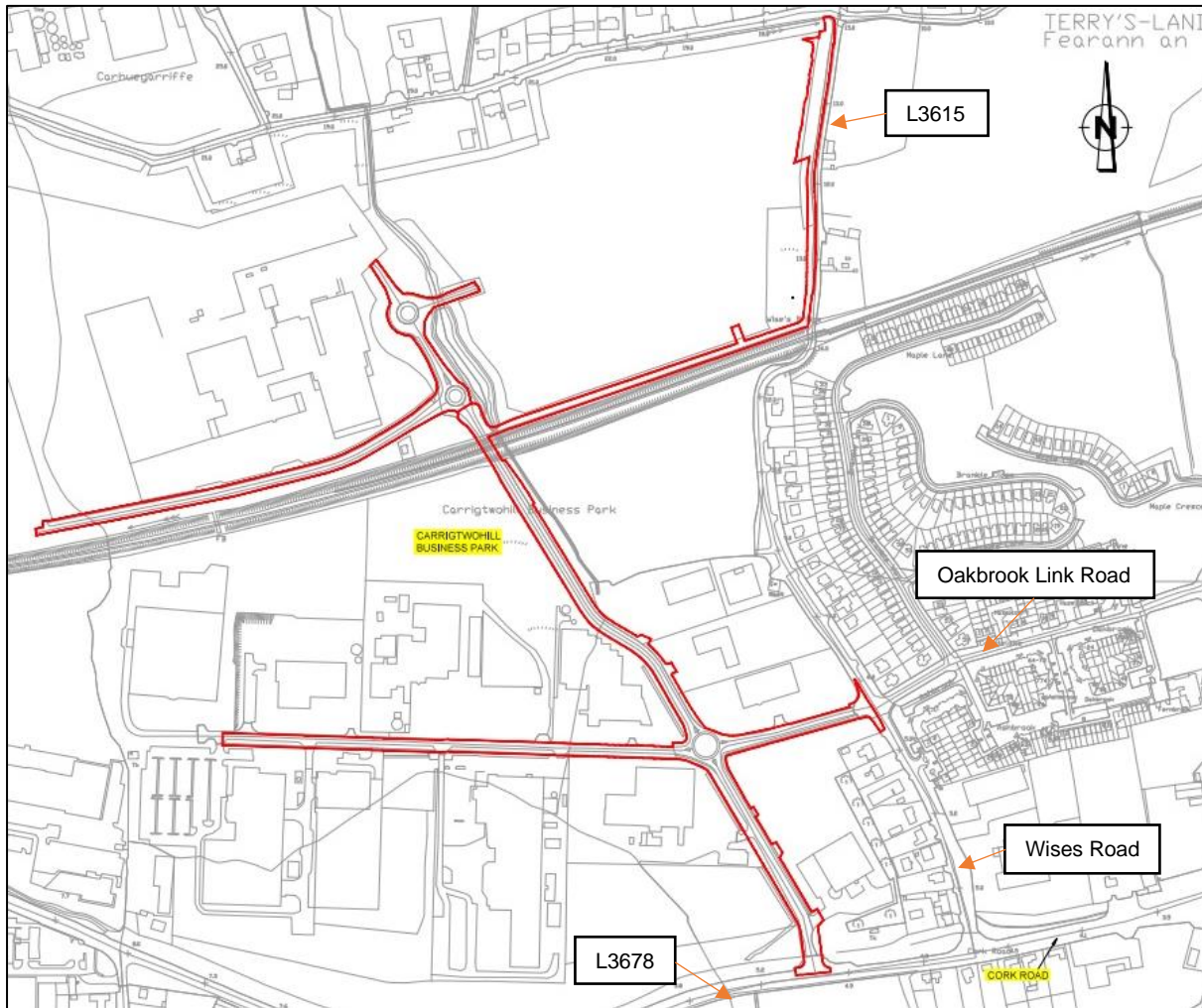


Figure 13-3 IDA Ireland Upgraded Road Network Facilities Location Map

The IDA Ireland shared facilities are part of Cork County Council's Dunkettle to Carrigtwohill to Midleton Inter-Urban Strategic Cycleway, incorporating a shared pedestrian and cycle route, in association with the NTA. An initial phase of the Inter-Urban Strategic Cycleway was completed along the north side of the L3004 in 2021, on the east side of Glounthaune.

13.3.3 Existing Public Transport Services

The Iarnród Éireann (Irish Rail) Cork-Midleton Rail Line extends east-west immediately adjacent to the north side of the subject site. Carrigtwohill Train Station is located north east of the site, on the west side of Station Road, on the Cork-Midleton Rail Line, as shown on Figure 13-4. Covered cycle parking is provided at Carrigtwohill Train Station, together with Park & Ride car parking.

The Cork-Midleton Rail Line extends from Kent Station, in Cork city centre, to Midleton Station, and also serves stations at Little Island, Glounthaune and Carrigtwohill. Carrigtwohill Train Station provides services from circa 6.00 a.m. to 10.30 p.m., with 30 minutes frequencies during morning and evening peak hours and 60 minutes frequencies during off peak hours. The Cork-Midleton Rail Line links with the Cork-Cobh Rail Line at Glounthaune Train Station, as shown in the Cork train services map provided in Figure 13-5. The Cork-Cobh Rail Line extends from Kent Station to Cobh and also serves stations at Little Island, Glounthaune, Fota, Carrigaloe and Rushbrooke.



Figure 13-4 Existing Public Transport Services

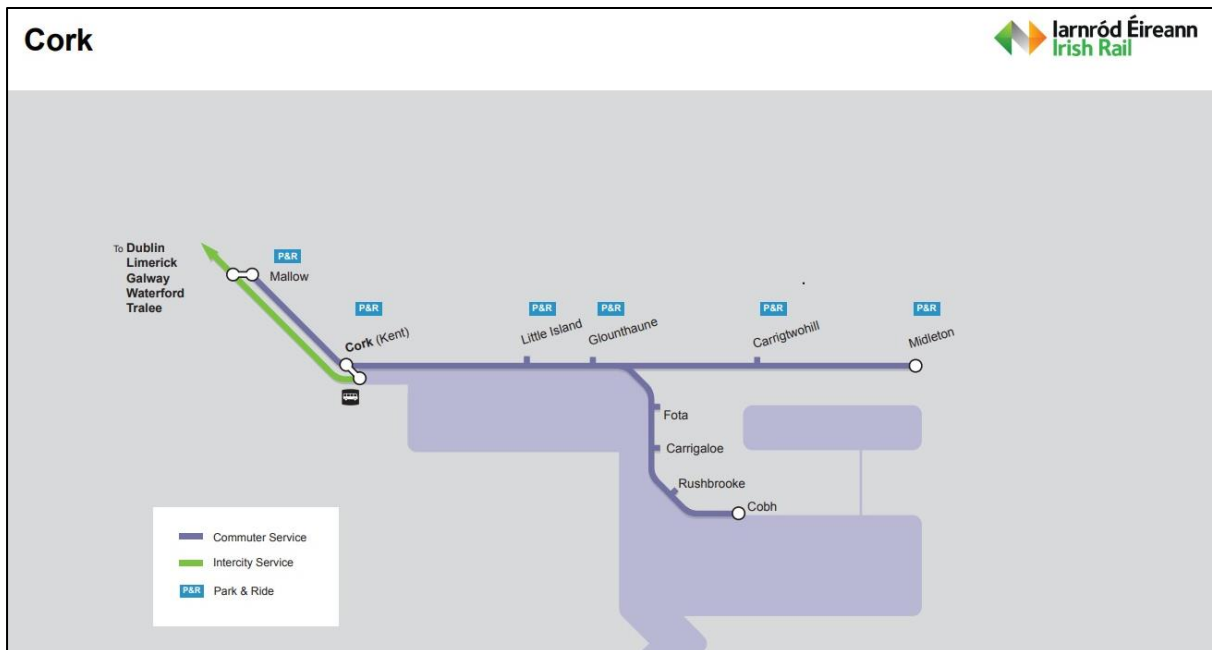


Figure 13-5 Cork Train Services Map

The Transport For Ireland Cork Bus and Train Services Map is shown on Figure 6, including Carrigtwohill. Carrigtwohill Main Street is served by the Bus Éireann service numbers 240, 241, 260 and 261, as summarised in Table 13-1. The Main Street Bus Éireann bus stops are shown on Figure 13-6.

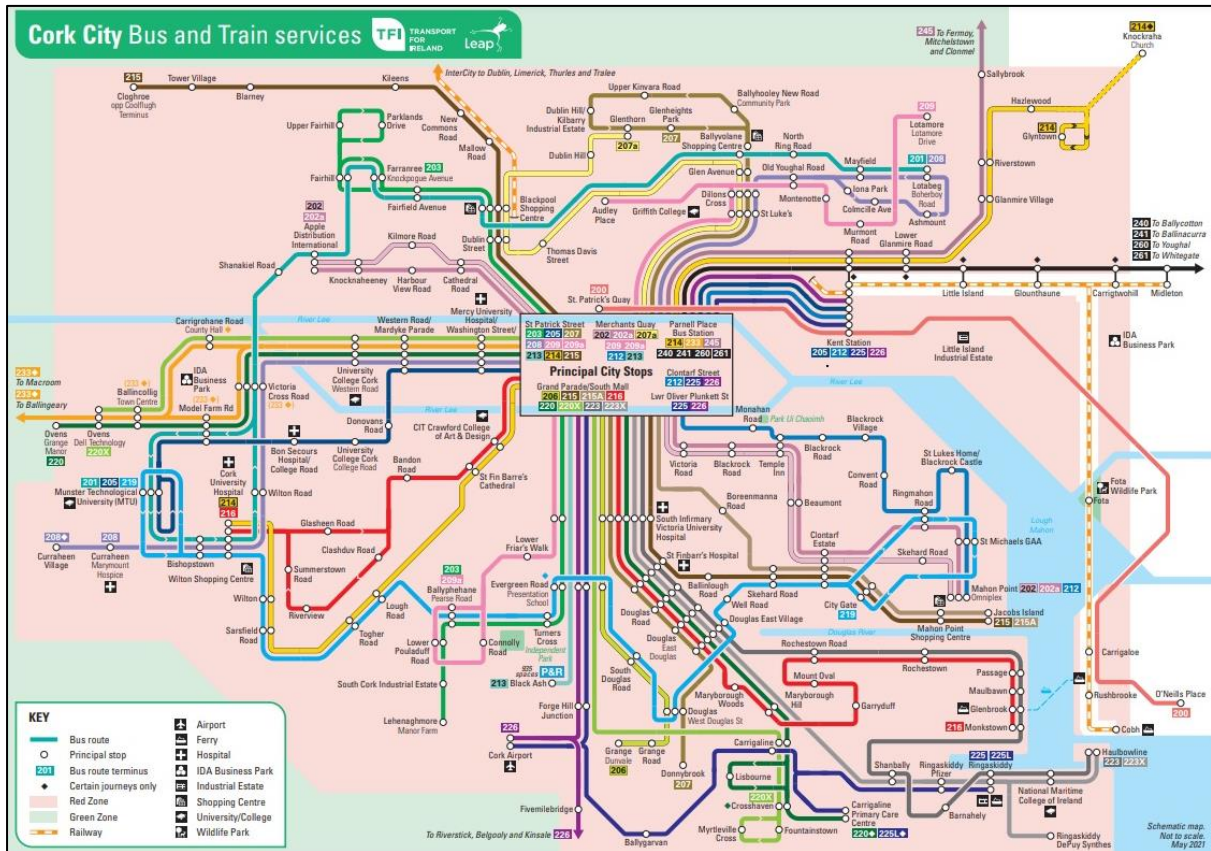


Figure 13-6 Cork Bus and Train Services Map

Table 13-1 Carrigtohill Main Street Bus Éireann Services

Bus Éireann Service Number	Route
240	Cork-Cloyne-Ballycotton
241	Cork-Midleton-Whitegate-Trabolgan
260	Cork-Youghal-Ardmore
261	Cork-Midleton-Ballinacurra

13.3.4 Pre Covid-19 Baseline Traffic Volumes (2019)

This assessment was undertaken in March and April 2021, during the Government’s Coronavirus (Covid-19) recommendations and measures, and ongoing remote working from home by workers. This restricted on-site traffic surveys to record typical existing peak hour traffic volumes. Accordingly, pre Covid-19, traffic volumes on the proposed development existing road network have been established on the basis of traffic data provided in the public planning file for the permitted relocated schools campus (19/5706).

The pre Covid-19 2019 morning and evening peak hour junction traffic turning volumes on the existing local road network, from 8.00 a.m. to 9.00 a.m. and from 5.00 p.m. to 6.00 p.m., respectively, are provided in **Appendix 13.1**. The equivalent link traffic volumes are provided in Table 13-2, together with the volumes of heavy commercial vehicles (HCVs).

Table 13-2 Pre Covid-19 2019 Peak Hour Link Traffic Volumes (Vehicles)

Junction	Road Link	Peak Hour Vehicles (HCVs)	
		AM	PM
N25 Junction 3 Northern Roundabout	L3004	1,226 (35)	855 (28)
	L3678	1,378 (31)	1,084 (24)
	N25 Eastbound On-Ramp	432 (17)	433 (10)
	R624	1,595 (57)	1,511 (22)
	N25 Eastbound Off-Ramp	628 (34)	524 (34)
Castlelake Access/L3678 Main Street/Industrial Estate Access	Castlelake Access	202 (0)	325 (0)
	Main Street East	844 (15)	888 (9)
	Industrial Estate	51 (16)	138 (19)
	Main Street West	717 (21)	845 (22)
L3606 Station Road/L7643 An Guagán	Station Road North	356 (5)	245 (4)
	An Guagán	382 (1)	196 (0)
	Station Road South	480 (4)	333 (4)
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	Station Road (Church Lane)	374 (4)	388 (6)
	Main Street East	643 (5)	804 (5)
	Main Street West	857 (9)	944 (7)
L3680 Main Street/L3612	Main Street East	758 (15)	854 (8)
	L3612	649 (15)	612 (9)
	Main Street West	717 (4)	816 (5)
N25 Junction 4 North	L3612 North	649 (15)	612 (9)
	East Link Business Park	242 (2)	164 (3)
	L3612 South	729 (25)	557 (7)
	N25 Eastbound Off-Ramp	259 (14)	220 (4)
N25 Junction 4 South	L3612 North	725 (27)	562 (9)
	N25 Westbound Off-Ramp	239 (9)	203 (5)
	Local Cul-de-Sac Road	23 (0)	2 (0)
	L3612 South	182 (26)	175 (7)
	N25 Westbound On-Ramp	443 (9)	238 (1)

13.4 Future Baseline Conditions

The roads and transport objectives and policies of Cork County Council are set out in their Cork County Development Plan 2022 and Ballincollig Carrigaline Municipal District Local Area Plan August 2017.

The Cork City and County Councils’ strategic road infrastructure objectives include the upgrading of Dunkettle Interchange, in association with TII, at the intersection of the N40/M8/N8/N25 National Roads. The Dunkettle Interchange Upgrade map is shown in Figure 13-7. Planning permission for the Dunkettle Interchange Upgrade has been granted by An Bord Pleanála and construction is ongoing since Q4 2020.

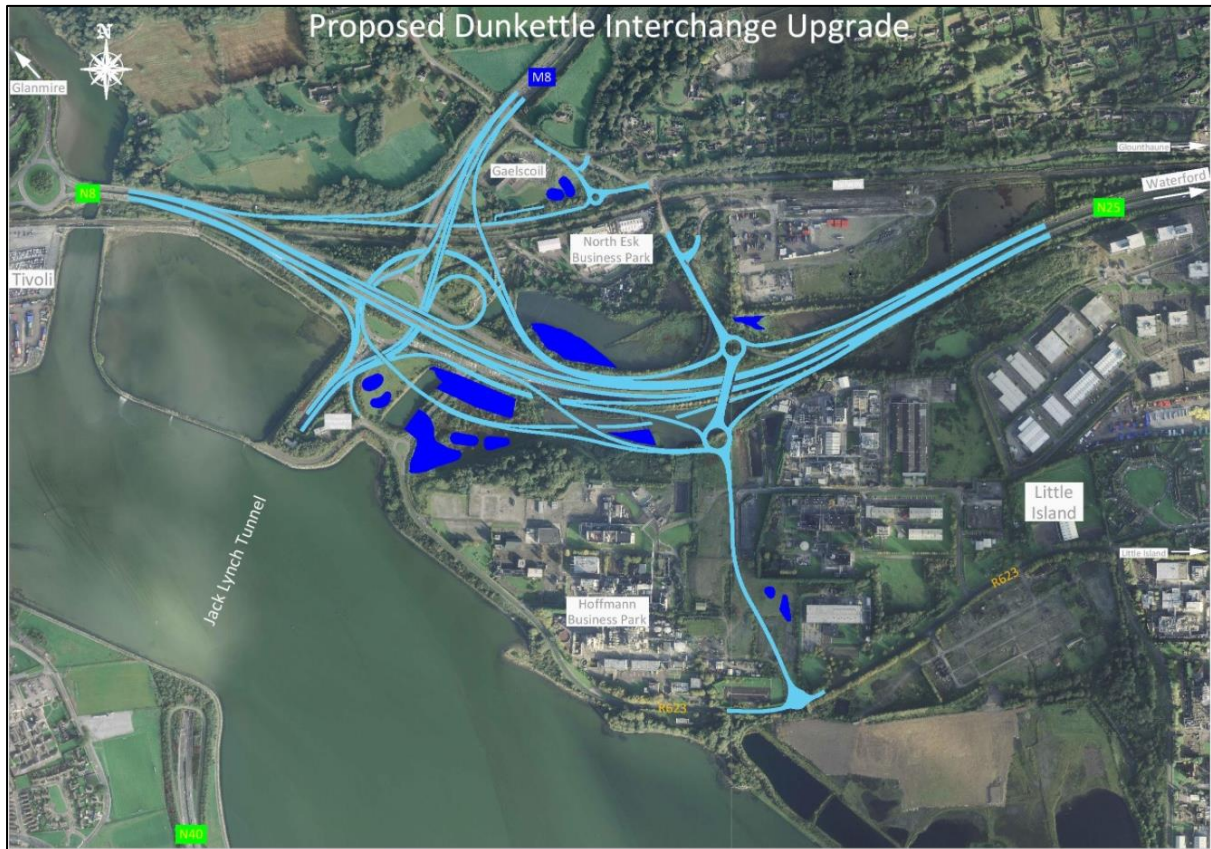


Figure 13-7 M8/N40/N25 Dunkettle Interchange Scheme Map

13.4.1 Cork Metropolitan Area Transport Strategy (CMATS)

The Cork Metropolitan Area Transport Strategy (CMATS) has been developed by the National Transport Authority (NTA) in collaboration with TII, Cork City Council and Cork County Council. CMATS represents a coordinated land use and transport strategy for the Cork Metropolitan Area to cover the period up to 2040.

The CMATS Public Transport Network Map, CMATS Cycle Network Map and CMATS BusConnects Route Map are shown in Figures 13-8, 13-9 and 13-10, respectively, and include Carrigtwohill.

Cork County Council's Dunkettle to Midleton Inter-Urban Strategic Cycleway, incorporating a shared pedestrian and cycle route, is identified as a key part of the inter-urban network.

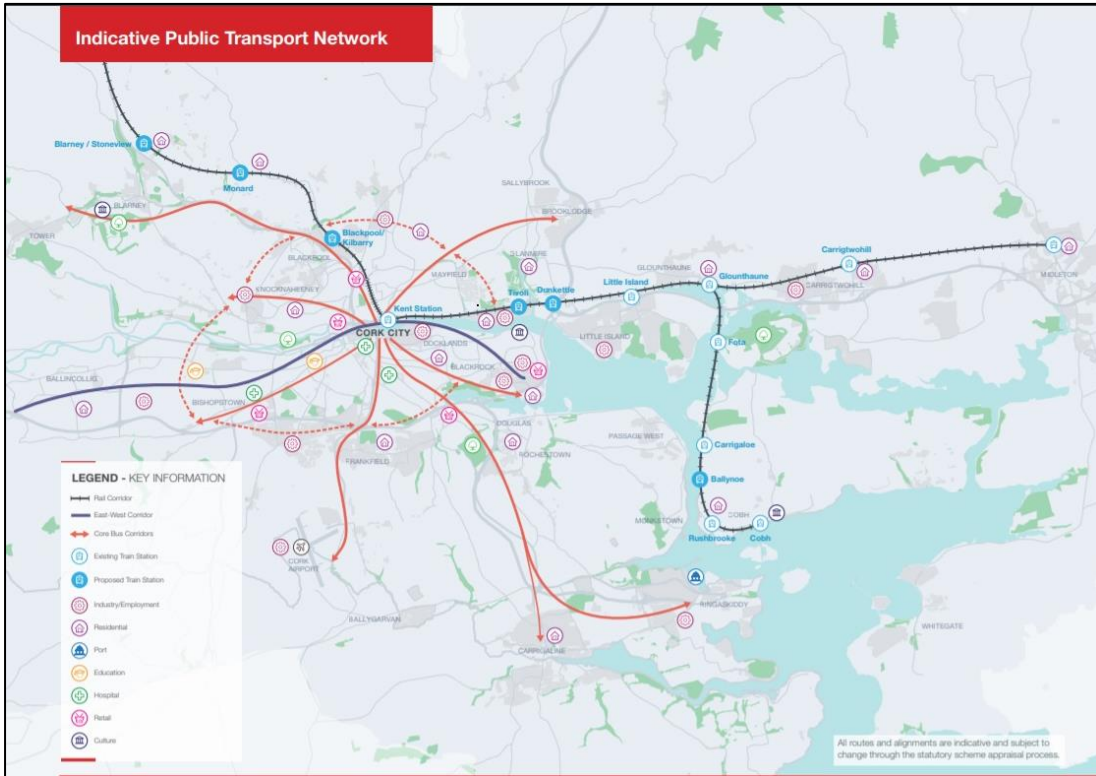


Figure 13-8 CMATS Public Transport Network Map

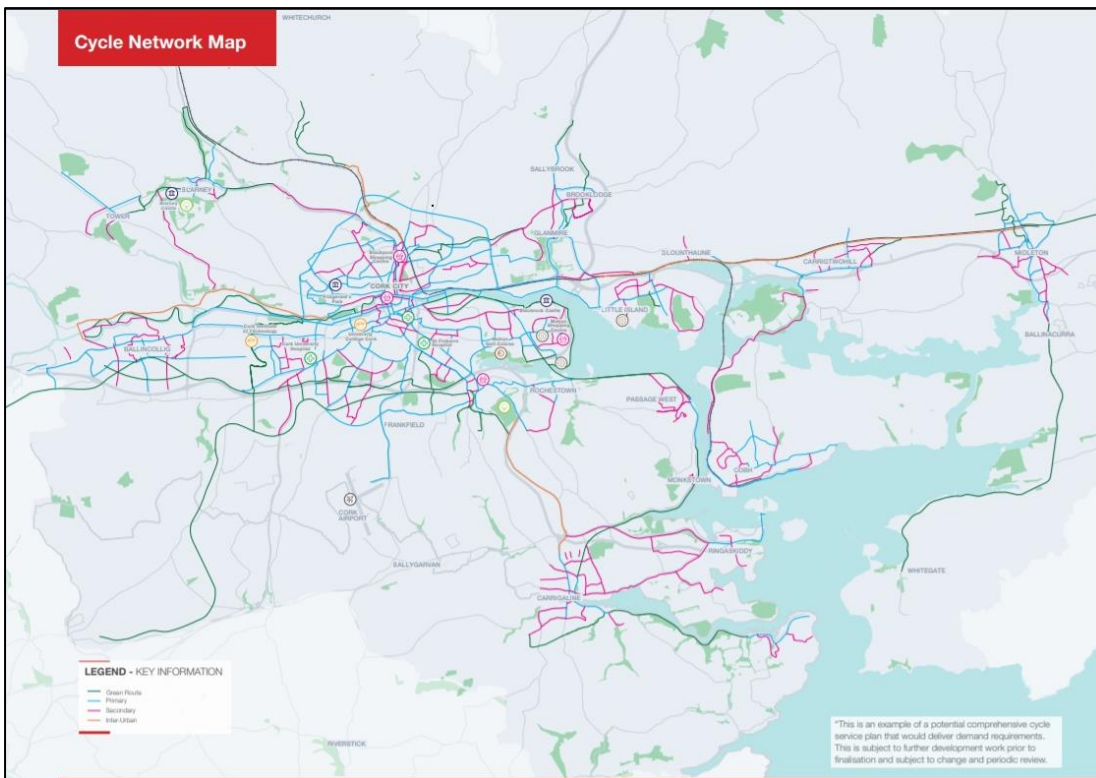


Figure 13-9 CMATS Cycle Network Map

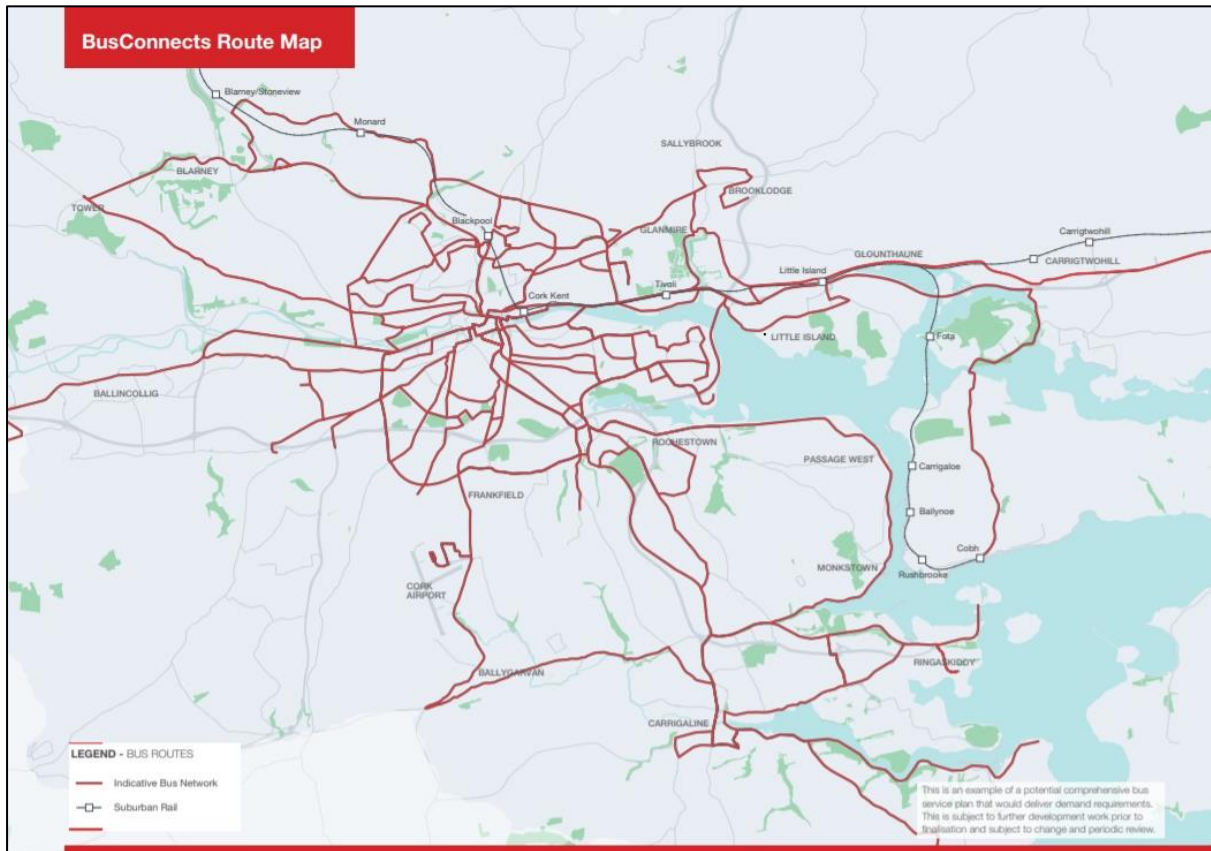


Figure 13-10 CMATS BusConnects Route Map

13.4.2 Relocated Schools Campus (19/5707)

The Department of Education proposed permitted relocated schools campus (Cork County Council planning file reference number: 19/5707) is located on the south side of the recently constructed Castl lake Link Road, adjacent to the subject proposed development site. The proposed relocated schools include the Scoil Chliodha and Scoil Mhuire Noafa primary schools and Carrigtwohill Community College secondary school. The existing Scoil Chliodha and Scoil Mhuire Noafa are located on the south side of Main Street; and the existing Carrigtwohill Community College is located on the north side of the L3004, west of Carrigtwohill.

The permitted relocated schools campus includes capacity for expected future pupil demand generated by the residential development of the subject lands (reference: 19/5707 Traffic and Transport Assessment February 2020).

13.4.3 Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1

Cork County Council has obtained Part 8 planning approval for their proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1, which is part of the Council’s Dunkettle to Midleton Inter-Urban Strategic Cycleway, incorporating a shared pedestrian and cycle route. A layout plan map extract for the proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1 is shown on Figure 13-11.



Figure 13-11 Proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1

The proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1 extends through the subject site via an existing underpass of the Cork-Midleton Rail Line, and links with the recently constructed Castllake Link Road and with Carrigtwohill Train Station, as shown on the layout plan extract provided in Figure 13-12.

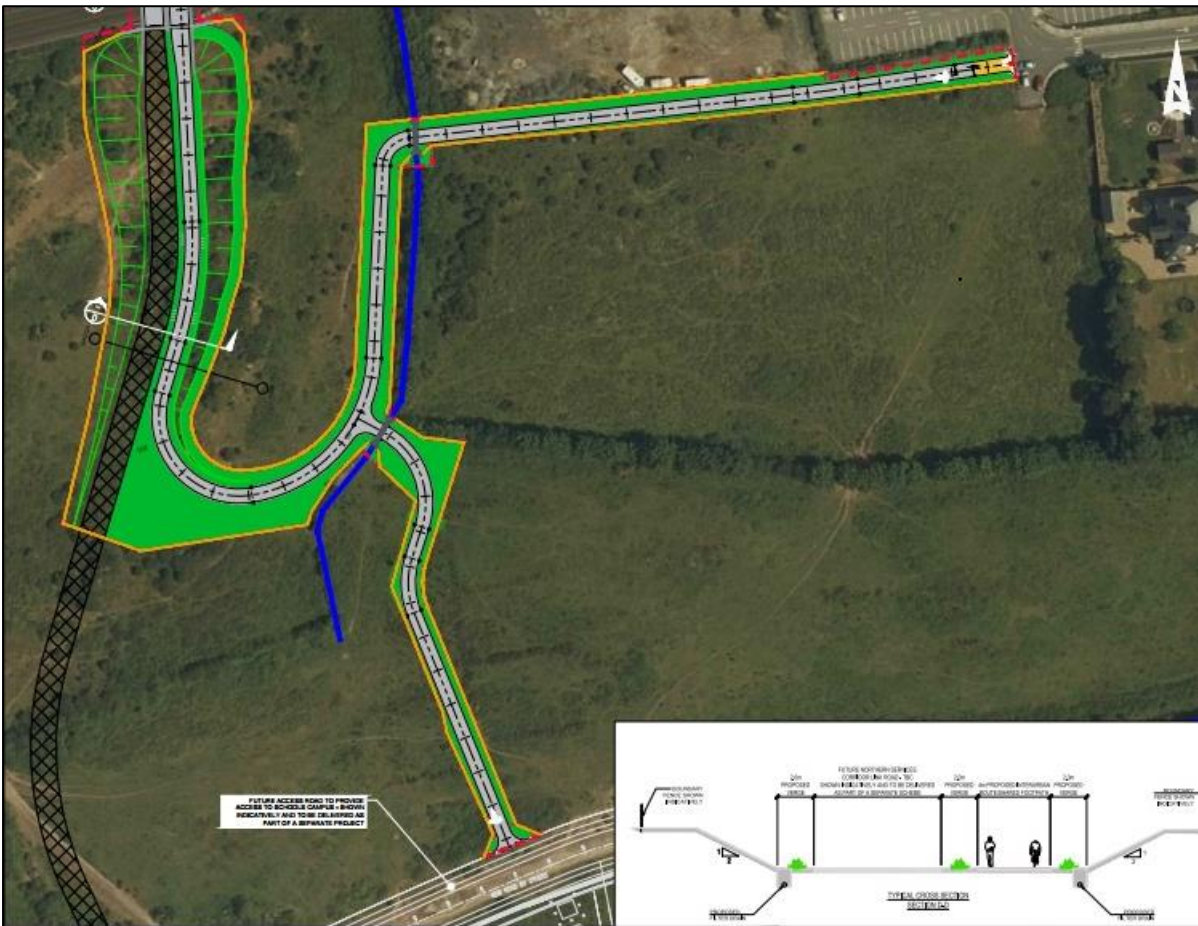


Figure 13-12 Proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1 at Subject Site

13.4.4 Carrigtwohill URDF Initiative – Public Realm Infrastructure Bundle

Cork County Council has submitted a Part 8 planning proposal for their proposed Carrigtwohill Urban Regeneration and Development Fund (URDF) Initiative – Public Realm Infrastructure Bundle. A site location map extract for the proposed public realm infrastructure is shown on Figure 13-13.

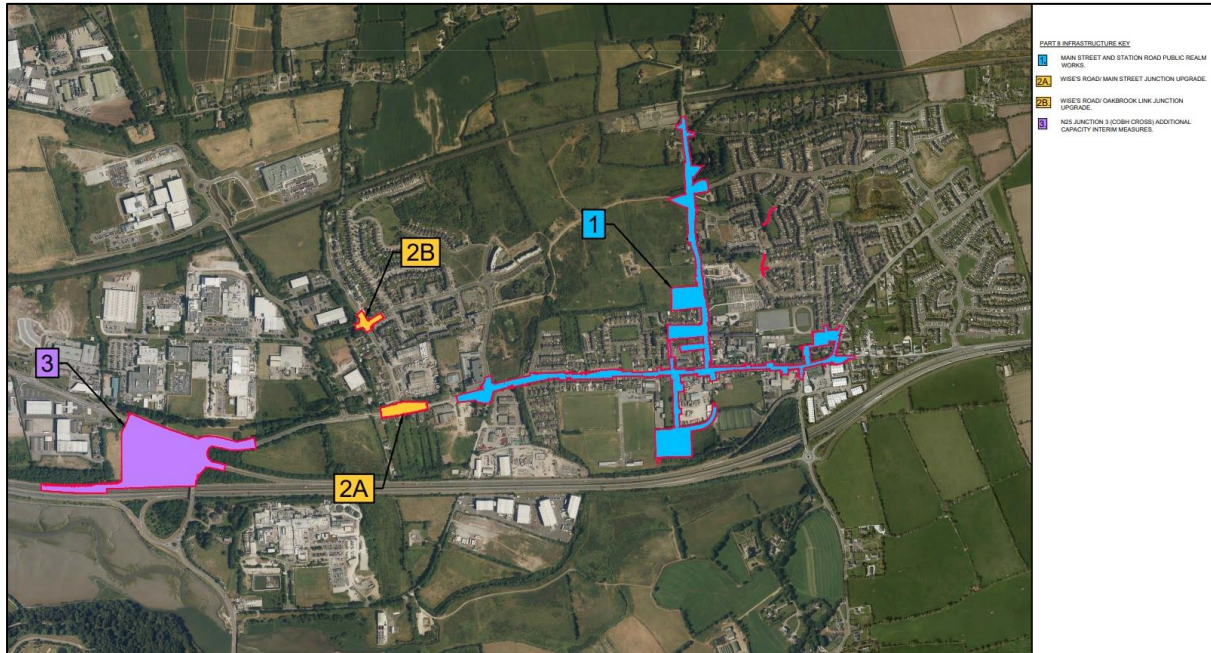


Figure 13-13 Carrigtwohill URDF Public Realm Infrastructure Location Map

The proposed Main Street and Station Road Carrigtwohill URDF Public Realm Infrastructure works include footway widening, road re-alignment, resurfacing, signalisation, traffic calming measures, street lighting, demolition of buildings at the junction of Main Street and Station Road along with other small-scale demolition works, and the provision of new public spaces. Off-carriageway cycle lanes are proposed on Station Road. The proposed Main Street and Station Road Carrigtwohill URDF Public Realm Infrastructure works are shown on Figure 13-14.

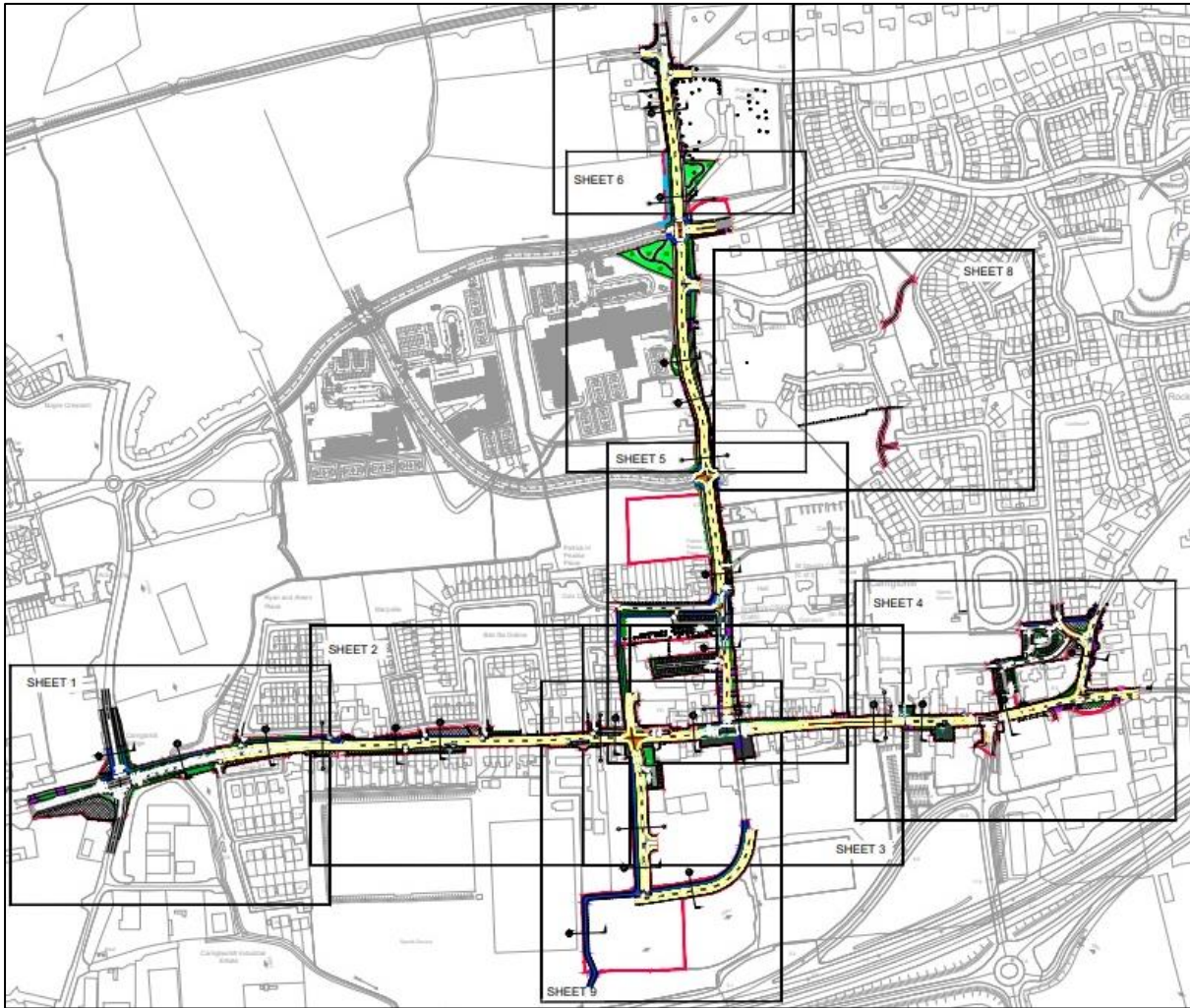


Figure 13-14 Proposed Main Street and Station Road Carrigtwohill URDF Public Realm Infrastructure Works

The proposed Wises Road Carrigtwohill URDF Public Realm Infrastructure works include the upgrade of the Wises Road/L3678 junction and Wises Road/Oakbrook Link Road/IDA Access Road junction, including the provision of traffic signals, road realignment, footway widening and controlled pedestrian crossing facilities. The proposed Wises Road Carrigtwohill URDF Public Realm Infrastructure works are shown on Figure 13-15.

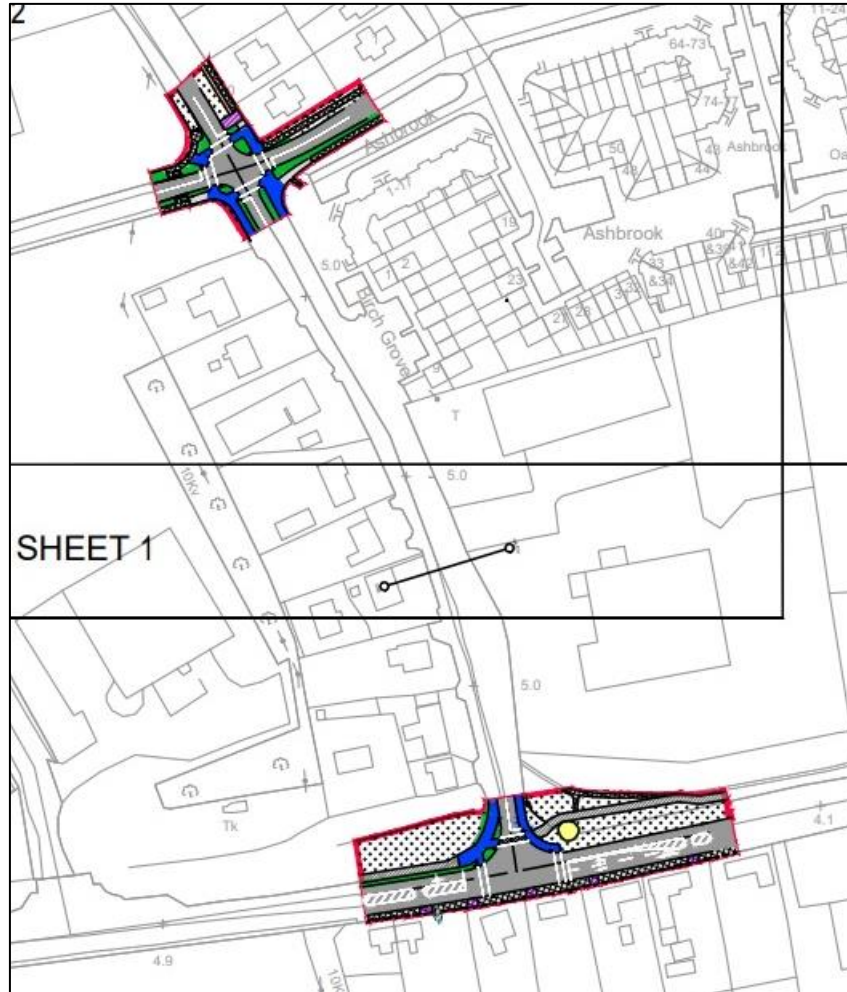


Figure 13-15 Proposed Wises Road Carrigtwohill URDF Public Realm Infrastructure Works

The proposed N25 Junction 3 (Cobh Cross) Northern Roundabout Carrigtwohill URDF Public Realm Infrastructure works include an increase in the size of the roundabout, pedestrian crossing facilities and realignment of roundabout road arms, to provide additional traffic capacity. The proposed N25 Junction 3 Northern Roundabout URDF Public Realm Infrastructure works are shown on Figure 13-16.



Figure 13-16 Proposed N25 Junction 3 Northern Roundabout Carrigtwohill URDF Public Realm Infrastructure Works

13.4.5 Cork County Council 2025 Do Minimum Scenario Infrastructure

Cork County Council's HIIT URDF Transport Assessment and Modelling Report 2025 Do Minimum Scenario Infrastructure includes the infrastructure associated with the permitted proposed relocated schools new campus at Castl lake, as follows:

- New Link Road from Castl lake Roundabout to Station Road (now constructed);
- New Second Link Road from New Castl lake Link Road to Station Road;
- Signalisation of Station Road/An Guagán/New Castl lake Link Road junction;
- Signalisation of Station Road (Church Lane)/Main Street junction, within existing road footprint, including a dedicated right-turn lane on Main Street; and
- Signalisation of Castl lake Access Road/Main Street junction, with pedestrian and cyclist facilities.

13.4.6 Cork County Council 2025 Do Something Scenario Infrastructure

Cork County Council's HIIT URDF Transport Assessment and Modelling Report 2025 Do Something Scenario Infrastructure includes the 2025 Do Minimum infrastructure associated with the permitted proposed relocated schools new campus at Castl lake, plus the following:

- Further upgrade of signalised Station Road (Church Lane)/Main Street junction, to include increased width on Station Road (Church Lane), outside the existing road footprint;
- The upgrading and realignment of Station Road, including enhanced pedestrian and cyclist facilities at Barry's Bridge, and the signalisation of the Station Road/Ashbrook junction and Station Road/Leamlara Road Junction;
- Signalisation of Wisers Road/Main Street junction;
- Signalisation of L3612/Main Street junction; and
- Upgrade of N25 Junction 3 (Cobh Cross) Northern Roundabout, to include an increased inscribed circle diameter and associated realignment.

13.4.7 Cork County Council Predicted Future Traffic Volumes (2025)

Future traffic volumes have been established on the basis of future traffic data provided by Cork County Council from their Housing Infrastructure Implementation Team’s (HIIT) Carrigtwohill Strategic Transport Assessment Report and Micro Simulation Modelling Report to consider the optimum approach for development in Carrigtwohill. Cork County Council’s HIIT assessment includes development within the Carrigtwohill Urban Expansion Area (UEA) and elsewhere within Carrigtwohill, including the subject site lands, and associated proposed new infrastructure, including as part of the Carrigtwohill Urban Regeneration Development Fund (URDF) Initiative.

In their submitted Opinion to An Bord Pleanála as part of pre planning consultation for the subject proposed development (ABP-311855-21), Cork County Council’s Planning and Development Traffic and Transportation Section identified HIIT’s Carrigtwohill Strategic Transport Assessment and Micro Simulation Modelling as the “best” basis “to confirm the traffic/transport impact of” the subject proposed development. During pre-planning consultations with MWP, Cork County Council’s Planning and Development Traffic and Transportation Section identified the Phase 1A 2025 Do Minimum and Do Something scenarios as the appropriate scenarios to include the order of proposed new residential units, similar to the subject proposed development. Phase 1A includes up to 605 proposed new residential units, including 250 Carrigtwohill UEA units and 355 other units, in addition to permitted expected other developments.

The Cork County Council predicted 2025 Do Minimum and 2025 Do Something morning and evening peak hour junction traffic turning volumes on the local road network, are provided in **Appendix 13.2** and **Appendix 13.3**, respectively. The equivalent link traffic volumes are provided in Table 13-3 and Table 13-4, respectively, together with the predicted changes on the 2019 pre Covid-19 volumes.

Table 13-3 Cork County Council Predicted 2025 Do Minimum Traffic Volumes

Junction	Road Link	Cork County Council Predicted 2025 Do Minimum Peak Hour Vehicles		Change on 2019 Pre Covid-19 Peak Hour Vehicles	
		AM	PM	AM	PM
N25 Junction 3 Northern Roundabout	L3004	1,706	1,069	+480	+214
	L3678	1,956	1,673	+578	+589
	N25 Eastbound On-Ramp	432	459	0	+26
	R624	1,952	2,166	+357	+655
Castlelake Access/L3678 Main Street/Industrial Estate Access	N25 Eastbound Off-Ramp	380	687	-248	+163
	Castlelake Access	577	351	+375	+26
	Main Street East	955	1,189	+111	+301
	Industrial Estate	63	144	+12	+6
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	Main Street West	891	1,190	+174	+345
	Station Road (Church Lane)	517	451	+143	+63
	Main Street East	1,230	1,285	+587	+481
L3680 Main Street/L3612	Main Street West	891	1,132	+34	+188
	Main Street East	1,120	1,290	+362	+436
	L3612	806	580	+157	-32
N25 Junction 4 North	Main Street West	1,404	1,366	+687	+550
	L3612 North	808	585	+159	-27
	East Link Business Park	221	129	-21	-35

	L3612 South	716	509	-13	-48
	N25 Eastbound Off-Ramp	291	133	+32	-87
N25 Junction 4 South	L3612 North	799	518	+74	-44
	N25 Westbound Off-Ramp	404	241	+165	+38
	L3612 South	243	189	+61	+14
	N25 Westbound On-Ramp	318	180	-125	-58

Table 13-4 Cork County Council Predicted 2025 Do Something Traffic Volumes

Junction	Road Link	Cork County Council Predicted 2025 Do Something Peak Hour Vehicles		Change on 2019 Pre Covid-19 Peak Hour Vehicles	
		AM	PM	AM	PM
N25 Junction 3 Northern Roundabout	L3004	1,463	707	+237	-148
	L3678	1,806	1,423	+428	+339
	N25 Eastbound On-Ramp	443	222	+11	-211
	R624	1,848	1,838	+253	+327
	N25 Eastbound Off-Ramp	500	1,272	-128	+748
Castlelake Access/L3678 Main Street/Industrial Estate Access	Castlelake Access	362	450	+160	+125
	Main Street East	611	582	-233	-306
	Industrial Estate	55	139	+4	+1
	Main Street West	685	909	-32	+64
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	Station Road (Church Lane)	680	507	+306	+119
	Main Street East	1,075	1,045	+432	+241
	Main Street West	565	680	-292	-264
L3680 Main Street/L3612	Main Street East	1,098	1,201	+340	+347
	L3612	889	790	+240	+178
	Main Street West	1,229	1,161	+512	+345
N25 Junction 4 North	L3612 North	886	791	+237	+179
	East Link Business Park	293	164	+51	0
	L3612 South	953	758	+224	+201
	N25 Eastbound Off-Ramp	220	175	-39	-45
N25 Junction 4 South	L3612 North	949	758	+224	+196
	N25 Westbound Off-Ramp	407	245	+168	+42
	L3612 South	225	234	+43	+59
	N25 Westbound On-Ramp	471	369	+28	+131

The Cork County Council predicted 2025 Do Minimum morning and evening peak hour junction traffic volumes on the local road network are provided in Table 13-5, together with the predicted changes on the 2019 pre Covid-19 volumes. The 2025 Do Minimum traffic volumes are 22% to 37% higher at the N25 Junction 3 Northern Roundabout, 4% to 13% higher at the N25 Junction 4, and 31% to 57% higher at the Main Street junctions, compared to 2019.

Table 13-5 Cork County Council Predicted 2025 Do Minimum Junction Traffic Volumes

Junction	Cork County Council Predicted 2025 Do Minimum Peak Hour Vehicles		Change on 2019 Pre Covid-19 Peak Hour Vehicles (%)	
	AM	PM	AM	PM
N25 Junction 3 Northern Roundabout	3,213	3,027	+588 (22%)	+823 (37%)
Castlelake Access/L3678 Main Street/Industrial Estate Access	1,243	1,437	+336 (37%)	+339 (31%)
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	1,319	1,434	+382 (41%)	+366 (34%)
L3680 Main Street/L3612	1,665	1,618	+603 (57%)	+477 (42%)
N25 Junction 4 North	1,018	678	+78 (8%)	-99 (13%)
N25 Junction 4 South	882	564	+76 (9%)	-26 (4%)

The Cork County Council predicted 2025 Do Something morning and evening peak hour junction traffic volumes on the local road network are provided in Table 13-6, together with the predicted changes on the 2019 pre Covid-19 volumes. The predicted 2025 Do Something increases at the N25 Junction 3 Northern Roundabout and at the Main Street junctions are not as high as the 2025 Do Minimum scenario. The predicted increases at the N25 Junction 4 are higher than the 2025 Do Minimum scenario, at 21% to 36%.

Table 13-6 Cork County Council Predicted 2025 Do Something Junction Traffic Volumes

Junction	Cork County Council Predicted 2025 Do Something Peak Hour Vehicles		Change on 2019 Pre Covid-19 Peak Hour Vehicles (%)	
	AM	PM	AM	PM
N25 Junction 3 Northern Roundabout	3,030	2,731	+400 (15%)	+526 (24%)
Castlelake Access/L3678 Main Street/Industrial Estate Access	857	1,040	-50 (6%)	-58 (5%)
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	1,160	1,116	+223 (24%)	+48 (5%)
L3680 Main Street/L3612	1,608	1,576	+546 (51%)	+435 (38%)
N25 Junction 4 North	1,176	944	+236 (25%)	+167 (22%)
N25 Junction 4 South	1,026	803	+220 (21%)	+213 (36%)

The ratios (%) of the Cork County Council predicted 2025 Do Something/2025 Do Minimum peak hour junction traffic volumes are provided in Table 7. The ratios confirm the foregoing that the 2025 Do Something traffic volumes are lower than the 2025 Do Minimum traffic volumes at the N25 Junction 3 Northern Roundabout and the Main Street junctions, and higher at the N25 Junction 4. The predicted traffic volumes at the N25 Junction 4 North and South junctions are significantly lower than predicted at the N25 Junction 3 Northern Roundabout.

Table 7 Cork County Council Predicted 2025 Do Something Junction Traffic Volumes

Junction	Cork County Council Predicted 2025 Do Something/Do Minimum Peak Hour Junction Vehicles Ratio (%)	
	AM	PM
N25 Junction 3 Northern Roundabout	94%	90%
Castlelake Access/L3678 Main Street/Industrial Estate Access	69%	72%
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	88%	78%
L3680 Main Street/L3612	97%	97%
N25 Junction 4 North	116%	139%
N25 Junction 4 South	116%	142%

The foregoing predicted 2025 Do Something and 2025 Do Minimum morning and evening peak hour traffic volumes, comparisons and ratios confirm that the Cork County Council 2025 Do Something Scenario Infrastructure fully mitigates the 2025 Do Something peak hours traffic scenario.

On the basis of Cork County Council’s predicted 2025 Do Something morning and evening peak hour traffic volumes, the predicted estimated distribution of vehicle trips generated by residential development at the subject lands is provided in Table 13-8.

Table 13-8 Predicted Estimated Distribution of Vehicle Trips Generated by Residential Development at Subject Lands

Direction/Route/Location	Vehicle Trips Distribution	
	Morning Peak Hour	Evening Peak Hour
N25 Junction 3	58%	54%
N25 Junction 4	11%	21%
Carrigtowhill (Local)	26%	22%
North	5%	3%

13.5 Construction Phase Impacts

Subject to planning permission, the proposed development on-site construction is scheduled to commence in Q1 2023 and will be completed on a phased basis. The proposed development construction phasing plan is shown in Figure 13-17.

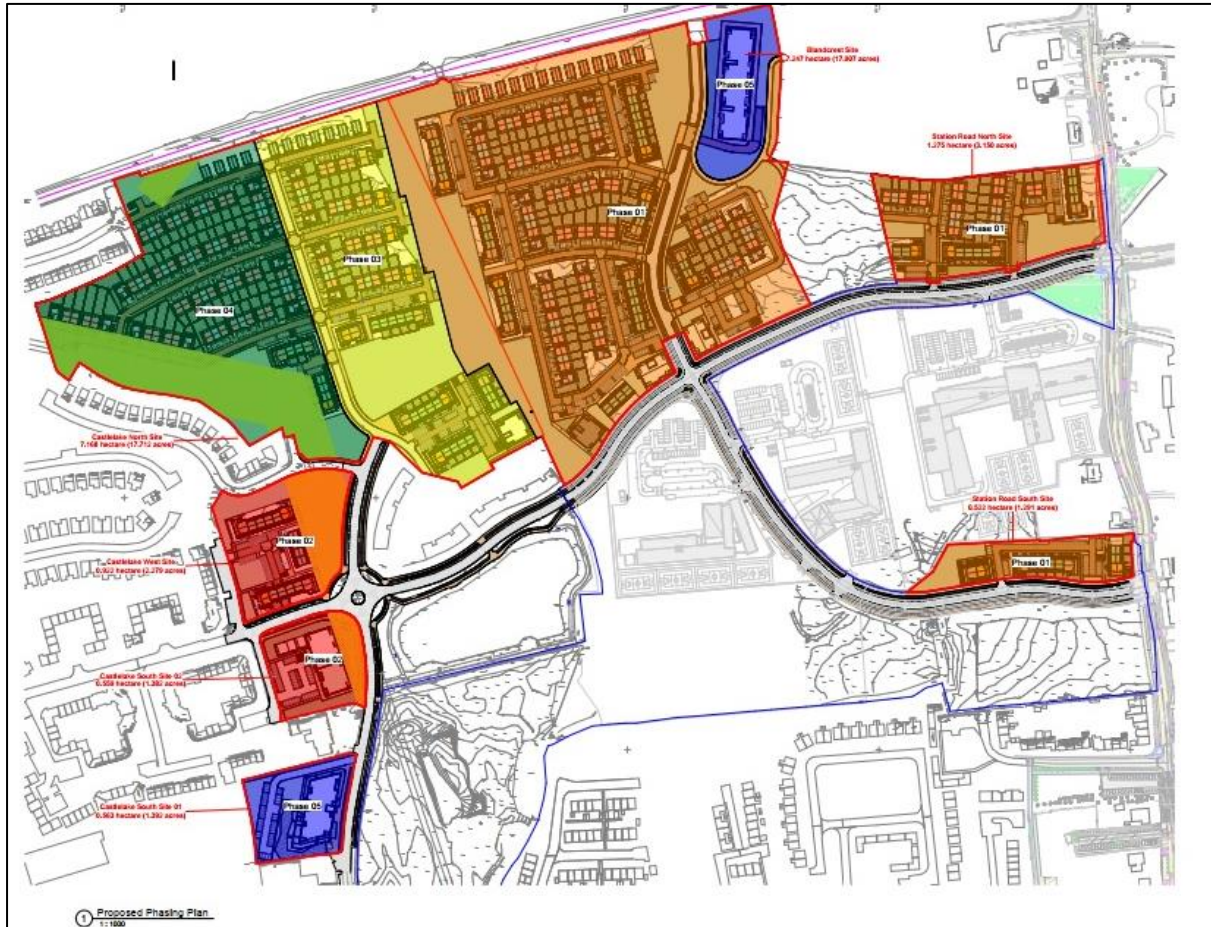


Figure 13-17 Proposed Development Construction Phasing Plan

13.5.1 Construction and Environmental Management Plan

The proposed development construction includes a Construction and Environmental Management Plan (CEMP).

13.5.2 Proposed Construction Traffic Management Plan

13.5.2.1 Construction Vehicles Route

All construction delivery vehicles and construction contractor vehicles will travel to and from the site via the N25 Junction 3 and Castlelake Access Road. This will be a condition of the construction contract, all sub-contracts and all suppliers.

13.5.2.2 Temporary Construction Compound and Parking

A temporary construction site compound is proposed within the site on the north side of the Castlelake Access Road/Castlelake Link Road roundabout. The extent and layout of the construction site compound will be altered as construction progresses.

A temporary construction off-street carpark will be provided within the site on the west side of the Castlelake Access Road, south of the Castlelake Access Road/Castlelake Link Road roundabout.

13.5.2.3 Construction Hours

The proposed construction on-site working hours are from 7.00 a.m. to 7.00 p.m. Monday to Friday, and from 8.00 a.m. to 1.00 p.m. on Saturdays.

13.5.2.4 Construction Staff Numbers

The proposed development construction includes a typical total of 70 on-site construction staff, and a peak on-site total of up to 120 construction staff.

13.5.2.5 Construction Staff Vehicle Occupancy

The construction project contractor will operate a continuous incentive scheme to encourage car pooling and lift sharing by all construction staff, with eligibility for the incentive scheme based on a minimum vehicle occupancy rate of three construction staff per vehicle. It is expected that Covid-19 vaccinated staff will participate in the incentive scheme. The proximity of the site to Carrigtwohill Train Station and the existing train services times will also facilitate construction staff travel, to and from site, by train.

It is envisaged that this will achieve an average construction staff vehicle occupancy rate of 1.8 construction staff per vehicle during the proposed construction.

13.5.2.6 Construction Earthworks Volumes

It is proposed that all earthworks materials excavated on-site during construction will be retained and reused on-site. No excavated earthworks materials are expected to be removed off-site.

13.5.2.7 Community Liaison

The main construction contractor contract manager and project manager will be based on site and will be available to liaise with the community. Contact phone numbers will be displayed on construction site signage. The construction contractor will provide regular updates to the community on the progress on the project, liaise regarding any construction issues, including regarding other projects in the area that may require coordination, and address any issues that might be raised by local residents. The construction contractor will also liaise regularly with Cork County Council.

13.5.2.8 Peak Construction Staff Traffic Volumes

During construction, the majority of construction staff will arrive and depart outside peak traffic hours and local schools' start and finish times. Peak construction staff vehicles would generate a peak total of 67 daily inbound vehicles and 67 daily outbound vehicles.

13.5.2.9 Peak Construction Deliveries Traffic Volumes

Peak construction delivery and heavy vehicle volumes would generate a peak total of 20 daily inbound vehicles and 20 daily outbound vehicles.

13.5.2.10 Peak Construction Total Traffic Volumes

Peak construction would generate a peak total of 87 daily inbound vehicles and 87 daily outbound vehicles, which would occur mostly during off peak traffic periods. Construction traffic volumes generated during the peak traffic hours would not be significant.

13.5.3 Mitigation

All construction parking and compounds will be provided within the site confines. Construction wheel wash facilities will be provided on-site. A specialist road washing and cleaning vehicle will be used regularly each day to maintain public roads, as appropriate. All necessary construction signage and other measures required by Cork County Council will be provided.

An updated Construction Traffic Management Plan will be submitted to Cork County Council, for approval, prior to the commencement of construction.

13.5.4 Construction Impact Significance and Duration

On the basis of the EPA EIS Guidelines, the construction impact of the proposed development will be slight to moderate and short to medium term.

13.5.5 Cumulative Construction Impacts

It is envisaged that any cumulative construction activities traffic impact, occurring during the proposed development construction programme, will be a temporary to medium term slight to moderate impact on the basis of the EPA EIS Guidelines.

13.6 Operational Phase Impacts

13.6.1 Access

Access for the proposed development is proposed via Castl lake Access Road, Castl lake Link Road (recently constructed) and the permitted proposed new second link road from Castl lake Link Road to Station Road (under construction), as shown on the proposed development layout plan shown in Figure 13-18.

The proposed development layout includes provision for Cork County Council's Part 8 planning approved Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1, which is part of the Council's Dunkettle to Midleton Inter-Urban Strategic Cycleway. The proposed Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1 links with the recently constructed Castl lake Link Road and with Carrigtwohill Train Station.

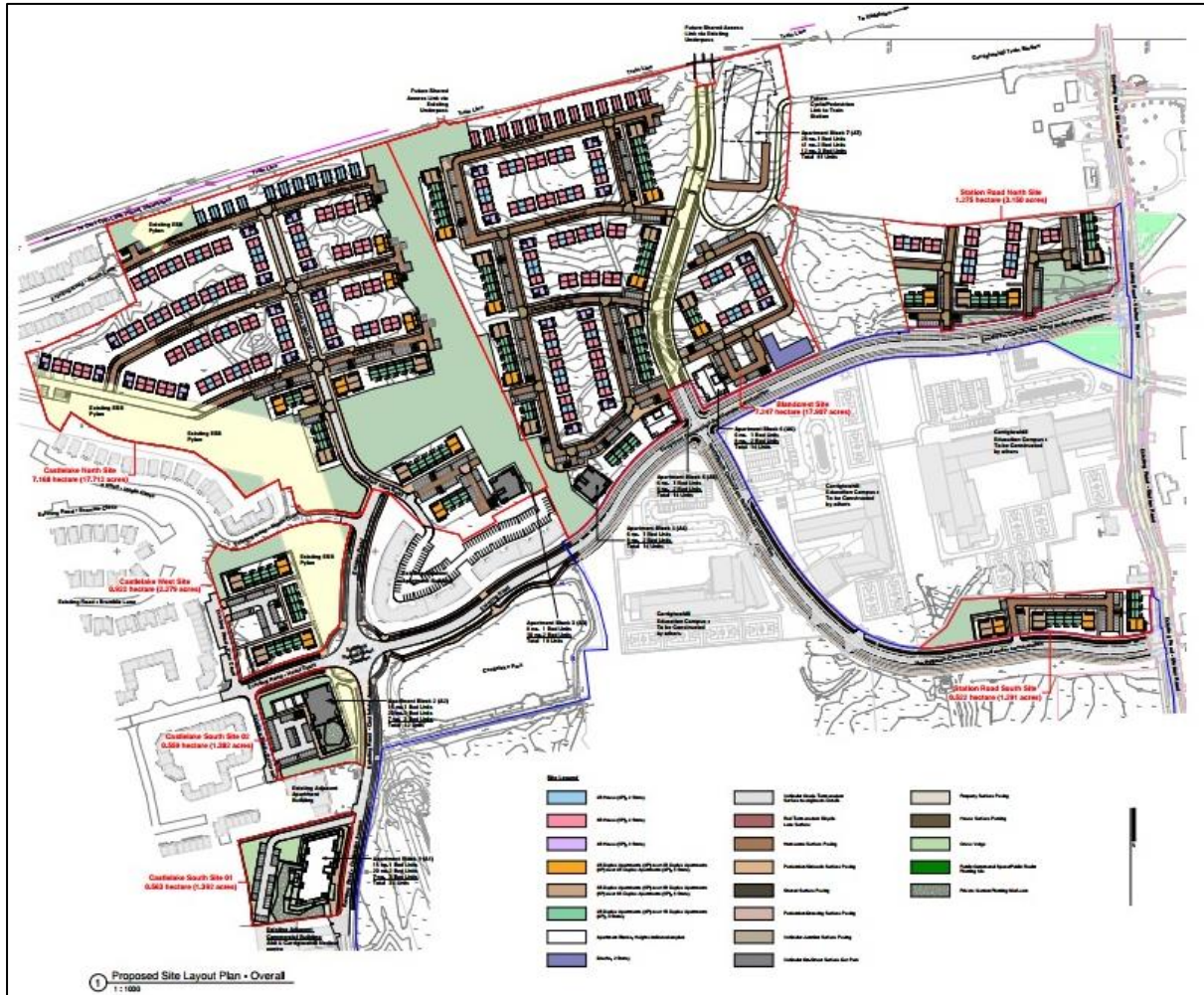


Figure 13-18 Proposed Development Layout Plan

13.6.2 Public Transport, Walking and Cycling Connectivity and Trips

The CIHT Guidelines For Providing Journeys On Foot suggested acceptable walking distances, for pedestrians without a mobility impairment for some common facilities, including public transport (commuting), schools, employment (commuting) and town centres are provided in Table 13-9.

Table 13-9 CIHT Guidelines for Providing Journeys On Foot
Suggested Acceptable Walking Distances (metres)

	Town Centre	Commuting/School	Elsewhere
Acceptable	400	1,000	800
Preferred Maximum	800	2,000	1,200

13.6.2.1 Carrigtwohill Train Station

On the basis of the CIHT Guidelines, a significant proportion of the proposed residential units are located within an acceptable walking distance of Carrigtwohill Train Station, via the recently constructed Castlelake Link Road

and Station Road. All of the proposed residential units are located within the preferred maximum walking distance, identified by CIHT, of Carrigtwohill Train Station.

The provision of Cork County Council's Part 8 planning approved Carrigtwohill to Midleton Inter-Urban Cycleway Phase 1 and its link with Carrigtwohill Train Station will increase the proportion of the proposed residential units within the CIHT identified acceptable walking distance of the Train Station.

13.6.2.2 Bus Éireann Main Street Bus Stops

Similarly, on the basis of the CIHT Guidelines, a significant proportion of the proposed residential units are located within an acceptable walking distance of the Bus Éireann bus stops located on Main Street/L3678. All of the proposed residential units are located within the preferred maximum walking distance of the Bus Éireann bus stops, identified by CIHT.

13.6.2.3 Relocated Schools Campus

On the basis of the CIHT Guidelines, all of the proposed residential units are located within an acceptable walking distance of the Department of Education proposed permitted relocated schools campus located on the south side of the recently constructed Castlelake Link Road.

13.6.2.4 IDA Ireland Business and Technology Park

On the basis of the CIHT Guidelines, a significant proportion of the proposed residential units are located within an acceptable commuting walking distance of the IDA Business and Technology Park. All of the proposed residential units are located within the preferred maximum walking distance, identified by CIHT, of the IDA Ireland Park.

13.6.2.5 Industrial Estates

On the basis of the CIHT Guidelines, a significant proportion of the proposed residential units are located within an acceptable commuting walking distance of the Carrigtwohill Industrial Estate on the south side of the L3678 Main Street/Castlelake Access Road junction. All of the proposed residential units are located within the preferred maximum walking distance, identified by CIHT, of the Industrial Estate.

On the basis of the CIHT Guidelines, all of the proposed residential units are located within the preferred maximum walking distance, identified by CIHT, of the East Link Industrial Estate on the south side of the Main Street/L3612 junction.

13.6.2.6 Town Centre

On the basis of the CIHT Guidelines, a proportion of the proposed residential units are located within the 800 metres preferred maximum walking distance of Carrigtwohill town centre.

Carrigtwohill town centre is located within convenient cycling distance of the proposed residential development.

13.6.2.7 Dunkettle to Midleton Inter-Urban Strategic Cycleway

Cork County Council's completed, permitted and proposed phases of their Dunkettle to Midleton Inter-Urban Strategic Cycleway will further facilitate walking and cycling trips generated by the proposed residential development.

13.6.2.8 Proposed Creche

On the basis of the CIHT Guidelines, all of the proposed residential units are located within an acceptable walking distance of the proposed development creche on the north side of Castlake Link Road.

13.6.2.9 Cycle Parking

The proposed residential development includes bicycle parking spaces.

13.6.3 Sustainable Transport Trips

On the basis of the foregoing, the proposed residential development will generate a high proportion of non-car, sustainable transport trips, particularly in respect of school, creche and work commuting type trips that occur during peak traffic hours.

13.6.4 Vehicle Trips

The CIHT TRICS morning and evening peak hour vehicle trip rates for residential developments located within acceptable walking distances of schools, town centres and public transport are provided in Table 13-10.

Table 13-10 CIHT TRICS Residential Vehicle Trip Rates

Residential Use	Peak Hour	Vehicle Trips/Unit	
		Arrivals	Departures
Houses	Morning	0.156	0.404
	Evening	0.372	0.238
Apartments/Duplexes	Morning	0.112	0.169
	Evening	0.235	0.126

The proposed residential development predicted morning and evening peak hour vehicle trips are provided in Table 13-11.

Table 11 Proposed Residential Development Predicted Vehicle Trips

Proposed Residential Development	Peak Hour	Vehicle Trips		
		Arrivals	Departures	Total
Houses (224 units)	Morning	35	91	126
	Evening	83	53	136
Apartments/Duplexes (492 units)	Morning	55	83	138
	Evening	116	62	178
Total (716 units)	Morning	90	174	264
	Evening	199	115	314

The proposed development would generate a predicted two-way total of 264 vehicle trips during the morning peak hour and 314 vehicle trips during the evening peak hour.

13.6.5 Traffic Volumes

It is envisaged that the distribution of vehicle trips generated by the proposed development would be similar to the predicted distribution of vehicle trips generated by residential development at the subject lands, provided in Table 8, on the basis of Cork County Council’s predicted 2025 Do Something morning and evening peak hour traffic volumes.

The proposed development predicted morning and evening peak hour junction traffic volumes at local network junctions are provided in Table 13-12, together with the total Cork County Council predicted 2025 Do Something morning and evening peak hour junction traffic volumes.

Table 13-12 Proposed Development Predicted Generated Junction Traffic Volumes - Cork County Council Predicted 2025 Do Something Junction Traffic Volumes

Junction	Cork County Council Predicted 2025 Do Something Peak Hour Vehicles		Proposed Development Generated Vehicles (% of Total 2025 Do Something)	
	AM	PM	AM	PM
N25 Junction 3 Northern Roundabout	3,030	2,731	153 (5.1%)	170 (6.2%)
Castlelake Access/L3678 Main Street/Industrial Estate Access	857	1,040	153 (17.9%)	170 (16.3%)
L3606 Station Road (Church Lane)/L3680 & L3678 Main Street	1,160	1,116	98 (8.4%)	135 (12.1%)
N25 Junction 4 North	1,176	944	29 (2.5%)	66 (7.0%)

The proposed development predicted morning and evening peak hour link traffic volumes on local network roads are provided in Table 13-13, together with the total Cork County Council predicted 2025 Do Something morning and evening peak hour link traffic volumes.

**Table 13-13 Proposed Development Predicted Generated Link Traffic Volumes - Cork County Council
Predicted 2025 Do Something Traffic Volumes**

Road Link	Cork County Council Predicted 2025 Do Something Peak Hour Vehicles		Proposed Development Generated Vehicles (% of Total 2025 Do Something)	
	AM	PM	AM	PM
L3678 at N25 Junction 3 Northern Roundabout	1,806	1,423	153 (8.5%)	170 (11.9%)
Castlelake Access Road	362	450	153 (42.3%)	170 (37.8%)
Station Road (Church Lane)	680	507	98 (14.4%)	135 (26.6%)
L3612 North	886	791	29 (3.3%)	66 (8.3%)

The proposed development predicted generated junction traffic volumes would be up to 17.9%, 12.1% and 6.2% at the Castlelake Access Road/Main Street, Station Road/Main Street and N25 Junction 3 Northern Roundabout junctions.

13.6.6 Impact Statement

As detailed in the foregoing Section 1.4.8, Cork County Council’s 2025 Do Something Scenario Infrastructure fully mitigates the 2025 Do Something peak hours traffic scenario. This includes the subject proposed development quantum of residential development.

13.6.7 Mitigation

No additional mitigation would be required to facilitate the subject proposed development for Cork County Council’s 2025 Do Something Scenario Infrastructure.

13.6.7.1 Operational Mobility Management Plan (MMP)

Operational MMPs are warranted for employment and commercial traffic generating developments. There will be no operational employment at the proposed 716 residential units. The expected employment at the proposed creche will be relatively low and less than Development Plan threshold for a formal operational MMP.

The proposed residential development will generate a high proportion of non-car, sustainable transport trips, particularly in respect of school, creche and work commuting type trips that occur during peak traffic hours.

Accordingly, no further specific operational mobility measures and incentives for the 716 residential units are warranted, in addition to the existing and proposed transport facilities and services included in Cork County Council’s 2025 Do Something Scenario Infrastructure.

13.6.8 Operational Impact Significance and Duration

On the basis of the EPA EIS Guidelines, the operational impact of the proposed development will be not significant to slight and long-term.

13.6.9 Cumulative Operational Impacts

As detailed in Section 1.4.8, Cork County Council's 2025 Do Something Scenario includes other expected developments. There would be no additional significant cumulative impacts with other proposed developments.

14. Interaction of the Foregoing

14.1 Introduction

There is potential for interactions between one aspect of the environment and another which can result in direct or indirect impacts, and which may be positive or negative. Where relevant, interactions between specific environmental aspects and effects and the measures proposed to mitigate them are already addressed within each of the individual assessment topic areas of this EIAR. However, for any development with the potential for significant environmental effects, there is also the potential for interaction between these potential significant effects. The purpose of this chapter is to draw attention to significant interaction and interdependencies between one topic and another.

14.2 Identification of Environmental Impacts

While all environmental aspects can be inter-related to some extent, the following outlines the key interactions identified between each of the various environmental subject areas considered in this EIAR for both the construction and operational phases of the proposed development.

14.2.1 Population and Human Health

There is potential for further impacts on population and human health in relation to air quality, material assets, landscape and visual, noise and vibration and traffic. The impacts associated with each individual aspect are addressed in the preceding chapters.

14.2.2 Biodiversity

Changes associated with biodiversity such as the removal of habitats, planting of new trees and other vegetation and landscaping works has the potential to cause interactions with other aspects of the environment. There is potential for interaction between biodiversity and land and soils, water, air quality and climate, landscape and visual, noise and vibration and traffic and transportation.

14.2.3 Land and Soils

The excavation and stockpiling and movement of soil for the proposed development has the potential to impact on air quality from increased dust emissions associated. There is also potential for related impacts on surface and ground water, cultural heritage/archaeology, biodiversity, landscape, noise and vibration and traffic and transportation. The associated impacts for each aspect are addressed individually in the preceding chapters.

14.2.4 Water

There is potential for the impacts associated with surface water and ground water to interact with material assets, land and soils, landscape, traffic and biodiversity. The potential impacts associated with surface water and ground water due to the construction and operational phases of the proposed development are addressed individually and in detail within the preceding individual chapters.

14.2.5 Air and Climate

There is potential for emissions to air during the construction phases in the forms of temporary fugitive dust and vehicle movements and emissions associated with greater population density associated with the operation phase. This has the potential to impact population and human health, biodiversity, land and soils and traffic and transportation. The potential and predicted effects of emissions associated with the construction and operational phases of the proposed development are addressed in Chapter 8 Air Quality and Climate.

14.2.6 Noise and Vibration

Noise impacts will occur during the construction phase of the project as a result of increased levels of site associated traffic, excavations and during the proposed works, and during operation due to increased population and traffic during operation. Noise and Vibration has the potential to impact on population and human health, biodiversity, land and soils and traffic and transportation which are addressed individually and in detail within the preceding chapters.

14.2.7 Material Assets

The use of services during construction and the increase in population and associated increased load on services during operation has the potential to impact on material assets. There is potential for interaction between material assets and population and human health and water from the proposed development.

14.2.8 Traffic and Transportation

Traffic associated with the proposed construction works has the potential to have an impact on air quality and climate, water, noise and vibration, population and human health, land and soils and biodiversity. The impacts associated with each aspect are addressed individually within the preceding chapters.

14.2.9 Landscape and Visual

Landscape and visual impacts have the potential to interact with other aspects of the environment due to the temporary and permanent physical changes which will occur during construction and operation. There is potential for interactions with population and human health, biodiversity, land and soils and water.

14.2.10 Cultural Heritage and Archaeology

The excavation of soils for the purposes of archaeology and cultural heritage has the potential to impact on land and soils during construction.

14.3 Summary of Interactions

A matrix has been generated to summarise the relevant interactions and interdependencies between specific environmental aspects and a significance rating has been given. The matrix is presented in **Table 14.1**. It contains each of the environmental topics, which were considered as part of this environmental impact assessment, on both axes. These interactions have been identified for both the construction [C] and operation [O] phases of the proposed development. Full details of the significance of the impacts and the relevant interactions of the environmental aspects along with any proposed mitigation are discussed within each of the individual preceding Chapters.

A number of interactions have been identified in the EIAR. These are set out below and have been addressed in the relevant chapter.

Table 14.1 Matrix of Impacts

	Population and Human Health	Biodiversity	Land and Soil	Water	Air Quality and Climate	Material Assets	Cultural Heritage and Archaeology	Landscape and Visual	Noise and Vibration	Traffic and Transportation
Population and Human Health					C/O	C/O		C/O	C	C/O
Biodiversity			C/O	C/O	C			C/O	C	C
Land and Soils		C/O		C	C		C	C	C	C
Water		C/O	C			C/O		C/O		C
Air Quality and Climate	C/O	C	C							C/O
Material Assets	C/O			C/O						
Cultural Heritage and Archaeology			C							
Landscape and Visual	C/O	C/O	C	C/O						
Noise and Vibration	C	C	C							C/O
Traffic and Transportation	C/O	C	C	C	C/O				C/O	

Interaction	
No Interaction	
Construction Phase Impact	C
Operation Phase Impact	O

15. Schedule of Mitigation Measures

15.1 Introduction

This Schedule of Environmental Mitigation summarises and sets out an implementation programme for all environmental mitigation measures recommended in the Environmental Impact Assessment Report (EIAR) for the proposed SHD at Castlelake, Carrigtwohill, County Cork. The full project description is provided in Chapter 2 Description of the Proposed Development.

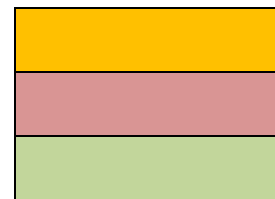
15.2 Format of the Mitigation Schedule

The schedule on the following pages is structured in accordance with the following project phases:

Prior to Commencement of Construction

During Construction Phase

Post Construction/ Operational Phase



The schedule is presented in a Table format which outlines, for each of the project phases:

- i. the environmental aspect or resource for which mitigation is required,
- ii. the required or proposed mitigation measure to undertake/implemented,
- iii. the persons responsible for implementing the recommended mitigation
- iv. the relevant actions, procedures and plans relating to implementation of the mitigation

Table 15-1 Schedule of Environmental Mitigation Measures

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
<p>Prior to Commencement of Construction Works</p>	<p>Biodiversity</p>	<p>An Environmental Manager/Ecological Clerk of Works (ECoW) will be appointed by the Developer or Contractor and will be responsible for overseeing the correct implementation of ecological mitigation measures throughout construction works, as required.</p>	<p>NA</p>
		<p>An ecologist will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present (e.g. Irish hare, pygmy shrew or hedgehog) on site will be reconfirmed prior to commencement of works so as to allow appropriate mitigation measures to be put in place.</p>	
		<p>An Environmental Management Plan has been prepared by the developer. It will be updated prior to construction and will be implemented for the duration of the works.</p>	
		<p>Prior to the commencement of the works, all Method Statements will be reviewed by the ECoW. Following the review, improvements will be made to the method statements as required.</p>	
		<p>Management of Invasive Species</p> <p>The following measures will be taken to avoid the spread of invasive plants plant both within and outside of the site:</p> <ul style="list-style-type: none"> • The infested areas will be demarcated prior to construction commencing (i.e. exclusion zone); • Toolbox talks will be carried out to communicate measures to all personnel involved; and • The ISMP prepared to manage, treat and prevent the spread of invasive species (see Appendix 5.4) will be implemented in full. <p>An invasive species survey shall be undertaken prior to commencement of construction. Should newly established invasive species be identified within the site, an updated ISMP will be prepared.</p>	

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
<p>During Construction</p>	<p>Biodiversity</p>	<p>An ecologist will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present (e.g. Irish hare, pygmy shrew or hedgehog) on site will be reconfirmed prior to commencement of works so as to allow appropriate mitigation measures to be put in place.</p>	<p>Sites of National Importance:</p> <p>Near certain to result in an imperceptible negative effect on the Natura 2000 network.</p>
		<p>In the event that an issue arises, the NPWS will be updated, consulted with and the relevant guidelines will be implemented as appropriate (e.g. 'NRA guidelines for the treatment of badgers prior to the construction of national road schemes'; NRA, 2005).</p>	
		<p>Construction operations will take place during daylight hours to minimise disturbances to faunal species at night.</p>	
		<p>An Environmental Management Plan has been prepared by the developer. It will be updated prior to construction and will be implemented for the duration of the works. The following sets out the features of the EMP.</p>	
		<p>The management controls, which have been put in place, are appropriate to the nature, duration and scale of the activity on this project and the particular sensitivity of the local environment. They will be revised in the event of any significant changes to the scope of the activity during this Project, especially when there is additional works, or a change in the method of works.</p> <p>Additional management controls will be adopted when there are changes to client requirements, stakeholder interests to a particular local environmental sensitivity. The significant risks which are highlighted in the risk assessment and the management controls are communicated to the workforce by site inductions and toolbox talks.</p>	
<p>Habitats – Trees and Scrub</p> <p>The proposed development site boundaries will be marked. The vegetation (trees and shrubs) to be retained as part of the landscaping plan will be marked out by secure posts and robust high visibility tape, with reference to design drawings, under supervision of the project engineer/manager and the site ecologist and these areas will be avoided insofar as possible. Machinery will not be permitted breach these boundaries during the work.</p> <p>Landscaping planting will incorporate native species in any hedgerow planting or shrub stands, and native trees in woodland settings, to provide links and connectivity with existing landscape features in the surrounding environment.</p> <p>Given that the construction phase of the proposed project will adversely impact the habitat available for birds, and other fauna, mitigation will include transplanting scrub vegetation removed during construction stage, in line with the landscaping plan. Existing young trees occurring within the site include quality immature oak and willow. These trees are a valuable natural asset of local provenance and will be used as part of the planting regime. They will be transplanted into their final position or retained until required and then planted.</p>	<p>Habitat loss/alteration:</p> <p>permanent negative effect on KERs, ranging from imperceptible where habitats will be retained (e.g. some linear tree-hedgerow features) to significant in the case of direct habitat loss.</p>		

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
	Biodiversity	<p>Soil that has not been subject to compaction or desiccation at the proposed development site harbours a valuable seed bank with regard to local flora. Topsoil will be retained and reused on site through landscaping. The use of any wildflower areas in the landscaping plan will utilise such soil.</p>	<p>Water:</p> <p>Freshwater habitat alteration resulting from effects on water quality are considered probable and short-term slight. Estuarine habitat alteration resulting from effects on water quality are considered probable and short-term imperceptible.</p>
		<p>Habitats – Water Features</p> <p>With regard to other surface water features at the site, namely existing drainage ditches, physical variation/heterogeneity will be a key influence in biodiversity richness as water features develop at operation stage. Therefore, sinuosity in waterbody outline/plan is preferable to linearity, so borders/banks will be of varied shape/angle. The planting regime should aim to create a dappled shading effect i.e. partial shade where the sunlight filters through the branches and foliage. This will involve the strategic use of waterside plants and native deciduous trees. Suitable examples of riparian and instream emergent plants used will be common rush (<i>Juncus effusus</i>), yellow iris (<i>Iris pseudacorus</i>), fool's water cress, floating sweet-grass, hemlock water dropwort (<i>Oenanthe crocata</i>), water mint (<i>Mentha aquatica</i>), lesser water parsnip (<i>Berula erecta</i>), meadowsweet, water horsetail (<i>Equisetum fluviatile</i>), brooklime (<i>Veronica beccabunga</i>), marsh pennywort angelica (<i>Angelica sylvestris</i>), marsh marigold (<i>Caltha palustris</i>), water crowfoot and lesser spearwort (<i>Ranunculus flammula</i>). Some of these plants, especially the broadleaved herbs already occur at the site and should be used in water feature landscaping. For example, where a section of a drainage ditch is to be culverted, the vegetation will be transplanted to a reach of a channel that will no longer be modified.</p>	
		<p>Disturbance to fauna (general measures)</p> <p>No night-time construction works will take place. All works will be scheduled to be completed within the 07:00 – 19:00 period Monday to Friday and 8.00 – 13.00 on Saturdays. Scrub clearance and tree felling will take place outside of the bird nesting season, which is from 1st March - 30th August inclusive. Where 36 months or more has elapsed between obtaining statutory approval for the proposed development and initiation of the construction phase, an appropriate level of mammal resurvey will be required because the baseline data may be altered during this time. This will allow adjustments to be made to the mitigation strategy specified in the CEMP.</p> <p>Noise reduction measures will include:</p> <ul style="list-style-type: none"> • Locate plant known to emit noise strongly in one direction so that noise is directed away from sensitive receivers; • Ensure that plant and equipment are maintained and lubricated as per the manufacturer's instructions to avoid malfunction and possible subsequent leaks and excessive emissions; • Efficient silencing devices to be used on all tools, plant and motors and should be in accordance with BS5228 "Noise Control on Construction and Demolition Sites"; 	

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	Biodiversity	<ul style="list-style-type: none"> • Ensure that no engines or items of machinery are left running for long periods when not required to be used; • Ensure that all entrances to sites are at points where the noise from vehicles entering and leaving the site will cause the least nuisance or disturbance; • Start-up plant and vehicles sequentially rather than all together; • Plan the working hours and duration of work with consideration for the effects of noise/vibration on any noise sensitive receiver; • Ensure the use of the least noisiest plant suitable for the activity; and <p>Avoid simultaneous use of noisy equipment where reasonably practicable</p>	
		<p>Bats</p> <p>The mitigation measures for bats will follow:</p> <ul style="list-style-type: none"> • Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2005a); • Guidelines for the treatment of bats during the construction of National Road Schemes (NRA, 2005b); and • NPWS Irish Wildlife Manuals, No. 28: Bat Mitigation Guidelines for Ireland – V2 (Marnell et al., 2022). <p>If felling of trees with bat roosting potential (i.e. mature trees with voids, cracks, loose bark and/or ivy cover) is required, a bat survey will be required by a suitably qualified bat ecologist prior to felling; as such works have the potential to cause disturbance and/or damage to roosting bats. Should any tree roosts be identified, a derogation licence from the NPWS will be required to fell or undertake works in close proximity these trees.</p> <p>If felling of such mature trees is required, the following NRA (2005a) guidance will be followed:</p> <ul style="list-style-type: none"> • Immediately prior to felling, trees should be inspected for the presence of bats and/or other bat activity by a suitably qualified bat ecologist during daylight hours and night-time using a bat detector. This survey should be carried out from dusk through the night until dawn to ensure bats do not re-enter the tree; • Where examination of the tree has shown that bats have not emerged or returned to tree, felling may proceed the following day. Should a delay in felling be encountered, resurveying is required; 	

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	<p>Biodiversity</p>	<ul style="list-style-type: none"> In areas where bat activity has been recorded, tree-felling must not be conducted in June to early August; and As noted in Section 5.3.5.2.1, there are no trees that would be considered as obviously of value as roost habitat. As such, any vegetation and tree removal should be carried out during winter (December to February) to avoid impacts on bats, corresponding to a time when even best bat roost habitat recorded on site would be highly unlikely to be used as winter roosts. Winter hibernation roosts are generally restricted to places that are sheltered from extremes of temperature (Marnell et al., 2022) and trees present on site are deemed unlikely to be mature enough to provide appropriate winter roosting habitat on the basis of the habitat suitability survey carried out on-site. It is recommended that any trees on site with ivy should be dropped to the ground as gently as possible and left on the ground for a period of 24hrs post felling under the supervision of the ECoW. This soft felling approach will give any bats, if present, the opportunity to vacate. 	
	<p>Birds</p>	<p>Trees, scrub and hedgerows in the site and adjacent have been shown to be suitable habitat for a number of species potentially breeding on-site, including for certain species of conservation concern. For this reason, avoidance of works likely to impact birds must be implemented in terms of phasing works to avoid unnecessary disturbance to any breeding birds that may be using the site during construction. This is particularly important for phasing of works noted as being used by meadow pipit and snipe, both of which were noted in the northeast of the proposed development site.</p> <p>Pre-construction site clearance and removal of vegetation should be minimised and, where required, only be timed to occur outside the bird breeding season (1st of March to 31st of August inclusive) to avoid undue deleterious impacts on breeding birds.</p> <p>Should construction works other than vegetation clearance be required during the breeding season it is recommended that the ECoW be consulted to monitor such works and minimise resulting disturbance or displacement of sensitive species.</p> <p>Regarding the nearby Castl lake, the main issue to mitigate against will be disturbance to species there during the construction and operational phases of the proposed project. Given the location of Castl lake within a public amenity area that birds using it will already be used to a significant degree of human disturbance.</p>	
		<p>Dust management</p> <p>Dust and fine particulate emissions arising during the construction phase will be reduced and controlled via the following measures:</p>	

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	<p>Biodiversity</p>	<ul style="list-style-type: none"> • Offsite roads and footpaths will be regularly monitored and maintained and cleaned if required; • Water tanks will be used to keep down dust on site; • A wheel wash will be used at the site entrance to clean vehicles as they leave the site; • The internal access roads shall be sprayed during dry windy weather conditions to control fugitive dust emissions from the road surface. • Regular maintenance of the road surface near the site entrance will be undertaken to prevent fugitive dust and PM emissions generated by passing vehicles. A mechanical vacuum road sweeper shall be used if necessary. • Loose, fine aggregates and other similar sized building materials that can be easily re-suspended by the wind will be stored in temporary covered stockpiles in designated areas of the site. • Maximum vehicle speeds shall be controlled to 15 km/h within the construction site areas to prevent high levels of dust being re-suspended from the internal road surfaces; • Dampening of exposed earthwork activities and site haul roads during dry weather; • Protective hoarding screens shall be erected around construction activities to reduce dust-blow from the site; • Ensure there is access to a water source in close proximity to each area on site where dust is deemed most likely to occur; • Periodic maintenance of the public road surface near the entrance will be undertaken. This will include the removal of any spillages so as to prevent the dispersion of dust along the road, which is likely to be re-suspended by passing vehicles. A mechanical vacuum road sweeper will be used if necessary; • Any spillage of material from vehicles departing the site will be removed to prevent re-suspension of silt from the road surface by passing vehicles; • Dust control measures will be active on equipment used for drilling or pavement cutting, grinding of block surfaces and similar types of stone finishing is taking place as significant fine particulate emissions can be generated which may cause a local nuisance; • Stockpiles will be located away from drainage systems and soil retaining measures (silt fence/ silt curtain or other suitable materials) to reduce risk of silt run-off; 	

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	Biodiversity	<ul style="list-style-type: none"> Vehicles and plant machinery operating on-site will be properly maintained to prevent excessive emissions of particulates and other pollutants from the exhaust pipes; 	
		<p>Other Air Quality Control Measures</p> <ul style="list-style-type: none"> Exhaust emissions where practical will be minimised by ensuring that all plant, equipment and vehicles are in good working order and regularly serviced to ensure efficient running, by using the smallest engine-sized plant and equipment suitable for the task and by ensuring that engines are not left idling unnecessarily. Burning of materials on site will not be permitted. 	
		<p>Management of Invasive Species</p> <p>Measures avoid the spread of invasive alien species will follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010). The following measures address potential effects associated with the construction phase of the project:</p> <ul style="list-style-type: none"> Prior to being brought onto the site, all plant and equipment will need to be clean and free of soil/mud/debris or any attached plant or animal material; Prior to entering the site, all plant/equipment will be visually inspected to ensure all adherent material and debris has been removed; Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Himalayan balsam, Japanese knotweed etc.) by thoroughly washing vehicles prior to leaving any site; All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species; All washing must be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement; Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present; and All planting and landscaping associated with the proposed development shall avoid the use on invasive shrubs. 	

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	Biodiversity	<p>All footwear/waders and all equipment that will be placed within the water should be treated to prevent foreign flora/fauna entering the water and after use to prevent the spread to other catchments.</p> <p>Non-native species control will be practised according to the following IFI documents:</p> <ul style="list-style-type: none"> • 'IFI Biosecurity Protocol for Field Survey Work' (IFI, 2010); • 'Disinfection of scuba diving equipment' (IFI, 2011) ; and • 'Invasive species biosecurity guidelines for boaters' (IFI, 2013) . 	
		<p>Management of Water Quality</p> <p>An Environmental Management Plan has been developed for the project to ensure that the construction works will not negatively impact the water quality and will safeguard existing water. The key to avoid impacts to water during the construction works is good site management practices, tight controls, regular inspections and ongoing vigilance with staff and employees on site.</p> <p>Construction best practice measures (of relevance in respect of any potential ecological impacts) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:</p> <ul style="list-style-type: none"> • Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin. • IFI (2016) Guidelines on protection of fisheries during construction Works in and adjacent to waters (IFI, 2016) • H. Masters-Williams et al (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA. • E. Murnane, A. Heap and A. Swain. (2006) Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA. • E. Murnane et al., (2006) Control of water pollution from linear construction projects. Site guide (C649). CIRIA. <p>In addition, the following construction surface water management measures will be implemented and monitored for the duration of the works. The potential for the construction works to have an impact on the quality of the local watercourses will be minimised through the implementation of the following control measures as outlined in the EMP:</p>	

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	Biodiversity	<ul style="list-style-type: none"> • Contact will be maintained with the relevant authority such as the Inland Fisheries Ireland when required. • Special attention will be paid to minimising the opportunities for wash-off of inert solids (usually from exposed soil mounds, embankments or excavated trenches etc.) from entering watercourses. Silt traps will be used where necessary around the open steams and watercourses. • A sedimat will be utilised for the protection of streams from sedimentation damage during in stream construction activities for the installation of culverts, • Care will be taken to avoid interference with the supply or quality of any groundwater resource. • Waste products associated with the works will not be permitted to enter watercourses adjacent to the works through the use of French drains, petrol interceptors or other agreed methods. • Water that is high in solids or contaminated with cement or oil, will not be pumped from excavations directly to watercourses without pre-treatment (e.g. sedimentation/ filtration and oil separation). • All site run-off associated with the construction will be directed to storm control areas or tanks to prevent direct discharge into drains and watercourses. • All operational machinery used in-stream will be kept to an absolute minimum. • Spill kits will be provided at all river locations identified. <p>Fuels, oils, greases and hydraulic fluids will be stored in bunded compounds well away from watercourses. Refueling of machinery, etc. must be carried out in bunded areas. Fuels will be stored during the construction phase in bunded fuel storage tanks with a 110% holding capacity. Where it is necessary to dispense fuels on site, this will be undertaken in areas covered with an impermeable surface to protect surface water and ground water;</p> <ul style="list-style-type: none"> • Construction works, especially ones involving the pouring of concrete, will be conducted in the dry. Precast concrete will be used in preference to uncured concrete, which kills aquatic fauna through alteration of stream pH. When cast-in-place concrete is required, all work will be done in the dry and allowed cure for 48 hours before re-flooding. • To help prevent the contamination of the ground and groundwater, contaminated materials (oils, fuels, chemicals etc.) will be used and stored in an appropriate manner as outlined in the relevant guidance, i.e. CIRIA (2001) and DMRB Volume 11 (1994). <p>Should any monitoring or inspection indicate that pollution of the Castlelake Roads Infrastructure or adjacent watercourses has occurred then the Site Management Team will immediately inspect all work activities to ascertain whether they are operating effectively. All works may be stopped and/or additional control measures</p>	

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	Biodiversity	<p>installed to prevent further pollution or discharge to the watercourse. Appropriate action will be taken in consultation with the Site Agent. Water samples will be taken at the watercourse if required.</p>	
		<p>Silt Fencing</p> <p>As an additional measure where the construction works are adjacent to water courses, silt fencing will be installed. The purpose of the silt fence is to retain any soil and silt disturbed during construction and prevent it from entering watercourses.</p>	
		<p>Inspection and Maintenance</p> <p>The construction drainage system for the proposed development must be managed and monitored at all times and particularly after heavy rainfall events during the construction phase. The construction drainage system will be regularly inspected and maintained to ensure that any failures are quickly identified and repaired so as to limit/prevent water pollution.</p>	
		<p>Management of Concrete</p> <p>To reduce the potential for cementitious material entering surface waters, concrete pours will be supervised by the Construction Manager, a suitably qualified Engineer and the Environmental Manager.</p> <p>Management Measures will include the following:</p> <ul style="list-style-type: none"> • The Construction Manager will ensure that the area of the pour is completely drained of water before a pour commences. • Pours will not take place during forecasted heavy rainfall; • Incidental rainfall from light showers during the period of a pour is typically absorbed into the concrete matrix but heavier showers can result in some run off from the top surface of the concrete pour. If run-off is encountered the Environmental Manager will block the outflow from the drains to retain or treat the run-off until the pH is neutral before discharge to the drainage network; • In the event of a spillage on site, the Environmental Manager will temporarily block the dirty water drains in the immediate area and monitor the pH levels of the water in the open drainage channel and if necessary, will adjust the pH levels using CO2 entrainment. Any spillage will be cleared immediately and deposited in the Chute wash down area; • To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site at the source quarry. Only Concrete truck chutes will be allowed to be cleaned on site at a central concrete wash out area. 	

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	Biodiversity	<p>Fuel/Oils Management</p> <p>Fuel Management Measures that will be employed during the Construction phase include:</p> <ul style="list-style-type: none"> • The potential for hydrocarbons getting into the existing watercourses will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed re-fuelling procedure; • Refuelling will be carried out using 110% capacity double banded mobile bowser. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using; • To reduce the potential for oil leaks, only mechanically sound vehicles and machinery will be allowed onto the site. An up to date service record will be required from the main contractor; • Mobile bowser, tanks and drums should be stored in secure, impermeable storage area, away from drains and open water. • Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements. • Potential leaks from delivery vehicles will be reduced by visually inspecting all delivery vehicles for major leaks. Contractors supplying concrete and crushed stone to the site will be contractually required to supply their products using roadworthy vehicles; • Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits. This contaminated material will be properly disposed of in a licensed waste facility; • The Environmental Coordinator will be immediately informed of the oil leak/spill, and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil, and initiate the clean-up if necessary; • Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery; • Corrective action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Coordinator at site induction; 	

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	Biodiversity	<ul style="list-style-type: none"> In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery. Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider. 	
		<p>Recycling/Waste Management</p> <p>All waste will be managed in accordance with the relevant statutory provisions and the waste hierarchy. The waste management strategy for the Project will follow the waste hierarchy: Prevention > Preparing for reuse > Recycling > Energy recovery > Disposal.</p> <p>Waste management goals will include:</p> <ul style="list-style-type: none"> Whenever possible materials for construction activities will be ordered as to prevent the minimum storage time and kept in the storage area before release to site for use; Materials will be ordered, where possible, in sizes to prevent wastage e.g. in form of offcuts and waste to be able to be returned to the original supplier (e.g. plastic pipe); Materials delivered to the project will be received and controlled by the Stores Manager (or similar). Materials will be stored to minimise the potential of damage or wastage. Measures will include off-ground storage (e.g. on pallets), remaining in original packaging, protection from rain damage or collision by plant or vehicles; The materials storage area will be secured during out of hours to prevent unauthorised access; A waste management compound will be set up to handle incoming waste from construction activities. This will be designed to facilitate the segregation of key waste streams to maximise the opportunity to re-use, recycle and return wastes generated on site; The segregated waste will be placed in skip containers. Waste will be placed in the skips in such a way to minimise 'empty' void space; Skips will be labelled to clearly highlight waste stream for each skip. As a minimum skips and containers will be provided for segregating of the key waste streams (mixed metal, timber, general/mixed C&D, packaging (plastic & cardboard), hazardous) Hazardous waste will be kept in a secure area away from other wastes to ensure no contamination takes place; and 	

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	Biodiversity	<ul style="list-style-type: none"> Separate areas within the waste compound will also be allocated for the storage of plastic piping awaiting return to supplier, waste tyres and WEEE (where applicable). 	
	Land and Soils	<p>Roads and Drainage</p> <p>The permanent road works will require a drainage network to be in place for the construction and operation phases of the proposed development. Fundamental to any construction phase is the need to keep water (i.e. runoff from adjacent ground upslope of the permitted development footprint) clean and manage all other run off and water from construction in an appropriate manner. Wheel wash facilities will be available onsite for the duration of the construction phase. These and other measures are outlined in the CEMP (Appendix 2.1.). The proposed surface water drainage is summarised in Chapter 7 Water and Chapter 9 Material Assets.</p>	<p>Land: Slight adverse long-term impact</p> <p>Soils: Slight adverse long-term impact</p>
		<p>Excavations and related activities</p> <p>Excavated material will be managed in line with the approved CEMP which can be found in Appendix 2.1.</p> <p>The soil excavated from the construction of the proposed development will be reused beneficially on site where feasible to reduce waste, and used in the development such as for landscaping and general fill.</p> <p>Within excavations and around excavations, pore water pressure will be kept low by avoiding loading the soil/subsoil and giving careful attention to the existing drainage.</p> <p>All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Where appropriate and necessary, cuts and excavations will be protected against ingress of water or erosion by the use of cut off drains around the excavation works. Temporary works will be such that they do not adversely interfere with existing drainage channels/regimes.</p> <p>A Landscape Design Rationale Plan has been developed which outlines the measures to be taken to prepare soils for planting following construction.</p>	<p>Land: Slight Imperceptible permanent impact</p> <p>Soils: Not significant adverse permanent impact</p> <p>Geology: Not significant adverse long-term impact</p>
		<p>Storage and Management of Excavated Materials</p> <p>The handling, storage and management of excavated spoil will be carried out in line with an approved CEMP. Storage of excessive material will be avoided. Site management should include the checking of equipment, materials storage and transfer areas, drainage structures and their attenuation ability on a regular basis during the construction phase of the project. The purpose of this management control is to ensure that the measures in place are operating effectively, prevent accidental leakages, and identify potential breaches in the protective retention and attenuation network during earthworks operations.</p>	<p>Land: Not significant adverse temporary impact</p> <p>Soils: Not significant neutral temporary impact</p>

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	Land and Soils	<p>Materials required for construction should be handled and stored in a manner which reduces unnecessary wasting. Stone and any other quarry materials should be imported from local quarries where possible and stored neatly in segregated areas.</p> <p>No permanent waste or stockpiles will be left on site, other than those materials required for designed landscaping and construction generally. Excavated material that is not reused on site for landscaping will be removed from site by the appropriate permitted contractors and taken to an authorised facility.</p>	
	Vehicular movement	<p>A traffic management plan has been developed as part of the CEMP. This is to manage and control vehicular movement onsite. Measures include the scheduling of HGVs during the construction phase to reduce the number of vehicles move in, through and off site. This in turn will reduce the impact of soil compaction and erosion. Unscheduled vehicles will not have access to the site.</p> <p>Machinery should not operate directly on excavated/stockpiled soils.</p>	<p>Land: Likely Imperceptible neutral short-term impact</p> <p>Soils: Likely not-significant adverse short-term impact</p>
	Accidental spills / contaminated runoff	<p>Good site practice is applied to ensure no fuels, oils, other substances or contaminated runoff are stored in a manner on site in which they may spill and enter the ground, particularly when the initial top layer of made ground is excavated. Dedicated, bunded storage areas should be used for all fuels or hazardous substances. Spill kits should be maintained on site.</p>	<p>Land: Unlikely not-significant adverse short-term impact</p> <p>Soils: Unlikely not-significant adverse short-term impact</p> <p>Geology: Unlikely not significant adverse short-term impact</p>
	Waste Generation and Management	<p>A waste management plan (WMP) has been developed as part of the CEMP. This can be found in Appendix 2.1. The CEMP includes provisions for handling waste in full accordance with statutory legislation and associated guidance. All waste handling contractors and waste disposal facilities used by the contractor must be fully authorised.</p> <p>Construction phase waste management measures are in place to tightly control all site generated construction waste and the storage and disposal of same. All waste will be managed, collected, stored and segregated in separate areas and removed off site by a licensed waste management contractor at regular intervals during the works.</p>	<p>Land: Likely Imperceptible neutral short-term impact</p> <p>Soils: Likely Imperceptible neutral short-term impact</p>
	Water	<p>Drainage and Sediment Control</p> <p>Control measures to be implemented include:</p>	<p>Excavation:</p> <p>Hydrology: Unlikely slight adverse short term</p>

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	<p>Water</p>	<ul style="list-style-type: none"> • Contact will be maintained with the relevant authority such as the Inland Fisheries Ireland when required. • Special attention will be paid to minimising the opportunities for wash-off of inert solids(usually from exposed soil mounds, embankments or excavated trenches etc.) from entering watercourses. Silt traps and interceptors will be used where necessary. • Care will be taken to avoid interference with the supply or quality of any ground water resource. • Waste products associated with the works will not be permitted to enter watercourses adjacent to the works through the use of French drains, petrol interceptors or other agreed methods. • Water that is high in solids or contaminated with cement or oil, will not be pumped from excavations directly to watercourses without pre-treatment (e.g. sedimentation/filtration and oil separation). • All site run-off associated with the construction will be directed to storm control areas or tanks to prevent direct discharge into the river. • All operational machinery used in-stream will be kept to an absolute minimum. • Spill kits will be provided at all river locations identified. • Fuels, oils, greases and hydraulic fluids will be stored in bunded compounds well away from watercourses. Refuelling of machinery, etc. must be carried out in bunded areas. Fuels will be stored during the construction phase in bunded fuel storage tanks with a110% holding capacity. Where it is necessary to dispense fuels on site, this will be undertaken in areas covered with an impermeable surface to protect surface water and ground water; • Construction works, especially ones involving the pouring of concrete, will be conducted in the dry where possible. Precast concrete will be used in preference to uncured concrete, which kills aquatic fauna through alteration of stream pH. When cast-in-place concrete is required, all work will be done in the dry where possible and allowed cure for 48 hours before re-flooding. • To help prevent the contamination of the ground and groundwater, contaminated materials (oils, fuels, chemicals etc.) will be used and stored in an appropriate manner as outlined in the relevant guidance, i.e. CIRIA (2001) and DMRB Volume 11 (1994). <p>Temporary Construction Compound</p> <ul style="list-style-type: none"> • Drainage within the temporary site compound will be directed to an oil interceptor to prevent pollution if any spillage occurs. 	<p>Hydrogeology: Unlikely not significant short term</p> <p>Spillage: Unlikely not significant short term</p>

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
	<p>Water</p>	<ul style="list-style-type: none"> • Temporary toilet facilities will be managed by the Contractor during the construction phase. • A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc. • The compound will be in place for the duration of the construction phase and will be removed once commissioning is complete. <p>Storage and Stockpiles</p> <ul style="list-style-type: none"> • Temporary stockpiles of excavated earth will be constructed within the lands during construction. • Stockpiles will be located away from drainage systems and silt retaining measures (silt fence/silt curtain or other suitable materials) to reduce risk of silt run-off shall be installed along the downgradient edges of stockpiled earth materials. • All excavated materials from the site or introduced materials for construction will be either used or removed from the site. • No permanent spoil or stockpiles will be left on site, other than those materials required for landscaping, berm construction and construction generally. • Temporary storage areas for fuels and other hazardous materials required by the contractor during construction will be stored in appropriately bunded facilities to prevent the accidental spillage of hazardous liquids that could cause soil and groundwater contamination. • Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements. • Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider. • On-site washing of concrete truck barrels should not be allowed. The washing of the chutes at the rear of the trucks may be permitted. A designated wash area will be required. <p>Construction Wheel Wash</p> <p>A Construction Wheel Wash will be used to wash truck tyres leaving the construction site. Water residue from the wheel wash will be fed through a settlement pond, interceptor and then discharge to the stormwater drainage network. The wheel wash area will be cleaned regularly so as to avoid the build-up of residue.</p> <p>Monitoring</p>	

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	Water	Surface water quality should be regularly inspected during construction to ensure the surface water management controls are operating correctly. In line with Section 8.1.2 of the EMP, Water quality monitoring will be conducted regularly when work on or close to existing water courses.	
	Air Quality and Climate	<p>It is recommended that best practice is adhered to during the construction phase in order to minimise fugitive dust emissions in particular. Outlined below are a series of mitigation measures and good working practices to ensure that any potential impacts during the construction phase are minimised and to ensure there will be no adverse impact on the receiving environment. The mitigation measures have been sourced from national and international best practice guidance documents for the implementation of dust management plans including:</p> <ul style="list-style-type: none"> • 'Control of Dust from Construction and Demolition Activities', UK British Research Establishment (BRE), 2003. • 'Environmental Good Practice on Site', Construction Industry Research and Information Association (CIRA), 2015. • 'Environmental Management Plans', Institute of Environmental Management and Assessment (IEMA), 2013. • 'Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan' National Roads Authority of Ireland (NRA), 2005. <p>The potential effects arising from dust and exhaust emissions will be minimised through compliance with the following mitigation measures that will be incorporated in the site-specific Construction and Environmental Management Plan.</p> <ul style="list-style-type: none"> • The use of water as a dust suppressant, e.g., a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods when fugitive dust emissions could potentially arise. • Public roads will be inspected regularly for cleanliness and cleaned as necessary. • All loads entering and leaving the site will be covered during dry periods if dust becomes a nuisance on site. • Control of vehicle speeds passing over access roads and crane hardstanding areas within the site. • Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site and preventing its deposition on public roads. • Site stockpiling of materials will be designed and laid out to minimise exposure to wind. • Daily site inspections will take place to examine dust measures and their effectiveness. 	Short term slight adverse

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		<ul style="list-style-type: none"> Site hoarding will be erected along the boundary with Maple Land, Maple Close, Pine Close, Oakbrook road and the new internal road between the phase 3 and 4 development sections (if phase 3 is occupied when phase 4 is under construction) to minimise fugitive dust emissions to these residential areas. <p>Construction traffic emissions can be reduced using the following measures:</p> <ul style="list-style-type: none"> Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently. Implementation of the Traffic Management Plan to minimise congestion; and All site vehicles and machinery to be switched off when not in use - no idling. Construction personnel will be encouraged to car pool and use public transport – this is outlined in the CEMP. 	
	<p>Cultural Heritage and Archaeology</p>	<p>Licensed archaeological monitoring of all groundworks will be undertaken in these areas during construction. In the event of archaeological material being uncovered such material will be preserved <i>in situ</i>, where possible or preserved by record. Preservation <i>in situ</i> will require the relocation of the element of the development beyond the area of archaeological sensitivity. Preservation by record will require the excavation of the archaeological material and such material will be fully resolved to professional standards of archaeological practice (Policy Guidelines on Archaeological Excavation – Department of Arts, Heritage, Gaeltacht and the Islands). This work will be funded by the developer.</p>	<p>If previously unknown archaeological sites are identified during archaeological monitoring, they will be preserved <i>in situ</i> or preserved by record. If such sites are preserved by record, the effect will be permanent.</p>
	<p>Noise and Vibration</p>	<p>Best practice mitigation techniques as specified in BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites shall be implemented during the construction phase. Contractors will be familiar with the measures in this document,</p> <p>There is the potential for construction noise to exceed guideline construction noise thresholds at receptors close to works areas during periods of intense construction activity.</p> <p>Solid 3 m high perimeter timber hoarding will be erected at the west and southern construction perimeters to protect receptors at Maple Lane, Maple Close and Cascade Apartment Complex.</p> <p>To prevent construction noise thresholds being exceeded, noise screens shall be utilised around noisy plant and machinery such as generators, cutting stations, and pneumatic rock breakers.</p> <p>Noise stationary equipment will be located away from sensitive boundaries as far as practicable.</p> <p>The use of inherently quiet plant is required where appropriate – all compressors and generators will be “sound reduced” or “super silent” models fitted with properly lined and sealed acoustic covers, which will be kept closed</p>	<p>Noise levels within typical tolerable construction noise guideline thresholds</p>

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
	<p>Noise and Vibration</p>	<p>whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.</p> <p>Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.</p> <p>A nominated person from the Project Management team will be appointed to liaise with residents and businesses regarding noise nuisance events.</p> <p>In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, Cork County Council shall be immediately notified prior to the works commencing.</p>	
	<p>Traffic and Transportation</p>	<p>All construction parking and compounds will be provided within the site confines. Construction wheel wash facilities will be provided on-site. A specialist road washing and cleaning vehicle will be used regularly each day to maintain public roads, as appropriate. All necessary construction signage and other measures required by Cork County Council will be provided.</p> <p>An updated Construction Traffic Management Plan will be submitted to Cork County Council, for approval, prior to the commencement of construction.</p>	<p>Slight to moderate and short to medium term.</p>
	<p>Landscape and Visual</p>	<p>Mitigation by design and avoidance was carried out with the preparation of a Landscape Masterplan for the Proposed Development site. The landscape masterplan has influenced the overall site layout through the Proposed Development design evolution, see Appendix 11.1 and supporting planning documents (LMP drawings 21642-2-100-107, section drawings 21642-2-201-203 and the Landscape Design Rationale Report) for further information on the proposals.</p> <p>The landscape proposals for the Proposed Development site include retaining existing landscape features wherever possible including areas of scrub, hedgerows and trees and drainage ditches and stream.</p> <p>The works around the existing vegetation to be cleared and retained will be supervised by the clerk of works ecologist and project arborist. Protection measures will be outlined in the Environmental Management Plan which will help protect these features. Retained trees and hedgerows will be protected by installation of fencing in accordance with BS5837:2012: Trees in Relation to Construction around the root protection areas (RPAs) as per the arborists Arboricultural Impact Assessment (AIA) report. Similarly, the retained waterways and ditches will be protected from the siteworks by slit fencing and waterways by the culvert drains with sedimats where required by the clerk of works ecologist. Areas of soil outside the main site works will be fenced off to prevent compaction.</p>	<p>Landscape: Moderate Adverse Temporary.</p> <p>Visual: Moderate Adverse Temporary</p>

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
		<p>Where the soil will be disturbed by the site works it will be removed and stored elsewhere on site and reused across the Proposed Development for landscaping including use as a seedbank for wildflowers.</p> <p>Visual impacts will be mitigated through the appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish. Works will be carried at agreed hours with the council.</p> <p>Site hoarding will be appropriately scaled, finished, and maintained for the period of construction of each section of the works as appropriate. Similarly, other structures including the site compound and scaffolding will be temporary in nature and contained with the works area.</p>	
	<p>Material Assets</p>	<p>Mitigation Measures for Electricity The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks. All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines. Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements.</p> <p>Mitigation Measures for Telecoms All works in the vicinity of the telecommunications providers infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines that are included in the CEMP in Appendix 2.1 of Volume 3.</p> <p>Mitigation Measures for Wastewater/Water Supply All mitigation measures outlined in the CEMP, Appendix 2.1 of Volume 3 should also be implemented during installation of water supply and wastewater infrastructure.</p> <p>Any temporary water supply for the temporary site compound will be agreed with Cork County Council and Irish Water. To enable leak detection, a water meter will be installed for the temporary water supply. The water meter will monitor consumption of water and will be used to help confirm potential leaks.</p> <p>Effluent generated on site from the contractors sanitary facilities will be discharged to a holding tank and removed off site to a licensed removal contractor. Temporary discharge utilising the existing, or permitted sewerage network will be in agreement with Cork County Council and Irish Water. All necessary health and safety measures will be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.</p>	<p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p>

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
		<p>Mitigation Measures for Surface Water Drainage The contractor will be obliged to consult the CEMP Appendix 2.1 of Volume 3, which includes a Surface Water Management Plan (SWMP) for implementation of mitigation measures to prevent impacts damage to existing infrastructure and over ground infrastructure and watercourses.</p> <p>Prior to excavation the Contractor will ensure that adequate silt management methods are implemented and that silt controls are in place as recommended in CEMP and SWMP. All silt controls will be checked on a regular basis in accordance with a monitoring schedule outlined in the CEMP and SWMP.</p> <p>Mitigation Measures for Waste Management All measures included in the Waste Management Plan (WMP), Appendix A of the CEMP which is included in Appendix 2.1 of this EIAR, should be adhered to ensure effective waste management and minimisation, reuse, recycling and disposal of waste material generated during the construction phase of the proposed development. Prior to commencement of the construction phase, the contractor (s) will be required to refine/update the WMP to detail specific measures to minimise waste generation and provide details of the proposed waste contractors and destinations for each waste stream.</p>	<p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p>

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
Post Construction/ Operational Phase	Biodiversity	<p>Any maintenance of the drainage system, such as petrol/oil interceptors will be in accordance with the design specifications.</p>	<p>There will be loss of habitats at the proposed development site where buildings and hard surface exist at operation stage. This unavoidable loss is independently assessed as a permanent profound permanent negative effect. Elsewhere, habitats will be preserved and/or altered, with plans to increase their biodiversity value, leading to an effect independently assessed as probably moderate positive effect. The overall effect on habitats is assessed as probably moderate negative taking account of the greater proportion of habitat converted to building and artificial surfaces.</p> <p>There will be an increased human presence in the locality with an expected associated increased in noise and disturbance during construction and operation stages. The effect on red-listed birds will be probably significant negative. For other fauna, it is considered that the residual effects will be probably imperceptible negative provided the appropriate mitigation measures and best practice methodologies recommended and provided in the CEMP are implemented, and possibly trend towards probably neutral, depending on the biodiversity value of green areas and efficacy of installed features such as log piles, nest and bat boxes. The effect on aquatic features will be near certain moderate positive taking account of the current degraded state of drainage ditches and proposed improvements to these habitats.</p>
		<p>There may be a requirement to continue work on the ISMP at operation stage.</p>	
		<p>Lighting</p> <p>In general, artificial light creates a barrier to commuting bats so lighting should be minimised during the active bat season from March to the end of September as it deters some bat species (Marnell et al., 2022). Where lighting is required, directional lighting (i.e. lighting which only shines on access roads and not nearby habitats) should be used to prevent overspill. This can be achieved by the design of the luminaire, the height of the lamp and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only. Modern LED lighting has also been shown to deter bats but it is available in a range of colours other than white which may be used to avoid or lessen impacts. Warmer colour wavelengths between 2700 and 3000 Kelvin seem to have less impact on bats.</p> <p>Bat boxes</p> <p>As foraging habitat and potential tree roost sites will be removed to facilitate the project, it is proposed that bat boxes will be erected at suitable locations in the study area (e.g., in standing trees). A minimum of twenty bat boxes will be installed, more may be required if trees felled during construction stage support some potential roost features, in which case three boxes will be installed per felled tree, on remaining trees.</p> <p>Woodcrete (cement and sawdust) bat boxes, such as those manufactured by Schwegler (available from NHBS at www.nhbs.com) are proposed. These have the advantage of being far more durable and thus needing less maintenance. Bat boxes will be installed and maintained (if required) by an Ecologist according to manufacturer’s instructions. Any boxes installed should be robust and cater for a range of species. Guidance for installation of bat boxes will follow:</p> <ul style="list-style-type: none"> • Bat Conservation Ireland (BCI) Guidance Notes for Agri-environmental Schemes (2015); and 	

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		<ul style="list-style-type: none"> Bat Mitigation Guidelines for Ireland (Marnell <i>et al.</i>, 2022). 	
		<p>Birds</p> <p>As the proposed development will result in habitat loss to breeding birds on this site it is proposed that thirty bird nest boxes will be provided on retained trees in order to help offset habitat loss. Nest boxes will incorporate a range of dimensions that have been specifically chosen and sited, based on their suitability for the BoCCI listed species recorded on site. It is recommended that a minimum of twenty-five nest boxes be installed throughout the site.</p> <p>In addition, provision will be made for for nesting swifts. Specially designed concrete composite swift nest boxes will be installed in new buildings to accommodate twenty breeding pairs (single or multiple cavity nest boxes are available). The nest boxes will be installed using Birdwatch Ireland guidance¹ as follows:</p> <ul style="list-style-type: none"> Swifts are colonial birds which prefer the company of other Swifts. With this in mind, always try to install a nest box with multiple nest cavities or attach several single-cavity nest boxes to a building Place the nest box or brick on a side of the building that gets some shade during the day; If possible, install it under an overhang or under the eaves, to give it protection from the weather and the heat of the sun; It should be sited at least five metres above ground, with clear, adjacent air space so the swifts can access it in high-speed direct flight; Make sure that predators such as cats, crows, squirrels and rats do not have easy access to the nest, for example by being able to climb up creepers or flying in from nearby trees. Where possible place boxes up close under fascia/soffit or gutter to stop predators perching on top; Avoid positioning nest boxes above obstacles where possible, swifts drop from entrance holes before taking flight meaning they could accidentally collide with 	

¹ https://birdwatchireland.ie/app/uploads/2019/10/Saving-Swifts-Guide_pdf.pdf

Time Frame / Schedule	Aspect / Resource	Environmental Mitigation / Recommendation	Residual Impact
		<p>structures below the nest. Outdoor lights, flag poles and pipes are some examples; and</p> <ul style="list-style-type: none"> • Always avoid placing boxes near to spotlights as birds can become dazzled by bright light whilst trying to enter nest sites in the late evening. • Use strong, corrosion-resistant fixings suitable for the wall surface. 	
	<p>Landscape and Visual</p>	<p>The retained landscape features will be incorporated into the overall landscape proposal which will bolster the existing green and blue infrastructure of the existing Proposed Development site and immediate surroundings. An existing hedge and ditch through the central part of the Proposed Development site will be incorporated as a key feature within the new neighbourhood park. The revitalised ditch along with another stream to the eastern boundary end will serve as valuable functioning SUD features. Planting across the Proposed Development will include trees, hedges, shrubs, wildflower meadow, amenity/private grassland. The planting will consist of a range of suitable native and non-native non-invasive species which across the various open spaces and gardens will help to soften the appearance of the buildings and act as a visual barrier to reduce potential visual impacts. The existing hedgerow against the northern boundary of the Proposed Development site A acts an importance physical and visual barrier to the railway and lands to north. Short hedgerows border the adjoining lands to northern ends of Proposed Development site B and C. Tree lines are proposed across the Proposed Development to add structure and act as vertical screens. The retained and enhanced hedgerows and new planting will help to connect with the existing landscape features within the surroundings and strength the green infrastructure.</p> <p>Habitat housing will include the placement of log piles (created from felled trees within the Proposed Development site), bird (min. 25no. swift boxes) and bat boxes (min. 20no.) at locations through the Proposed Development as determined by the ecologist clerk of works.</p> <p>Pathways are designed to allow good legibility for all abilities users across the Proposed Development and to directly connect into the adjoining under construction shared pedestrian/cycle paths along the connection road to the south and the proposed inter urban cycleway to the east. Providing users unfettered access through the Proposed Development and direct connections with other adjoining approved/pending developments, town of Carrigwohill and wider local area.</p> <p>The lighting across the Proposed Development will be designed to prevent light spillage pollution into the surrounding urban and rural areas.</p>	<p>Landscape Impact: Moderate Beneficial Long Term</p> <p>Visual impact: Significant adverse, neutral or beneficial qualities to Very Significant adverse quality and all Long Term</p>

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	Material Assets	<p>Electricity</p> <p>It is not envisaged that any other reductive measures will be necessary upon completion of the development.</p> <p>Telecoms</p> <p>The design and construction of the required telecoms services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.</p> <p>Wastewater/Water Supply</p> <p>Once the proposed development is complete, the water supply network and wastewater network will be vested to Irish Water who will have responsibility for operation and maintenance of the water supply.</p> <p>Private drainage areas, such as the various apartment blocks, will be maintained by the units maintenance company. Any issues going forward will therefore be addressed and mitigated against.</p> <p>Surface Water Drainage</p> <p>Appropriate maintenance regimes will be put in place to monitor/maintain surface water drainage. This will include periodic cleaning out of gully pots & drainage channel sumps and cleaning out of pipes if/when blockages occur.</p> <p>Waste Management</p> <p>An Operational Waste Management Plan (OWMP) has been prepared and is included in Appendix 9.5. The implementation of the OWMP will ensure a high level of recycling, reuse and recovery at the development during the operational phase. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving targets set out in the Southern Region Waste Management Plan 2015-2021.</p>	<p>Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p> <p>Likely Long Term/Permanent Neutral</p>

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	Land and Soils	No mitigation proposed for the operational phase	Neutral long-term impacts
	Water	No mitigation proposed for the operational phase	Hydrology: Likely not significant permanent Hydrogeology: Neutral long term
	Air and Climate	It is not expected that any significant negative impacts to the climate will occur during the operational phase of the Castlelake Development, therefore no mitigation measures are required. The inherent design of the buildings will ensure no adverse impact to air quality or climate.	Once operational, there will be no negative residual air quality or climate impacts. Given the scale of the development and the temporary nature of construction works, the construction phase will not impact adversely on Ireland's National Climate Objectives. In the operational phase beneficial effects associated with energy efficiency of the buildings, use of public transport and electric vehicles will be positive not significant and long term.
	Cultural Heritage	No mitigation is required during the operational phase of the proposed development.	No residual effect on the archaeological, architectural and cultural heritage environment.
	Noise and Vibration	No mitigation measures additional to the inherent design as proposed as required.	Not significant
	Traffic and Transportation	Operational MMPs are warranted for employment and commercial traffic generating developments. There will be no operational employment at the proposed 716 residential units. The expected employment at the proposed creche will be relatively low and less than Development Plan threshold for a formal operational MMP.	not significant to slight and long-term.

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		<p>The proposed residential development will generate a high proportion of non-car, sustainable transport trips, particularly in respect of school, creche and work commuting type trips that occur during peak traffic hours.</p> <p>Accordingly, no further specific operational mobility measures and incentives for the 716 residential units are warranted, in addition to the existing and proposed transport facilities and services included in Cork County Council’s 2025 Do Something Scenario Infrastructure.</p>	