SHD at Baldoyle-Stapolin Growth Area 3 (GA3), Baldoyle, Dublin 13

Environmental Impact Assessment Report (EIAR)

Volume 2 – Main Text

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Environmental Assessment
Built Environment

Client: The Shoreline Partnership

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Contents

1 Introduction

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) presents the assessment of environmental impacts and applicable mitigation measures associated with the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13.

This EIAR has been prepared in accordance with European Union Directive 85/337/EC (the 'EIA Directive'), as amended by 97/11/EC, 2003/4/EC, 2011/92/EU, and Directive 2014/52/EU (the '2014 EIA Directive'), and the requirements of the Planning and Development Act 2000 – 2021 ('PDA 2000', hereafter), the Planning and Development Regulations 2001 – 2021 ('PDR 2001', hereafter), and the relevant guidance documents, as specified herein.

This Chapter was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin.

1.2 The Applicant

The Applicant for the proposed Project is the Shoreline Partnership, owners of the lands which are the subject of this planning application.

1.3 The Proposed Project

The proposed Project Site is located at Baldoyle-Stapolin, Dublin 13. It is a Site of c. 6.89 hectares (ha), and comprises lands referred to as Growth Area 3 (GA3) within the Baldoyle-Stapolin Local Area Plan (2013) (LAP). The lands are bound by the Dublin-Belfast / DART railway line to the west, existing and proposed residential areas to the south and east, and future Racecourse Park to the north.

The proposed Project will consist of the development of 1,221 no. residential apartment / duplex dwellings in 11 no. blocks, ranging in height from 2 to 15 storeys and including for residential tenant amenity, restaurant / cafe, crèche, car and bicycle parking and public realm. Residential tenant amenity facilities will be located in Blocks E3, E4, G3, G4 and G5, and external communal amenity space will be provided at ground, podium and terrace levels throughout the proposed Project.

Car parking will be provided in a mix of undercroft for Blocks E1 - E2, F1 and F2, and at basement level for Blocks G1 - G3 and G4 - G5. Cycle parking spaces will be provided for residents, visitors and commercial uses, in secure locations and within the public realm throughout the proposed Project.

A new central public space between Blocks E1 - E2, E3 and E4, and a new linear space between Blocks G2 - G3 and G4 - G5, will provide pedestrian and cycle connectivity from Longfield Road to the proposed future Racecourse Park to the north. A proposed new bus, cycle, pedestrian and taxi ramp to the south of the Site and north of Stapolin Square will provide access from Longfield Road to Clongriffin Train Station.

1.4 Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is a process for the systematic examination of the *likely significant effects* on the environment of a proposed Project; ensuring that adequate consideration is given to any such effects; and avoiding, reducing or offsetting any significant adverse effects. The findings of this systematic examination are set out in the EIAR.

The environmental assessment presented in this EIAR has evaluated the *construction* (initial Site development works) and *operational* (the day-to-day functioning / operation of the Site) phases of the proposed Project. It describes the existing receiving (baseline) environment; identifies the likely significant impacts of the proposed Project; details any mitigation measures required to avoid, prevent, reduce or offset these impacts; and identifies any residual impacts anticipated to occur after mitigation.

An overview of the EIA process and the steps involved are set out in Table 1.1 below. Further discussion of the EIA process is presented in Chapter 2.

Table 1.1: Overview of the EIA Process

Stage	Description	Status
1. Screening	Is an EIA required?	Yes (Completed)
2. Scoping	The outline of the likely significant effects of the proposed Project and the aspects to be considered in the impact assessment.	Completed

Stage	Description	Status
3. Environmental Impact Assessment	This stage includes: ▪ Collection of the baseline information ▪ Analysis of the proposed Project ▪ Assessment of impacts ▪ Developing mitigation measures ▪ Setting out requirements for monitoring	**Current Stage**
4. Review & Decision	The EIAR accompanies the planning application to the planning authority (An Bord Pleanála) for determination of the application.	
5. Monitoring	Implementation and monitoring of the proposed mitigation measures.	Next Stage

1.5 Format & Structure of the EIAR

Table 1.2 below sets out the format and structure of this EIAR that has been prepared to allow for ease of presentation and consistency when considering the various environmental factors considered. The EIAR has been prepared having due regard to the Environmental Protection Agency's (EPA) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2017), which sets out that:

"A systematic approach, standard descriptive methods and the use of replicable assessment techniques and standardised impact descriptions must be adopted to ensure that all likely significant effects are adequately considered and clearly communicated."

This EIAR comprises three volumes as follows:

- Volume I: Non-Technical Summary.
- Volume II: Environmental Impact Assessment Report.
- Volume III: Appendices to the Environmental Impact Assessment Report.

Table 1.2: Structure of the EIAR

Chapter No.	Description
Volume 1: Non-technical Summary (NTS)	
Summary of the EIAR in non-technical language	
Volume 2: Main Report	
Chapters 1 - 3	Provide an introduction and background to the proposed Project.

Chapter No.	Description
Chapter 4	An assessment of the alternatives considered for the proposed Project.
Chapter 5	Description of the proposed Project assessed in the EIA.
Chapter 6	Consultation
Chapter 7	Population and Human Health
Chapter 8	Biodiversity (Flora and Fauna)
Chapter 9	Land, Soils, Geology and Hydrogeology
Chapter 10	Water (Hydrology)
Chapter 11	Air Quality and Climate
Chapter 12	Noise and Vibration
Chapter 13	Landscape and Visual
Chapter 14	Cultural Heritage, Archaeology and Architectural
Chapter 15	Microclimate - Daylight / Sunlight
Chapter 16	Microclimate - Wind
Chapter 17	Traffic and Transportation
Chapter 18	Material Assets - Waste
Chapter 19	Material Assets - Services
Chapter 20	Presents an overview of all the major interactions between the different environmental aspects as outlined above and the interactions between the various attributes.
Chapter 21	Presents the cumulative impacts of this EIAR with committed development
Chapter 22	Presents the schedule of environmental commitments/mitigation measures included in the EIAR for ease of reference.
Volume 3: Appendices	
Technical reference information supporting the EIAR Chapters.	

1.5.1 EIAR Team

The EIA was project managed, co-ordinated and produced by Brady Shipman Martin (BSM). BSM coordinated the EIA process and liaised between the design team and various specialist environmental consultants.

The environmental specialists were commissioned to complete the specialist environmental chapters of the EIAR, as required by the EIA Directive and Regulations, to provide objective input based on their experience and possession of the requisite knowledge of the latest and most appropriate scientific methodology and assessment procedures, as well as the correct understanding and interpretation of the relevant data. Article 5(3) of the 2014 EIA Directive, expressly requires that the developer must ensure that the EIAR is prepared by competent experts, stating that:

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

Table 1.3 provides the names of the professionals who have contributed to this EIAR and lists their qualifications and relevant experience; demonstrating that the EIAR has been prepared by qualified and competent experts.

1.5.2 Guarantee of Competency and Independence

In accordance with the EIA Directive 2014/52/EU, we confirm that the EIAR has been carried out by fully qualified and competent experts in their relevant fields as outlined in this chapter. Further, each expert has been made aware of and are vigilant to the possibility of accumulation of effects that may arise from multiple non-significant effects.

Table 1.3: EIAR Team

Name	Role / Input	Company	Qualifications & Experience
Thomas Burns	EIAR Project Manager	BSM	**B.Agr.Sc. (Land.) Dip. EIA Mgmt., Adv. Dip. Plan. & Env. Law** ▪ Environmental Planner and Landscape Architect ▪ Member of Irish Landscape Institute & Irish Environmental Law Association ▪ Over 30 years of experience in EIA and LVIA
Pauline Byrne	Planner and Co-ordinator	BSM	**BSC (Mgmt.), Adv. Dip Marketing, Master Regional & Urban Planning (MRUP)** ▪ Head of Planning ▪ Member of Royal Town Planning Institute (MRTPI) ▪ Member of Irish Planning Institute (MIPI) ▪ Over 20 years of experience
Lorraine Guerin	Population & Human Health; Material Assets – Services	BSM	**BSc (Hons) Ecology, MSc Environmental Management & Policy** ▪ Environmental Consultant ▪ Over 2 years of experience in EIA
Bryan Deegan	Biodiversity	Altemar Ltd	**BSc (Hons) Applied Marine Biology, MSc Environmental Science** ▪ Managing Director of Altemar Ltd ▪ Environmental scientist and aquatic biologist. ▪ NCEA National Diploma in Applied Aquatic Science ▪ NCEA National Certificate in Science (Aquaculture) ▪ Over 20 years of experience
Paul Conaghan	Land, Soils, Geology and Hydrogeology Hydrology (Surface Water)	AWN Consulting Ltd.	**BSc MSc** ▪ Environmental Consultant ▪ Member of the International Association of Hydrogeologists ▪ 9 years of experience
Niamh Nolan	Air Quality and Climate	AWN Consulting Ltd.	**BSoc Sci (Hons) in Social Policy and Geography** ▪ Associate Member of Institute of Air Quality Management (IAQM) and Institution of Environmental Science ▪ Over 4 years of experience

Name	Role / Input	Company	Qualifications & Experience
Leo Williams	Noise and Vibration	AWN Consulting Ltd.	**BAI MAI PgDip** ▪ Member of Institute of Acoustics (MIOA) ▪ Over 5 years of experience
Chris Kennett	Landscape and Visual	Kennett Consulting Ltd.	**BSc MSc, Diploma in Landscape Architecture & Diploma in Urban Design** ▪ Director of Kennett Consulting Limited ▪ Chartered Member of the Landscape Institute ▪ BSc in Landscape Design and Plant Science ▪ MSc in Sustainable Development
Dr. Clare Crowley	Archaeological, Architectural and Cultural Heritage	Courtney Deery	**BA (Hons) Ancient History, Archaeology & French & PhD in Archaeology** ▪ Senior Heritage Consultant ▪ Certificate in Repair and Conservation of Historic Buildings (Dublin Civic Trust, 2004) ▪ Certificate in Condition Surveys of Historic Buildings (University of Oxford, 2017) ▪ Over 20 years of experience
Carlota Álvarez	Microclimate – Daylight / Sunlight	O'Connor Sutton Cronin	**B.Eng. (Hons) in Marine Engineering** ▪ Lead of the Daylight and Sunlight section of O'Connor Sutton Cronin ▪ Over 4 years of experience
Dr. Cristina Paduano	Microclimate – Wind	B-Fluid	**PhD in Mechanical Engineering, with M.Eng and B.Eng in Aerospace Engineering** ▪ Chartered Engineer (CEng) ▪ Member of Engineers Ireland ▪ Specialist in computational fluid dynamics applications for urban environment ▪ Over 15 years of experience
Dr. Patrick Okolo	Microclimate – Wind	B-Fluid	**PhD in Aeroacoustics Eng., MEng in Mechanical Engineering** ▪ Chartered Engineer (CEng) ▪ Member of Engineers Ireland ▪ Specialist in computational fluid dynamics for urban environment ▪ Ten years of experience
Dr. Arman Safdari	Microclimate – Wind	B-Fluid	**PhD in Mechanical Engineering, with M.Sc. and B.Sc. in Mechanical Engineering** ▪ CFD Modelling Engineer

Name	Role / Input	Company	Qualifications & Experience
			■ Specialist in computational fluid dynamics applications ■ Expert in airflow modelling, heat and mass transfer and multi-phase flow simulations
Gordon Finn	Traffic and Transportation; Material Assets – Services	Cronin & Sutton Consulting Engineers	BA, BAI, MAI, MIEI ■ Roads and Traffic Engineer
Chonaill Bradley	Material Assets – Waste	AWN Consulting Ltd.	BEnvSc ■ Environmental Consultant – Waste Management ■ AssocMCIWM ■ Member of CIWM ■ 7 years of experience

1.6 Impact Assessment Methodology

The impact assessment methodology is detailed in respect of the various EIAR topics in the respective specialist Chapters herein. Unless otherwise stated, the criteria for impact characterisation (i.e. for describing effects / impacts) are as per the EPA 2017 EIAR Draft Guidelines (set out in Table 1.4, below).

The significance of an impact is determined through comparison of the character of the predicted impact to the sensitivity of the receiving environment / receptor as per the EPA 2017 Draft Guidelines (as illustrated in Figure 1.1, below).

Figure 1.1: Determination of Significance of Impact (EPA, 2017)

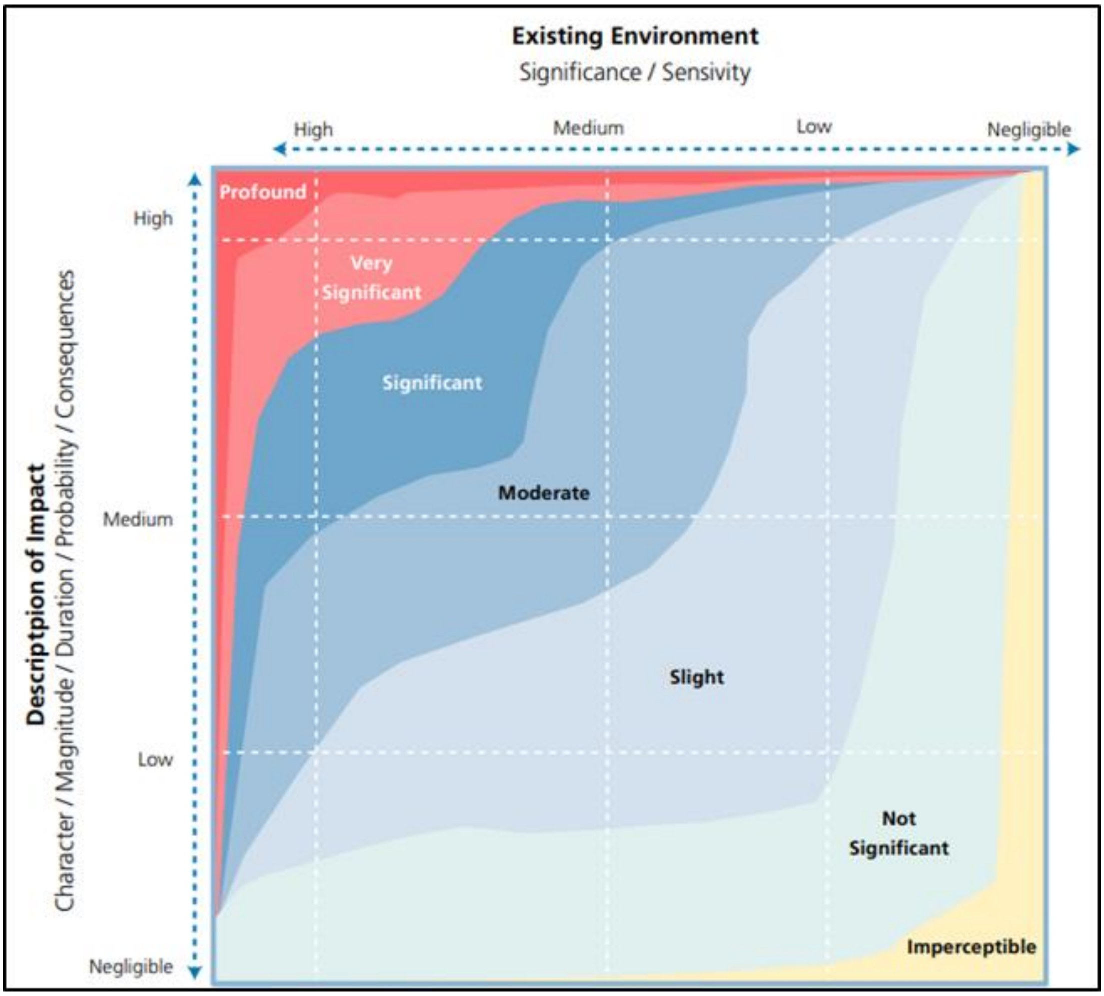


Table 1.4: Criteria for Effect / Impact Characterisation (EPA, 2017)

Criteria	Definition
Quality	
Positive	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	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 (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance	
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Extent & Context	
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.

Criteria	Definition
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration, Reversibility & Frequency	
Momentary	Effects lasting from seconds to minutes.
Brief	Effects lasting less than a day.
Temporary	Effects lasting less than a year.
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years.
Reversible	Effects that can be undone, for example through remediation or restoration.
Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually
Type	

Criteria	Definition
Indirect / Secondary	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 larger, more significant effects.
Do-Nothing	The environment as it would be in the future should the subject project not be carried out
Worst-case	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable	When the full consequences of a change in the environment cannot be described.
Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

2 The Environmental Impact Assessment (EIA) Process

This Chapter was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin.

2.1 EIA Legislation

The EIA Directive (Directive 85/337/EEC) was introduced in 1985. The Directive, along with its three subsequent amendments, was eventually codified by Directive 2011/92/EU, which was further amended by Directive 2014/52/EU. The 2014 Directive took effect in Ireland on the 16th of May 2017, and transposing legalisation, the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018), came into effect on the 1st of September 2018.

The EIA Directive aims to provide a high level of protection to the environment and ensure that environmental considerations are taken into account in the preparation of a proposed development or project, with a view to reducing environmental impacts. The EIA process also provides for public participation and thereby strengthens the quality, comprehensiveness and inclusivity of decision-making in relation to developments and projects.

The 2014 Directive requires that certain developments be assessed for *likely environmental effects* before planning approval be granted. When submitting a planning application for such development, the applicant must also submit an accompanying EIAR.

The Government has brought forward the PDR 2001 to provide for the transposition of the Directive into the Irish planning code. To this effect, the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 transposed the 2014 Directive into Irish law.

The Department also issued the updated *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment* in 2018, to provide practical guidance on legal and procedural issues arising from the requirement to undertake EIA in accordance with Directive 2014/52/EU. These Guidelines have informed the preparation of this EIAR. The preparation of the EIAR has also had regard to the EPA *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2017).

2.2 EIA Process

EIA is the process for anticipating the effects on the environment caused by a proposed development or project. Where effects are unacceptable, design or other measures can be taken to avoid or reduce these effects to acceptable levels. The EIAR is the document produced as a result of the EIA process, which:

- Provides a description of the baseline environment;
- Identifies the potential effects as a result of the proposed development or project; and
- Provides a description of any mitigation measures required to reduce or eliminate such potential effects.

The EIA process is summarised as follows:

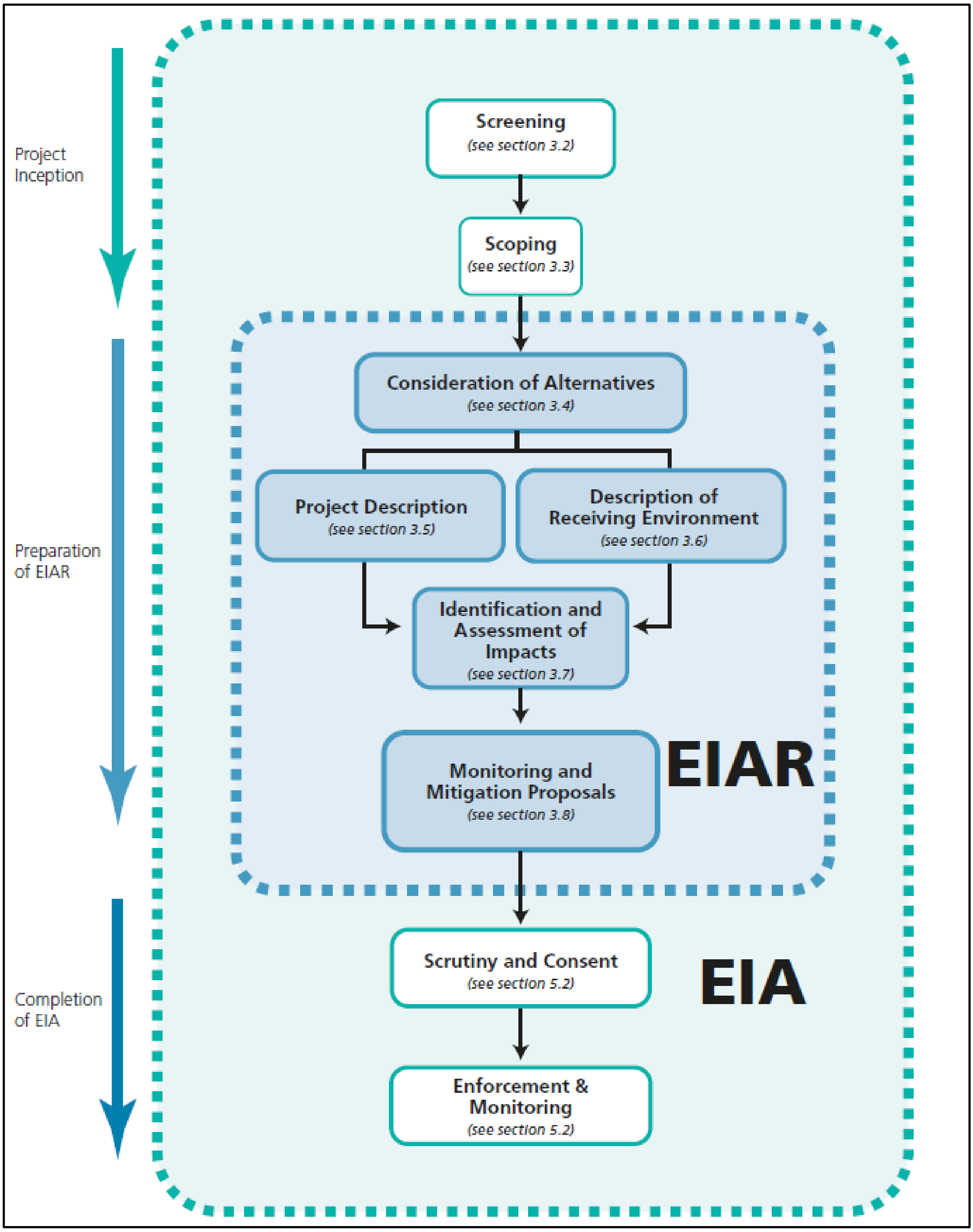
- **Screening**: Is an EIA required?
- **Scoping**: What issues should be considered in the EIAR?
- **Baseline Data Collection**: Establishing a robust baseline of the existing environment in the vicinity of the proposed Project. This includes a review of existing available information and undertaking any surveys identified during Scoping.
- **Impact Assessment**: Assessment of the environmental impacts and establishing their significance.
- **Mitigation:** A description of the mitigation measures needed to reduce or eliminate any significant environmental impacts identified, which cannot be avoided practically through design.
- **Consultation**: Consultation with Statutory Stakeholders, the public and other bodies, as appropriate.
- **Decision:** The Competent Authority (An Bord Pleanála in this case) decides, taking into consideration the results of stakeholder consultations, if the proposed Project can be authorised.
- **Implementation of Mitigation and Monitoring:** Assuming the development / project is granted permission and proceeds, the schedule of environmental commitments needs to be adhered to, including implementation of mitigation measures and monitoring set out in the EIAR.

In accordance with the requirements of Article 3 of the 2014 EIA Directive, the EIA shall identify, describe and assess in an appropriate manner, the direct and indirect significant effects of the proposed Project on the following factors:

> *" (a) population and human health;*
>
> *(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
>
> *(c) land, soil, water, air and climate;*
>
> *(d) material assets, cultural heritage and the landscape;*
>
> *(e) the interaction between the factors referred to in points (a) to (d)."*

The EIA process is summarised in Figure 2.1, below.

Figure 2.1: The EIA Process[1]



[1] EPA (2017).

2.3 EIA Methodology

2.3.1 EIA Guidance

This assessment of environmental impacts has been completed in accordance with, but not limited to, the following legislation and current guidance:

- DHPLG (2018). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- DHPLG (2017). Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition;
- EC (1999). Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions;
- EC (2013). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment;
- EC (2017). Environmental Impact Assessment of Projects. Guidance on Scoping;
- EC (2017). Environmental Impact Assessment of Projects. Guidance on the preparation of Environmental Impact Assessment Report;
- EPA (2015). Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;
- EPA (2017). Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Directive 2014/52/EC, amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment;
- PDA 2000, as amended; and
- PDR 2001, as amended.

In addition to these guidance documents, all EU Directives and national legislation relating to the specialist areas have been considered, as detailed in the various specialist Chapters of this EIAR.

2.3.2 EIA Screening

Screening is Stage 1 in the EIA process, whereby a decision is made on whether or not EIA is required. In order to determine whether EIA is required for the proposed Project, it is necessary to determine whether it is a project listed in one of the Annexes to Directive 2011/92/EU, as amended by Directive 2014/52/EU.

The 2014 Directive specifies the classes of project for which EIA is required and the information which must be contained within the EIAR. In accordance with Article 4(1) of the 2014 Directive, projects listed in Annex I are considered as having significant effects on the environment and shall be subject to EIA. For projects listed in Annex II of the Directive, national authorities may determine whether an EIA is needed, either on the basis of thresholds / criteria or case-by-case examinations.

These Annexes have been transposed into Irish law by the provisions of the PDA 2000 and the PDR 2001. Specifically, projects requiring mandatory EIA are listed in Part 1 of Schedule 5 of the PDR 2001 and those requiring mandatory EIA as a result of exceeding or meeting a stated threshold are listed in Part 2 of Schedule 5 of the PDR 2001.

Schedule 5 (Part 1) of the PDR 2001 (as amended) lists major project classes for the purposes of mandatory EIA, which typically include industrial, chemical, energy, waste, infrastructure and intensive agricultural developments. The proposed Project does not correspond to a class of development set out in this Part and therefore, EIA is not a mandatory requirement under this provision.

Schedule 5 (Part 2) of the PDR 2001 (as amended) sets thresholds for each project class at or above which EIA is required. Sub-sections 10(b)(i) and 10(b)(iv) require that the following classes of project be subject to EIA:

> *"Class 10(b) (i). Construction of more than 500 dwelling units."*
>
> *"Class 10(b) (iv). Urban development which would involve an area greater than 2ha in the case of a business district, 10ha in the case of other parts of a built-up area and 20ha elsewhere."*

The proposed Project provides for 1,221 no. new residential units on a Site of 6.89 ha, and therefore exceeds the above-stated threshold in respect of Class 10(b)(i). Therefore, EIA is required under Schedule 5 (Part 2) of the PDR 2001 as amended, and an EIAR (this report) has been prepared to accompany the planning application.

2.3.2.1 Appropriate Assessment (AA)

European Sites, also known as the 'Natura 2000' network, include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). These are a network of sites designated for nature conservation under Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') and Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the 'Birds Directive'). The requirements for Appropriate Assessment (AA) are set out under Article 6 of the Habitats Directive, transposed into Irish law by the European Union (Birds and Natural Habitats) Regulations 2011-2015[2] (the 'Birds and Natural Habitats Regulations') and the PDA 2000.

Article 6(3) of the Habitats Directive states that:

> *"Any plan or project not directly connected with or necessary to the management of the site but likely to have significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

The first test is to establish whether, in relation to a particular plan or project, AA is required. Sections 177U of the PDA 2000 and Regulation 42 of the Birds and Natural Habitats Regulations require that the AA screening test must be applied to a proposed development / project, as follows:

- To assess, in view of best scientific knowledge, if the development, individually or in combination with another plan or project is likely to have a significant effect on the European site; and

[2] S.I. No. 477 of 2011; S.I. No. 290 of 2013; S.I. No. 499 of 2013; and S.I. No. 355 of 2015.

- AA is required if it cannot be excluded, on the basis of objective information, that the development, individually or in combination with other plans or projects, will have a significant effect on a European Site.

An AA Screening Report and Natura Impact Statement (NIS) have been prepared for the proposed Project in accordance with the requirements of Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('the Habitats Directive') and Directive 2009/147/EC on the conservation of wild birds ('the Birds Directive'), the European Union (Birds and Natural Habitats) Regulations 2011 – 2015 and the PDA 2000. The findings of the AA are presented in the NIS, which is submitted under separate cover as part of the planning application.

2.3.3 EIA Scoping

The EPA Guidelines state that 'scoping' is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is defined in the EC guidance[3] as "*determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR".*

Scoping requires the consideration of the nature and likely scale of the potential environmental impacts likely to arise from a proposed development or project. This was carried out on an informal basis through the pre-planning process with both Fingal County Council and An Bord Pleanála, where key issues to be considered were identified and discussed.

The Scoping process is an iterative process which is ongoing throughout the development of the EIAR. The Scoping of this EIAR has been informed by consultations with Fingal County Council and An Bord Pleanála. The following topics, which include those set out in Directive 2011/92/EU, as amended by Directive 2014/52/EU, have been scoped in for this assessment:

- Population & Human Health
- Biodiversity (Flora & Fauna)
- Land, Soils, Geology & Hydrogeology
- Hydrology (Surface Water)
- Air Quality & Climate

[3] EC (2001).

- Noise & Vibration
- Landscape & Visual
- Archaeology, Architectural & Cultural Heritage
- Microclimate – Daylight & Sunlight
- Microclimate – Wind
- Traffic & Transportation
- Material Assets – Waste
- Material Assets – Services
- Interaction between above-listed environmental factors

The amended EIA Directive (2014/52/EU) requires that the EIAR "shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned" (Article 3). The objective of this requirement is to ensure appropriate risk management in this case of proposals which *"…because of their vulnerability to major accidents and/or natural disasters (such as flooding, sea level rise, or earthquakes), are likely to have significant adverse effects on the environment"*. In the absence of national guidance on the assessment of impacts in relation to major accidents and disasters (MADs), the 2020 IEMA document, Major Accidents and Disasters in EIA: A Primer, is referred to. In relation to scoping, the IEMA primer states that *"A major accidents and/or disasters assessment will be relevant to some developments more than others, and for many developments it is likely to be scoped out of the assessment"* (p. 12). It is further stated that the topic may be scoped out in the event that:

1. There is no source-pathway-receptor linkage of a hazard that could trigger a major accident and / or disaster[4] or potential for the scheme to lead to a significant environmental effect; or

[4] Where a 'major accident' is defined as *"Events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events"* and a 'disaster' is defined as *"a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident"* (IEMA, 2020, p. 4).

2. All possible major accidents and/ or disasters are adequately covered elsewhere in the assessment or covered by existing design measures or compliance with legislation and best practice.

Considering the nature of the receiving environment and the proposed Project, it is considered that there is no source-pathway-receptor linkage of a hazard which could trigger what would constitute a MAD. As such, an assessment of impacts in relation to MADs has been scoped out of this EIAR. The risks of feasible accidents and natural events are addressed, where relevant, in the various specialist chapters herein. Flood risk, for instance, is addressed in Chapter 10 (Hydrology); while geohazards are addressed in Chapter 9 (Land, Soils, Geology & Hydrogeology).

An assessment of impacts in relation to Seveso Sites[5] is often included in the MAD impact assessment. However, it has been confirmed through consultation with the Health & Safety Authority that there are no Seveso Sites within close proximity or within statutory consultation distances[6] of the Project Site. The nearest Seveso Site is Exolum Aviation Ireland Ltd at Dublin Airport, at a c. 6 km linear distance from the proposed Project. The statutory consultation distance for this Site is 400 m. There are also a cluster of Seveso Sites at Dublin Port and Ringsend (c. 7 – 8 km linear distance), but none of these are within consultation distance of the proposed Project. It follows that the proposed Project is not likely to be affected by an accident at any Seveso Site in the wider area; and vice versa, nor is any Seveso Site likely to be affected by the proposed Project itself.

2.4 EIA Consultation

Decisions are taken by the Competent Authority through the statutory planning process which allows for public participation and consultation while receiving advice from other key stakeholders and statutory authorities with specific environmental responsibilities. Public participation and consultation is an integral part of the SHD process as outlined in the Planning & Development (Strategic Housing Development) Regulations 2017 (S.I. No. 271 of 2017) and in the An Bord Pleanála publication, *Strategic Housing Development Pre-Application*

[5] Industrial sites that, because of the presence of dangerous substances in sufficient quantities, are regulated under Council Directives 96/82/EC and 2003/105/EC (the Seveso II Directive).
[6] The area which is liable to be affected by a major accident at a particular Seveso Site.

Consultation – Guidance for Prospective Applicants (2017). A detailed account of the consultation process for the proposed Project is provided in Chapter 6.

3 Planning & Development Context

3.1 Introduction

This Chapter sets out the policy context (multilateral, European Union, national, regional and local) related to the planning and development of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13. It has been prepared by Lorraine Guerin, Environmental Consultant at BSM, and Pauline Byrne, Head of Planning and Partner at BSM.

It should be noted that a Statement of Consistency, which discusses the consistency of the proposed Project with relevant national planning policy, has also been prepared by BSM, and is submitted under separate cover as part of the planning application.

The proposed Project falls under the definition of Strategic Housing Development (SHD) as set out under Section 3 of the Planning and Development (Housing) and Residential Tenancies Act 2016 (SHD 2016 Act) in that "*strategic housing development*" means:

(a) the development of 100 or more houses on land zoned for residential use or for a mixture of residential and other uses,

(b) the development of student accommodation units which, when combined, contain 200 or more bed spaces, on land the zoning of which facilitates the provision of student accommodation or a mixture of student accommodation and other uses thereon,

(c) development that includes developments of the type referred to in paragraph (a) and of the type referred to in paragraph (b), or

(d) the alteration of an existing planning permission granted under section 34 (other than under subsection (3A)) where the proposed alteration relates to development specified in paragraph (a), (b) or (c), each of which may include other uses on the land, the zoning of which facilitates such use, but only if-

(i) the cumulative gross floor area of the houses or student accommodation units, or both, as the case may be, comprises not less than 85 per cent, or such other percentage as may be prescribed, of the gross floor space of the proposed development or the number of houses or proposed bed spaces within student

accommodation to which the proposed alteration of a planning permission so granted relates, and

(ii) the other uses cumulatively do not exceed—

I. 15 square metres gross floor space for each house or 7.5 square metres gross floor space for each bed space in student accommodation, or both, as the case may be, in the proposed development or to which the proposed alteration of a planning permission so granted relates, subject to a maximum of 4,500 square metres gross floor space for such other uses in any development, or

II. such other area as may be prescribed, by reference to the number of houses or bed spaces in student accommodation within the proposed development or to which the proposed alteration of a planning permission so granted relates, which other area shall be subject to such other maximum area in the development as may be prescribed."

The proposed Project meets the requirements for strategic housing development as it will provide 1,221 residential units (a mix of duplexes and apartments) on lands zoned for residential development.

The following policy documents of relevance are discussed in relation to the proposed Project herein:

Multilateral and European Policy Context

- United Nations Sustainable Development Goals

National Policy Context

- Sustainable Urban Housing – Design Standards for New Apartments (2020)
- Climate Action Plan (2019)
- Project Ireland 2040 – National Planning Framework (2018 – 2040)
- Urban Development and Building Heights – Guidelines for Planning Authorities (2018)
- Rebuilding Ireland – Action Plan for Housing and Homelessness (2016)
- Design Manual for Urban Roads and Streets (2013)
- Smarter Travel – A Sustainable Transport Future (2009 – 2020)

- Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009)
- Urban Design Manual – A Best Practice Guide (2009)
- The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)
- Delivering Homes, Sustaining Communities (2007)
- Childcare Facilities – Guidelines for Planning Authorities (2001)

Regional Policy Context

- Eastern and Midland Regional Assembly – Regional Spatial and Economic Strategy (2019 – 2031)
- Transport Strategy for the Greater Dublin Area (2016 – 2035)

Local Policy Context

- Fingal Development Plan (2017 – 2023)
- Baldoyle-Stapolin Local Area Plan (2013) (as extended)

3.2 Multilateral and European Policy Context

3.2.1 United Nations Sustainable Development Goals

The United Nations' 17 Sustainable Development Goals (SDGs) provide a *"shared blueprint for peace and prosperity for people and the planet, now and into the future"* (Figure 3.1). They were adopted by the United Nations Member States – including Ireland – in 2015, as part of the adoption of the 2030 Agenda for Sustainable Development. These high-level goals frame and inform Irish national agendas and policies to 2030, including (but not limited to) Project Ireland 2040 (National Planning Framework) and the Eastern and Midland Regional Assembly's Regional Spatial and Economic Strategy, discussed below.

Goal 11 is of greatest relevance to the proposed Project: to make cities and human settlements inclusive, safe, resilient and sustainable. The UN has established a set of targets and indicators to measure progress against this goal to 2030, which include Target 11.1, to *"… ensure access for all to adequate, safe and affordable housing and basic services…"*, and Target 11.7, to *"… provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities"*.

The proposed Project is consistent with this SDG, in that it will provide new, high quality residential units in the Dublin Metropolitan Area (DMA), an area in which there is significant demand for housing. It will also provide a safe and accessible, high quality public realm.

Figure 3.1: The United Nations Sustainable Development Goals

3.3 National Policy Context

3.3.1 Sustainable Urban Housing – Design Standards for New Apartments (2020)

Sustainable Urban Housing – Design Standards for New Apartments was published in 2018 by the Department of Housing, Local Government and Heritage. It was subsequently updated in 2020, principally to introduce a presumption against co-living development.

It provides standards for apartment developments in a manner consistent with the national-level policy, particularly the Housing Agency's *National Statement on Housing Demand and Supply*, and the Government's *National Planning Framework* [NPF] and *Rebuilding Ireland – Action Plan for Housing and Homelessness.* Generally speaking, the principal objectives of these policies in relation to housing are to significantly increase supply and ensure that supply is delivered at locations and scales that are appropriate and sustainable. The document sets out a series of specific planning policy requirements (SPPRs), which planning authorities and An Bord Pleanála are required to have regard to in relation to apartment developments.

It states that *"… the purpose of these Guidelines is to strike an effective regulatory balance in setting out planning guidance to achieve both high quality apartment development and a significantly increased overall level of apartment output"* (p. 2).

The Guidelines sets out the general rationale for this increased apartment output as follows:

> *"Given the gap between Irish and European averages in numbers of households living in apartments and the importance of addressing the challenges of meeting the housing needs of a growing population in our key cities and towns and by building inwards and upwards rather than outwards, apartments need to become more and more the norm for urban housing solutions. This need will continue because of on-going population growth, particularly in Ireland's cities, a long-term move towards smaller average household size, an ageing and more diverse population, with greater labour mobility, and a higher proportion of households in the rented sector."* (p. 2)

In relation to the location of apartment developments, the Guidelines states that *"Existing public transport nodes or locations where high frequency public transport can be provided, that are close to locations of employment and a range of urban amenities including parks/waterfronts, shopping and other services, are also particularly suited to apartments"* (p. 5). It is further stated that central and / or accessible urban locations, including *"Sites within reasonable walking distance (i.e. up to 10 minutes or 800-1,000m) to/from high capacity urban public transport stops (such as DART or Luas)"* are generally suitable for small- to large-scale and higher density development (although this will vary subject to location) (p. 5).

A Housing Quality Assessment, prepared by HJL Architects, is submitted under separate cover as part of this planning application. It demonstrates the compliance of the proposed Project with the relevant standards as set out in the Guidelines, including SPPR3, *Minimum Apartment Floor Areas*, and SPPR 4, *Dual Aspect Apartments*. Please also refer to the Statement of Consistency prepared by BSM and submitted under separate cover, which addresses the consistency of the proposed Project with the Guidelines.

3.3.2 Climate Action Plan (2019)

With a view to reducing Ireland's greenhouse gas emissions in response to the Paris Agreement, the Government's *Climate Action Plan* (2019) sets out high-level decarbonisation targets to 2030 for all sector in Irish society, including the built environment.

The Plan states that the built environment accounted for 12.7% of Ireland's greenhouse gas emissions in 2017. The Government's targets for the sector include reducing CO_2 emissions by 40 – 50% relative to the 2030 pre-National Development Plan projections, and to sharply reduce fossil fuel reliance in buildings. Key measures set out to deliver the Plan's targets for the sector include ensuring that every significant new build takes the opportunity to maximise the adoption of climate resilient measures; promoting the adoption of heat pump and other renewable heating technologies; and implementing more stringent building regulations, with all new buildings to be Near Zero Energy Buildings (NZEB) from the second half of 2019.

Notably in relation to the proposed Project, it is stated that:

> *"Better spatial planning will reduce the carbon emissions of new developments, and deliver a better quality of life, including shorter commute times, better connections between our places of work and homes, and more vibrant, people-focused environments."* (p. 31)

For further information in relation to the climate impacts of the proposed Project, please refer to Chapter 11 (Air Quality & Climate).

3.3.3 Project Ireland 2040 – National Planning Framework (2018 – 2040)

Project Ireland 2040 is the Government's overarching planning and development policy for the country to 2040. It constitutes a *"strategy to make Ireland a better country for all of its people"* by setting public investment policy at a high level. It is comprised of two documents: the National Planning Framework (NPF), which details the strategy for development to 2040; and the National Development Plan (NDP), which outlines the public expenditure required to implement this strategy and identifies priority future projects.

The NPF presents ten National Strategic Outcomes (NSOs), *"a shared set of goals for every community across the country"* (p. 10), which it aims to deliver:

1. Compact Growth
2. Enhanced Regional Accessibility
3. Strengthened Rural Economies and Communities
4. Sustainable Mobility
5. A Strong Economy, supported by Enterprise, Innovation and Skills

6. High-Quality International Connectivity
7. Enhanced Amenity and Heritage
8. Transition to a Low Carbon and Climate Resilient Society
9. Sustainable Management of Water and other Environmental Resources
10. Access to Quality Childcare, Education and Health Services

A corresponding suite of National Policy Objectives (NPOs) are set out with a view to achieving these NSOs.

In order to meet the needs of Ireland's growing population, the NPF requires delivery of a baseline of 25,000 homes annually to 2020, followed by a likely level of 30 – 35,000 annually up to 2027. The NPF aims to promote a departure from previous patterns of sprawl, instead delivering 'compact growth', with 40% of future housing to be delivered within and close to the existing footprint of built-up areas.

The NPF identifies the urgent requirement for a major uplift of the delivery of housing within the existing built-up areas of cities and other urban areas. It has a particular focus on brownfield development, targeting derelict and vacant sites that may have been developed before but have fallen into disuse.

With regards to Dublin, the NPF identifies that Dublin City needs to *"accommodate a greater proportion of the growth it generates within its metropolitan boundaries and to offer improved housing choice"*.

The following NPOs are of particular relevance to the proposed Project:

- NPO 4 is to *"Ensure the creation of attractive, liveable, well designed, high quality urban places that are home to diverse and integrated communities that enjoy a high quality of life and well-being."*
- NPO 11 states that *"In meeting urban development requirements, there will be a presumption in favour of development that can encourage more people and generate more jobs and activity within existing cities, towns and villages, subject to development meeting appropriate planning standards and achieving targeted growth."*
- NPO 13 further states that *"In urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well-designed high quality outcomes in order to achieve targeted*

> *growth. These standards will be subject to a range of tolerance that enables alternative solutions to be proposed to achieve stated outcomes, provided public safety is not compromised and the environment is suitably protected."*

The NPF requires homes to be located in places that can support sustainable development. This includes places that are accessible to a range of local services, can encourage the use of public transport, walking and cycling, and help tackle climate change.

The proposed Project is well aligned with the NPFs policies, in that it will provide a large number of additional well-designed, high quality and liveable residential units within the DMA and at a Site well served by existing and future proposed public transport services.

3.3.4 Urban Development and Building Heights – Guidelines for Planning Authorities (2018)

The *Urban Development and Building Heights Guidelines for Planning Authorities* (UD & BHGs) were published in December 2018 by the Minister for Housing, Planning & Local Government. They have been published to support the objectives of the NPF, by securing a more compact and sustainable manner of development in urban areas. The Minister's foreword to the UD & BHGs sets out the Government policy on urban building heights, characterising the traditional settlement pattern of *"constantly expanding low-rise suburban residential areas resulting in ever longer commutes, more and more congestion, empty suburbs by day and empty city and town cores by night"* as *"completely unsustainable"*. The UD & BHGs support a departure from this trend, stating that *"Our cities and towns must grow upwards, not just outwards"* (ibid.).

It is stated that:

> *"Reflecting the National Planning Framework strategic outcomes in relation to compact urban growth, the Government considers that there is significant scope to accommodate anticipated population growth and development needs, whether for housing, employment or other purposes, by building up and consolidating the development of our existing urban areas."* (p. 2)

> *"Securing compact and sustainable urban growth means focusing on reusing previously developed 'brownfield' land, building up infill sites (which may not have been built on before) and either reusing or redeveloping existing sites and buildings, in well serviced*

> *urban locations, particularly those served by good public transport and supporting services, including employment opportunities."* (p. 4)

The UD & BHGs reference NPO 13 (of the NPF) which states that *"in urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well designed high quality outcomes in order to achieve targeted growth. These standards will be subject to a range of tolerance that enables alternative solutions to be proposed to achieve stated outcomes, provided public safety is not compromised and the environment is suitably protected"* (p. 5).

It recognises that in meeting the challenge set out above new approaches to urban planning and development are required and that securing an effective mix of uses within urban centres is critical. To bring about this increased density and increased residential development in urban centres the UD & BHGs state that *"significant increases in the building heights and overall density of development is not only facilitated but actively sought out and brought forward by our planning processes and particularly so at local authority and An Bord Pleanála levels […] Increasing prevailing building heights therefore has a critical role to play in addressing the delivery of more compact growth in our urban areas… "* (p. 5).

It is further stated that:

> *"In some cases, statutory development plans have tended to set out overly restrictive maximum height limits in certain locations and crucially without the proper consideration of the wider planning potential of development sites and wider implications of not maximising those opportunities by displacing development that our wider society and economy needs to other locations that may not be best placed to accommodate it."* (p. 8)

The proposed Project features new residential buildings ranging in height from two to 15 storeys. The proposed range of building heights contravenes the limits set out in the *Baldoyle-Stapolin Local Area Plan* (2013) as extended (LAP), which stipulates an upper limit of 4 – 4.5 storeys with the possibility of 'punctuation nodes' of increased height for residential development in this area. The LAP also stipulates a general density of 42 – 80+ units / ha across the Site, which the proposed density of 177 units / ha also exceeds.

A Material Contravention Statement has been submitted under separate cover as part of the planning application. It provides a rationale for these contraventions, based on the more recent national-level policies of the UD & BHGs and the NPF, as well as the regional-level policies of the *Fingal Development Plan (2017 – 2023)*. The Statement submits that, despite these contraventions, the proposed Project is consistent with the ultimate aims and objectives of the Development Plan, LAP and wider regional and national-level policies. Refer to the Material Contravention Statement for further detail in this respect.

3.3.5 Rebuilding Ireland – Action Plan for Housing and Homelessness (2016)

Rebuilding Ireland is the Government's Action Plan for Housing and Homelessness, launched in 2016. The Plan's aim is to accelerate housing supply by addressing the needs of homeless people and families in emergency accommodation, accelerate the provision of social housing, deliver more housing, utilise vacant homes and improve the rental sector.

The Plan contains five key pillars:

1. *Address Homelessness :* Provide early solutions to address the unacceptable level of families in emergency accommodation; deliver inter-agency supports for people who are currently homeless, with a particular emphasis on minimising the incidence of rough sleeping, and enhance State supports to keep people in their own homes.
2. *Accelerate Social Housing:* Increase the level and speed of delivery of social housing and other State-supported housing.
3. *Build More Homes:* Increase the output of private housing to meet demand at affordable prices.
4. *Improve the Rental Sector:* Address the obstacles to greater private rented sector delivery, to improve the supply of units at affordable rents.
5. *Utilise Existing Housing:* Ensure that existing housing stock is used to the maximum degree possible - focusing on measures to use vacant stock to renew urban and rural areas.

The proposed Project is consistent with Pillars 3 and 4, as it is proposing to construct 1,221 new residential units on a strategically located site in the DMA, providing a variety of unit types to suit differently sized households, including a significant number of smaller units, for which there is increasing demand. The proposed Project will also deliver 122 (10% of total) Part V social housing units.

3.3.6 Design Manual for Urban Roads and Streets (2013)

The *Design Manual for Urban Roads and Streets* (DMURS) was adopted by the Department of Transport and the Department of Environment (now Housing) in 2013. It sets out design guidance and standards for new / reconfigured urban roads and streets in Ireland. It also outlines practical design measures to encourage more sustainable travel patterns in urban areas.

The proposed Project is the outcome of integrated urban design and landscaping to create lower traffic speeds through the Site and, thereby, facilitate a safer environment for pedestrians and cyclists. The DMURS Statement of Consistency, prepared by Cronin Sutton and submitted as part of the planning application under separate cover, details the compliance of the proposed Project with DMURS.

3.3.7 Smarter Travel – A Sustainable Transport Future (2009 – 2020)

Smarter Travel – A Sustainable Transport Future (2009 – 2020) outlines the Government's goals to achieve transport sustainability as follows:

1. Reduce overall travel demand;
2. Maximise the efficiency of the transport network;
3. Reduce reliance on fossil fuels;
4. Reduce transport emissions; and
5. Improve accessibility to transport.

The key targets that the Smarter Travel Policy sets to achieve these goals area:

- Future population and employment growth will predominantly take place in sustainable compact forms, which reduce the need to travel for employment and services
- 500,000 more people will take alternative means to commute to work to the extent that the total share of car commuting will drop from 65% to 45%
- Alternatives such as walking, cycling and public transport will be supported and provided to the extent that these will rise to 55% of total commuter journeys to work

The total kilometres travelled by the car fleet in 2020 will not increase significantly from current levels

- A reduction will be achieved on the 2005 figure for greenhouse gas emissions from the transport sector.

The proposed Project will promote sustainable personal mobility decisions by virtue of its proximity to existing and future proposed public transport services (including its location immediately adjacent to the Clongriffin rail station), and the proposal to minimise car parking provision (with a ratio of 0.54 spaces per residential unit) while maximising bicycle parking (one space per bedroom, not including additional visitor spaces) and providing other cyclist facilities. The proposed Project will also provide electric vehicle (EV) charging points at 10% of car parking spaces.

3.3.8 Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009)

The Department of Environment, Heritage and Local Government's *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas* (2009) set out the key planning principles guiding the delivery of residential development in urban areas in Ireland. They establish core principles of urban design, with a view to creating urban places of high quality and distinct identity. The Guidelines are accompanied by an *Urban Design Manual*, which is discussed in relation to the proposed Project in the following section.

The guidelines reiterate the need for compact urban residential development expressed in the NPF:

> *"… planning authorities should promote increased residential densities in appropriate locations, including city and larger town centres… This recommendation was based on three significant social, economic and environmental considerations, namely:*
>
> - *The trend towards smaller average household sizes,*
> - *The need to encourage the provision of affordable housing, particularly in the greater Dublin area, and*
> - *The need to reduce CO_2 emissions by reducing energy consumption and to support a more efficient use of energy in the residential and transport sectors, in line with Ireland's commitments under the Kyoto Protocol."* (p. 40)

It is also stated that *"firm emphasis must be placed by planning authorities on the importance of qualitative standards in relation to design and layout in order to ensure that the highest quality of residential environment is achieved"* (ibid). These qualitative standards are set out in the *Urban Design Manual*, the *Fingal Development Plan* and in the *Sustainable Urban Housing Design Standards for New Apartments*, which have informed the design approach for the proposed Project.

To maximise the return on public transport investment, the Guidelines also identify that it is important that land use planning underpins the efficiency of public transport services by sustainable settlement patterns, including higher densities, on lands within existing or planned transport corridors – this includes Sites within 500 m walking distance of a bus stop, or 1 km of a light rail stop or a rail station. The proposed Project, situated immediately adjacent to the existing rail station at Clongriffin and in area served by existing and future proposed public bus services, is consistent with this policy.

3.3.9 Urban Design Manual – A Best Practice Guide (2009)

The *Urban Design Manual* provides best practice guidance on the practical implementation of the policies contained in the *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas* (2009) (discussed above). The core aim of the Manual is to provide developers, designers and planners with the information and support they need to improve the design quality and sustainability of the development schemes with which they are involved. It focuses primarily on the issues presented in housing schemes in the 30 – 50 units per hectare range but also addresses some of the specific issues generated by higher and lower density developments.

The Manual is based around 12 criteria for sustainable residential development, under the headings of 'neighbourhood', 'site', and 'home', as follows:

Neighbourhood

- Context – *How does the development respond to its surroundings?*
- Connections – *How well connected is the new neighbourhood?*
- Inclusivity – *How easily can people use and access the development?*
- Variety – *How does the development promote a good mix of activities?*

Site

- Efficiency – *How does the development make appropriate use of resources, including land?*
- Distinctiveness – *How do the proposals create a sense of place?*
- Layout – *How does the proposal create people friendly streets and spaces?*
- Public Realm – *How safe, secure and enjoyable are the public areas?*

Home

- Adaptability – *How will the buildings cope with change?*
- Privacy & Amenity – *How does the scheme provide a decent standard of amenity?*
- Parking – *How will the parking be secure and attractive?*
- Detailed Design – *How well thought through is the building and landscape design?*

The Manual recommends that these criteria be used in the assessment of residential planning applications. It identifies areas where conflicts may arise between particular criteria, stating that *"Certain issues have been identified where it may be necessary to find a balance between potentially conflicting design objectives"* (p. 9). The criteria of the *Urban Design Manual* have been given due consideration in the design of the proposed Project. Please refer to the Statement of Consistency, prepared by BSM and submitted as part of the planning application under separate cover, for a more detailed discussion of how the proposed Project aligns with the above-listed criteria.

3.3.10 The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)

The *Planning System and Flood Risk Management – Guidelines for Planning Authorities* was published by the Office of Public Works (OPW) and Department of Environment, Heritage and Local Government in 2009.

The guidelines introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. They aim to, among other things; avoid inappropriate development in areas at risk of flooding, and avoid new developments increasing flood risk elsewhere. They mandate the preparation of Site Specific Flood Risk Assessments (SSFRA) for development applications which relate to areas at risk of flooding, and stipulate the content and level of detail to be presented therein.

In accordance with these guidelines, a SSFRA has been prepared for the proposed Project by JBA Consulting, and has been submitted as part of the planning application under separate cover. In short, it has found that all proposed residential properties are situated in Flood Zone C and protected from inundation up to the 0.1% AEP HEFS tidal event. The proposed Project was not found to have a negative impact on flood levels downstream without mitigation. For further detail, please refer to the SSFRA and / or to Chapter 10 (Hydrology) herein. Section 5.1.1 in Chapter 5 (Description of the Proposed Project) also provides a more detailed summary.

3.3.11 Delivering Homes, Sustaining Communities – Statement on Housing Policy (2007)

The Department of Environment, Heritage and Local Government's 2007 policy statement, *Delivering Homes, Sustaining Communities – Statement on Housing Policy*, provides an overarching policy framework for an integrated approach to housing and planning. It notes that demographic factors will continue to underpin strong demand for housing, which in turn will present considerable challenges for the physical planning of new housing and the provision of associated services in Ireland:

> *"The coming decade is likely to be just as dynamic as the last. Housing policy and supports will need to reflect the demands of a growing population and greater cultural and ethnic diversity, changing social and economic conditions and rising expectations regarding the quality of accommodation on offer and the range of choice available to households. In meeting these challenges, the central guiding principles of housing policy must address three key goals – building sustainable communities, responding to housing needs and delivering housing services efficiently and effectively."* (p. 23)

The statement defines 'sustainable neighbourhoods' as areas where an efficient use of land, high quality urban design and effective integration in the provision of physical and social infrastructure such as public transport, schools, amenities and other facilities combine to create places people want to live in. It acknowledges the *"important role"* of the private rental sector in meeting increasing demand for accommodation (p. 35).

It sets out a series of 'actions focused on building sustainable communities' including promoting the supply of *"sufficient homes of the right type, in the right locations, integrated* *with other infrastructure requirements”* and improving *“the environmental sustainability of new housing through voluntary codes and building regulations”* (pp. 11 – 12).

It is considered that the proposed Project is consistent with the vision for housing set out in the Statement, in that it will provide high quality residential units (including 10% Part V social housing allocation) that is strategically located in terms of proximity to existing community amenities, public transport services and employment hubs. Please also refer to the Schools & Childcare Assessment and the Community & Social Infrastructure Audit, prepared by BSM and submitted under separate cover as part of the planning application, which assess the ability of the existing and permitted community amenities in the vicinity to support the operation of the proposed Project.

3.3.12 Childcare Facilities – Guidelines for Planning Authorities (2001)

Childcare Facilities – Guidelines for Planning Authorities (2001) provide a framework to guide Local Authorities in preparing development plans and assessing applications for planning permission, and developers and childcare providers in formulating development proposals.

They state that Local Authority policies should focus on *“The identification of appropriate locations for the provision of childcare facilities including city centres, district centres, neighbourhood centres, residential areas, places of employment, and educational institutions and convenience to public transport nodes as a key element in the development of sustainable communities”* (p. 4). These locations also include larger housing estates, where planning authorities should require the provision of a minimum of one childcare facility with 20 places for each 75 dwellings. However, *Sustainable Urban Housing – Design Standards for New Apartments* (2018) (discussed above) states the following:

> *“Notwithstanding the Planning Guidelines for Childcare Facilities (2001), in respect of which a review is to be progressed, and which recommend the provision of one child-care facility (equivalent to a minimum of 20 child places) for every 75 dwelling units, the threshold for provision of any such facilities in apartment schemes should be established having regard to the scale and unit mix of the proposed development and the existing geographical distribution of childcare facilities and the emerging demographic profile of the area. One-bedroom or studio type units should not generally be considered to*

> *contribute to a requirement for any childcare provision and subject to location, this may also apply in part or whole, to units with two or more bedrooms."* (pp. 20 – 21)

The proposed Project contains roughly 40% studios and one-bed apartments, which, as per the above-stated, should be discounted in the calculation of the childcare requirement. The calculation of the childcare requirement of the proposed Project, combined with a consideration of the local area population statistics, results in a requirement for a crèche for approx. 113 childcare spaces, to be delivered under the scope of the proposed Project.

A Childcare & Schools Assessment, carried out by BSM and submitted under separate cover as part of the planning application, has concluded that the proposed crèche, in combination with these existing and permitted crèches in the wider area, will meet residents' demand for childcare facilities.

3.4 Regional Policy Context

3.4.1 Eastern and Midland Regional Assembly – Regional Spatial and Economic Strategy (2019 – 2031)

There are three administrative Regions in Ireland: the Northern and Western Region, the Southern Region, and the Eastern and Midland Region. Under national policy, Regional Assemblies are tasked with drafting Regional Spatial and Economic Strategies (RSESs), which effectively set the agenda for implementing the national level development policy – the NPF – at the Regional level. The proposed Project is situated in the Eastern and Midland Region, which takes in Counties Longford, Westmeath, Offaly, Laois, Louth, Meath, Kildare, Wicklow and Dublin. The Region is the smallest in terms of land area but the largest in population size and is identified as the *"economic engine of the state"* because it contains the capital city (p. 14).

The current RSES for the Region was published in 2019. Its overarching vision for the Region is *"To create a sustainable and competitive Region that supports the health and wellbeing of our people and places, from urban to rural, with access to quality housing, travel and employment opportunities for all"* (p. 23).

In accordance with the requirements of the NPF, the RSES also contains a Metropolitan Area Strategic Plan (MASP) for the DMA, which contains the Site of the proposed Project. The vision statement for the DMA is to *"build on our strengths to become a smart, climate resilient and* *global city region, expanding access to social and economic opportunities and improved housing choice, travel options and quality of life for people who live, work, study in or visit the metropolitan area"* (p. 100).

The RSES identifies that *"the Region is home to over 800,000 households, with 4 out of 5 living in conventional housing while apartments account for around 18% or our housing stock. One of the challenges facing the region is the continued growth rates of household formation coupled with a severe slowdown in the development of new housing stock during the economic recession, resulting in housing supply and affordability pressures in both sale and rental markets, particularly in Dublin and urban areas but affecting all of the region"* (p. 17).

The RSES sets out 16 Regional Strategic Outcomes (RSOs), which are closely aligned with the NPF's NSOs and the UN SDGs. The RSOs include 'Sustainable Settlement Patterns', 'Compact Growth and Urban Regeneration', 'Healthy Communities', and 'Integrated Transport and Land Use'.

With a view to achieving the above-listed RSOs, the RSES sets out a suite of Regional Policy Objectives (RPOs). Those of greatest relevance to the proposed Project are as follows:

- RPO 5.3: *"Future development in the [DMA] shall be planned and designed in a manner that facilitates sustainable travel patterns, with a particular focus on increasing the share of active modes (walking and cycling) and public transport use and creating a safe attractive street environment for pedestrians and cyclists"* (p. 107).
- RPO 5.4: *"Future development of strategic residential development areas within the [DMA] shall provide for higher densities and qualitative standards as set out in the 'Sustainable Residential Development in Urban Areas', 'Sustainable Urban Housing; Design Standards for New Apartments' Guidelines, and 'Urban Development and Building Heights Guidelines for Planning Authorities'"* (p. 112).
- RPO 5.5: *"Future residential development supporting the right housing and tenure mix within the [DMA] shall follow a clear sequential approach, with a primary focus on the consolidation of Dublin and suburbs, and the development of Key Metropolitan Towns, as set out in the Metropolitan Area Strategic Plan (MASP) and in line with the overall Settlement Strategy for the RSES. Identification of suitable residential development sites*

shall be supported by a quality site selection process that addresses environmental concerns" (ibid.).

- RPO 7.12: *"Future statutory land use plans shall include Strategic Flood Risk Assessment (SFRA) and seek to avoid inappropriate land use zonings and development in areas at risk of flooding and to integrate sustainable water management solutions (such as SuDS, nonporous surfacing and green roofs) to create safe places in accordance with the Planning System and Flood Risk Assessment Guidelines for Local Authorities"* (p. 159).
- RPO 8.3: *"That future development is planned and designed in a manner which maximises the efficiency and protects the strategic capacity of the metropolitan area transport network, both existing and planned and to protect and maintain regional accessibility"* (p. 188).
- RPO 9.4: *"Design standards for new apartment developments should encourage a wider demographic profile which actively includes families and an ageing population"* (p. 203).
- RPO 9.10: *"In planning for the creation of healthy and attractive places, there is a need to provide alternatives to the car and to prioritise and promote cycling and walking in the design of streets and public spaces. Local authorities shall have regard to the Guiding Principles for 'Healthy Placemaking' and 'Integration of Land Use and Transport' as set out in the RSES and to national policy as set out in 'Sustainable Residential Development in Urban Areas' and the 'Design Manual for Urban Roads and Streets (DMURS)'"* (p. 206).
- RPO 9.17: *"To support local authorities in the development of regional scale Open Space and Recreational facilities particularly those close to large or growing population centres in the Region"* (p. 207).

The Dublin MASP seeks to focus development on a number of large scale strategic sites, based on key corridors that will deliver significant development in an integrated and sustainable fashion. In regards to Baldoyle, the MASP supports employment generation at strategic locations within the metropolitan area to strengthen the local employment base and reduce pressure on the metropolitan transport network, including future employment districts in Swords and Dublin Airport / South Fingal.

The RSES identifies the Clongriffin – Belmayne and Baldoyle – Stapolin areas as being part of the 'North Fringe' of Dublin City, offering large-scale urban expansion opportunities along the North – South (DART) Strategic Development Corridor. The RSES identifies the North – South

Corridor (DART expansion) as a key infrastructure project to be delivered by 2027, which will increase capacity on the northern commuter line and support ongoing large-scale urban expansion of the North Fringe lands and at Donabate.

The proposed Project is consistent with the objectives of the RSES. It will contribute to the provision of additional high-quality and high-density residential units on the 'North Fringe' of the DMA, in an area well served by existing and future proposed public transport services.

3.4.2 Transport Strategy for the Greater Dublin Area (2016 – 2035)

The Transport Strategy for the Greater Dublin Area 2016 – 2035, as prepared by the National Transport Authority, provides a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA) over the next two decades. It also provides a transport planning policy around which statutory agencies involved in land use planning, environmental protection, and delivery of other infrastructure such as housing, water and power, can align their investment priorities. It is, therefore, an essential component, along with investment programmes in other sectors, for the orderly development of the Greater Dublin Area over the next 20 years.

The Strategy identifies the challenges for transport in the GDA as being:

- An assumed return to sustained economic growth;
- Substantial population growth;
- Full employment;
- That no one is excluded from society, by virtue of the design and layout of transport infrastructure and services or by the cost of public transport use; and
- That the environment in the GDA is protected and enhanced.

Since the publication of the Strategy in 2016, economic and population growth has continued to substantially increase and, as such, the objectives of the plan are critical to ensuring a functional GDA.

The proposed Project is consistent with the objectives of the Strategy in that it will deliver residential development proximate to existing employment hubs and public transport networks, thereby reducing reliance on the private car and encouraging a shift to more sustainable transport modes.

3.5 Local Policy Context

3.5.1 Fingal Development Plan (2017 – 2023)

The Site is located within the administrative area of Fingal County Council (FCC / 'the Council') and subject to the Fingal Development Plan (2017 – 2023) ('the Development Plan') (including subsequent variations). The Development Plan sets out the Council's policies and objectives for the development of its administrative area to 2023. It seeks to develop and improve the social, economic, environmental and cultural assets of the area, in a manner that is sustainable and consistent with the national level policies.

The Core Strategy of the Development Plan requires local authorities to identify and reserve an appropriate amount of land in the right locations to meet the housing and population targets set out for the Region. LAPs prepared by FCC must be consistent with the allocations set out in the Core Strategy.

The Core Strategy of the Development Plan identifies the quantum, location and phasing of development for the plan period that is consistent with the regionally defined population targets and settlement hierarchy. It reflects the availability of existing services, planned investment, sequential development and environmental requirements *(i.e.* an evidence based approach in determining the suitability of lands for zoning purposes) and therefore also provides the policy framework for all Local Area Plans.

Fingal County Council have prepared Variation No. 2 to align the Development Plan with the NPF and the RSES. Variation No. 2 has not fundamentally changed the Baldoyle policy context. Baldoyle is located in the Metropolitan Area of the Greater Dublin Area (GDA).

The emphasis of the Development Plan is to continue to consolidate the existing zoned lands and to maximise the efficient use of existing and proposed infrastructure. In this way the Council can ensure an integrated land use and transport strategy in line with national and regional policy.

Objective SS01 aims to *"Consolidate the vast majority of the County's future growth into the strong and dynamic urban centres of the Metropolitan Area while directing development in the hinterland to towns and villages, as advocated by national and regional planning guidance"* (p. 40).

The development strategy of the subject lands seeks to utilise existing infrastructure such as roads and public transport in an area which has been designated to be consolidated within Dublin's North Fringe (new residential zone straddling Dublin City Council and FCC areas, at the northern edge of Dublin City).

In the Development Plan, Baldoyle is considered a 'Consolidation Area within the Gateway'. The policy approach in these areas is *"to gain maximum benefit from existing transport, social, and community infrastructure through the continued consolidation of the city and its suburbs. Future development will happen in a planned and efficient manner utilising opportunities to achieve increased densities where appropriate*" (p. 45).

Objective SS16 is to "*Examine the possibility of achieving higher densities in urban areas adjoining Dublin City where such an approach would be in keeping with the character and form of existing residential communities, or would otherwise be appropriate in the context of the site"* (ibid.).

Under the Development Plan, one of the Baldoyle Development Plan Objectives (Objective BALDOYLE 3) is to *"Prepare and / or implement a Local Area Plan for lands at Baldoyle / Stapolin to provide for the strategic development of the area as a planned sustainable mixed use residential development subject to the delivery of the necessary infrastructure"* (p. 116) (refer to Map Sheet No. 10, LAP 10.A). The corresponding *Baldoyle-Stapolin Local Area Plan* (2013 – 2019) as extended is discussed below.

The proposed Project will provide a well-designed, high quality and a higher density mixed-use (predominantly residential) development on appropriately zoned lands, which are well served by public transport (public bus and rail), supporting the delivery of planned sustainable mixed-use residential development in Baldoyle, as envisaged in the Development Plan.

Under the Development Plan, the majority of the Site is zoned 'RA', Residential Area. The objective of RA zoned lands is to "*provide for new residential communities subject to the provision of the necessary social and physical infrastructure"* (p. 390). The vision for RA lands is to *"Ensure the provision of high quality new residential environments with good layout and design, with adequate public transport and cycle links and within walking distance of community facilities. Provide an appropriate mix of house sizes, types and tenures in order to* *meet household needs and to promote balanced communities"* (ibid.). The proposed Project is consistent with these zoning objectives.

A relatively small portion of the northern margin of the Site is zoned 'HA', High Amenity, for which the objective is to *"Protect and enhance high amenity areas"* (p. 376). The stated vision for these lands is to *"Protect these highly sensitive and scenic locations from inappropriate development and reinforce their character, distinctiveness and sense of place. In recognition of the amenity potential of these areas, opportunities to increase public access will be explored"* (ibid.). The proposed Project is consistent with these zoning objectives.

As detailed in the Material Contravention Statement, the proposed Project will contravene the Development Plan, in that it will result in an exceedance of the residential unit capacity stipulated for the Baldoyle / Sutton area in the Plan. In Tables 2.6 and 2.8 of the Development Plan (p. 35 and p. 38, respectively), a capacity of 1,498 is proposed for the area. In combination with permitted and proposed residential development in the area, the proposed Project is expected to result in an exceedance of this capacity by somewhere in the region of 160 units.

However, this exceedance is considered to be acceptable, considering the broader national and regional policy context and the capacity of infrastructure in the area. For instance, it is an objective of the Development Plan to *"Examine the possibility of achieving higher densities in urban areas adjoining Dublin City where such an approach would be in keeping with the character and form of existing residential communities, or would otherwise be appropriate in the context of the site"* (Objective SS16, p. 45). Furthermore, the *Urban Development and Building Heights Guidelines* (2018) state that *"significant increases in the building heights and overall density of development is not only facilitated but actively sought out and brought forward by our planning processes and particularly so at local authority and An Bord Pleanála levels"* (p. 5). For further discussion of this matter, refer to the Material Contravention Statement, submitted under separate cover as part of the planning application.

Notwithstanding the above-stated material contravention, it is considered that the proposed Project is consistent with the objectives of the *Fingal Development Plan (2017 – 2023)*. For further detail of how the Development Plan relates to the proposed Project, please refer to the Statement of Consistency, prepared by BSM and submitted under separate cover as part of the planning application.

3.5.2 Baldoyle-Stapolin Local Area Plan (2013 – 2019) (Extended)

The *Baldoyle-Stapolin Local Area Plan* (2013 – 2019) (LAP) was adopted in May 2013 by FCC. In 2018, the Council Members approved the extension of the life of the LAP for a further period of 5 years, to May 2023. It sets out a detailed strategy for the Baldoyle-Stapolin area.

The stated vision for the area is *"to create a place to live that is appealing, distinctive and sustainable, with minimal impact on the surrounding environment and the coast. It is envisaged that Baldoyle-Stapolin will develop as a sustainable community comprised of new homes, community, leisure and educational facilities based around an identifiable and accessible new village centre which will form the heart of the area"* (p. 11).

As stated above, the Site is zoned RA in the Development Plan, which has the stated objective to *"Provide for new residential communities in accordance with approved local area plans and subject to the provision of the necessary social and physical infrastructure"* (p. 3 of the LAP), with a central area in the lands with a development objective of 'LC – to provide for a local centre'. This zoning and corresponding objectives are reflected in the LAP, where this central area is designated 'Village Centre' and 'Village Centre – Civic Space'.

The LAP seeks to create a green infrastructure network of high quality amenity and other green spaces that permeate through the plan lands while incorporating and protecting the natural heritage and biodiversity value of the lands.

In relation to housing mix, the LAP requires that *"a suitable variety and mix of dwelling types and sizes are provided in developments to meet different needs, having regard to demographics, social changes and the human life cycle patterns"*, and aims to ensure that *"one bedroom dwellings are kept to a minimum within the development and are provided only to facilitate choice for the homebuyer"* (p. 36). It is stated that *"… no more than 5% of units in any application or over the whole development, shall be one bedroom units"* (p. 36).

In terms of residential unit density, the proposed Project contravenes the LAP, which sets out a general density of 42 – 80+ units per hectare across the Site. It is considered that the proposed density of 177 units / ha is of an appropriate scale and form which responds to existing housing and the emerging development of the area. It is consistent with the approach indicated by Objective RS6 of the LAP, to *"Achieve a residential density in keeping with a compact urban form which reflects the character and function of the locality, having regard to* *the need to make the most efficient use of land and transport investment"* (p. 37). For further information, please refer to the Material Contravention Statement prepared by BSM and submitted under separate cover as part of the planning application.

Objective RS 9 is to *"Ensure the development of sustainable residential communities through the promotion of innovative, high quality building design and layouts that prioritise non-car based movement and provide for a high level of permeability, accessibility and connectivity to the existing built environment, services and facilities"* (p. 37).

The proposed Project also contravenes the LAP in terms of building heights. Residential buildings ranging from two to 15 storeys are proposed, while the LAP stipulates that building heights across the development lands should generally be within the range of two to five storeys.

Additionally, the proposed Project contravenes the unit mix requirements of the LAP, which states that *"no more than 5% of units in any application or over the whole development, shall be one bedroom units"*. It is proposed to deliver 502 (41%) one-bed units. Again, this contravention is considered appropriate in the context of more recent national-level policy (*Sustainable Urban Housing – Design Standards for New Apartments* (Department of Housing, Local Government and Heritage, 2020)).

For further information, please refer to the Material Contravention Statement prepared by BSM and submitted under separate cover as part of the planning application, which provides a rationale for this contravention.

To facilitate proper phasing of the development of the subject lands, the LAP identifies three growth areas: Growth Areas (GA) 1, 2 and 3. The proposed Project is located within GA3.

The LAP sets out the following general consideration for the wider development lands:

- The first phases of residential development within Growth Area 1 will ensure that linkages are created towards the village centre and the train station in an east-west and north-south direction from existing development at Red Arches and Myrtle.
- The second phases of development within Growth Area 2 will occur along the north-eastern boundary of the plan lands, linking to the existing development at the east of

the lands, through the open space at The Haggard and Stapolin Avenue, to the village centre along Ireland's Eye Avenue.

- The third phases of development within Growth Area 3 will provide, in the first instance, for the completion of the village centre through delivery of the northern half of the local centre site. Following, or in tandem with this, the remainder of the residential units will be built out thus completing the site. It will be possible to allow for the parallel development of Growth Areas 2 and 3 provided that the local centre is completed and that residential development in Growth Area 3 progresses from the village centre and Ireland's Eye Avenue northwards.

Specifically in relation to GA3, the LAP sets out the following phasing requirements:

> *"If not provided earlier, [the medium- to long-term] phase of development will provide for the completion of the village centre to the north of Station Square. Following, or in parallel with, the commencement of construction of the northern half of the village centre the residential sectors will be delivered from the south of the Growth Area northwards ensuring the necessary linkages to existing development. The timeframe for this phase may range from 2018-2025 delivering residential units in the range of 300 to 400+ units."* (p. 70)

Phasing and infrastructure requirements are set out in relation to roads, open space, the village centre, community facilities, and undeveloped / interim sites.

The proposed Project, in combination with the proposed development at GA1, meets the requirements for infrastructure on the LAP lands. The village centre is proposed for delivery within the GA1 application (subject of a separate application). The proposed Project overlaps with the area which is the subject of the GA1 application in the proposed delivery of the bus / vehicular access route to Clongriffin Station, to the north of the village centre. Therefore, the proposed Project will continue development north of the village centre.

It is considered that, with the exception of the above-stated contraventions (addressed under the scope of the Material Contravention Statement), the proposed Project is consistent with the objectives of the LAP.

For further detail of how the LAP relates to the proposed Project, please refer to the Statement of Consistency, prepared by BSM and submitted under separate cover as part of the planning application.

3.6 Planning History of the Site

As part of the development strategy for the wider lands, there have been two applications on the lands. Most significantly, an application was lodged on 4 June 2021 (ABP case ref. TA06F.310418) for alterations of a previously permitted development at GA1 (previously permitted under FCC Reg. Ref. F16A/0412 (ABP Ref. PL06F.248970), under the control of the Applicant. In September 2020, minor amendments to Reg. Ref. F16A/0412 were granted by FCC under Reg. Ref. F20A/0257, also pertaining to lands at GA1 under the control of the Applicant. In addition, we note one previously permitted application to the east of the subject lands at GA2 under Reg. Ref. F11A/0290.

The wider Clongriffin area has had a significant amount of planning activity. Notably this includes two recently permitted large-scale SHDs to the west of the proposed Project, within the administrative area of Dublin City Council.

3.6.1 SHD GA1: ABP Ref. TA06F.310418

An application was lodged on 4 June 2021 (ABP case ref. TA06F.310418) for alterations of a previously permitted development (previously permitted under FCC Reg. Ref. F16A/0412 (ABP Ref. PL06F.248970) as amended by F20A/0258 and F221A0046) for the development of 544 no. residential units (747 no. apartments and 135 no. houses) retail and a crèche. The proposed altered development would consist of 882 no. new residential dwellings (747 apartments, 135 houses), residential tenant amenity, retail, crèche, and public realm, over a site area of approx. 9.1 ha of which the development area is 8.89 ha.

3.6.2 FCC Ref. F20A/0257

This recently permitted development, dated 3 September 2020, entailed minor alterations to permitted development at lands at Baldoyle (formerly known as The Coast), Dublin 13, as permitted under F16A/0412, ABP Re. Ref.: PL06F.248970.

3.6.3 FCC Ref. F16A/0412 / ABP Ref. PL06F.248970

The extant permission on the subject lands comprises approximately 546 no. residential units (385 no. apartments and 161 no. houses) and a village centre comprising approx. 1,917 m² of commercial floor space that would include shops, a café and a crèche.

Pedestrian access to the train station was provided across a plaza known as Stapolin Square with steps and ramps to address the difference in levels. The existing access to the station would be closed. An open space of 1.57 ha would be provided at The Haggard to the north east of the main part of the site.

The permission was granted on appeal on 7 July 2017 and has a 10 year duration. The permitted density is 63 units per hectare.

The permitted residential accommodation would provide 546 homes of the following types:

- 20 one-bedroom apartments;
- 333 two-bedroom apartments;
- 32 three-bedroom apartments;
- 93 three-bedroom houses; and
- 68 four-bedroom houses.

In a number of areas the permitted development provided a density which was in excess of that set out in the Baldoyle-Stapolin LAP. The LAP sought development at Blocks B, C and D in the permitted development at a density of 38 – 42 units per hectare, to provide a total of 315 units. The permitted development would provide 351 units in these blocks, at a density of 47 units per hectare. At Block A, the development would provide another 195 units at a density of 108 units per hectare within Zone C of the LAP, where densities of over 80 units per hectare are sought.

In this regard, the Inspector observed that *"Those blocks would be less than 3 minutes' walk from the railway station, so the provision of a greater density of accommodation so close to a public transport corridor is justified with reference to the guidance at section 5.8 of the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas."* As such, this rationale for higher density is consistent with wider decision making and comparable with the proposed Project.

3.6.4 GA2: FCC Ref. F11A/0290 (/E1) / ABP Ref. PL06F.239732

Regents Park Development Ltd. were granted permission on appeal on 11 April 2013 and given a further extension of duration of permission in 2018 (FCC Reg. Ref. F11A/0290/E1) on lands at GA2, as per the Baldoyle-Stapolin LAP. FCC initially refused the application. However, ABP subsequently granted permission following appeal. The development entails 400 dwelling units, three retail units, a crèche, surface and basement level car parking, landscaping and all associated works on a site adjacent to the wider landholding.

3.6.5 SHD ABP-305316-19

A planning permission for a strategic housing development at Clongriffin, Dublin 13, on plots known as 6, 8, 11, 17, 25, 26, 27, 28, 29. The development consists of 1030 no. apartments (reduced to 916 in permission) c.163 units / ha, comprising 238 no. residential, 678 no. Build-to-Rent units, 2 no. crèches, 10 no. retail units and all associated site works. Primarily consisting of 6-7 storeys in height but also includes 17 storeys at Block 17 and 15 storeys at Block 26. Application included EIAR. Screened out for AA.

3.6.6 Clongriffin SHD Applications

ABP granted two SHD applications west of the DART line in the Dublin City Council administrative area, under SHD Ref 305316 and SHD Ref. 305319 on the 18 December 2019. Both applications were prepared together and considered concurrently:

- ***Ref 305316*** (‘Clongriffin SHD A’ hereafter): Consisting of 916 apartments (238 residential and 678 Build to Rent (BTR) units), two crèches, ten retail units, and all associated site works. Primarily six to seven storeys in height but also including 17 storeys at Block 17 and 15 storeys at Block 26, with a density of 163 units per hectare.
- ***Ref. 305319***: (‘Clongriffin SHD B’ hereafter) Consisting of 500 apartments (235 residential and 265 BTR units), crèche and all associated site works in block of two to eight storeys, with a density of 200 units per hectare.

Blocks 17 and 26 of SHD A are significantly higher than the other buildings permitted as part of these applications. The Clongriffin-Belmayne LAP identifies Block 17 as a location where a higher building is desirable, although it specifies heights of between 10 and 14 storeys. Precedent for a higher building at this location was established under ABP Ref. 248713 (Ref. 3634/16) which permitted a 16 storey building with 139 apartments at this block.

In relation to Block 26 (which stands at the edge of the North Fringe area beside the railway line, Mayne River and the greenbelt to the north) the Inspector states that *"Its suitability for a taller building is established by its situation position beside those open lands and at the intersection of two local routes through the North Fringe: Marrsfield Avenue and Station Street. The design submitted in the current proposal for a 15 storey building there is of a sufficient quality for its prominence. It would improve the legibility of the area and establish a clear boundary with the rural lands beyond".*

The Inspector considered the proposed maximum heights (17 storeys at Block 17 and 15 storeys at Block 26) as acceptable, despite their contravening Section 16.7.2 of the *Dublin City Development Plan 2016 – 2022* and Objective UD07 of the *Clongriffin-Belmayne Local Area Plan 2012 – 2018* as extended.

Further, the Inspector notes the taller buildings *"would also improve the overall density of residential development in a district centre on a public transport corridor. Any contravention of the development or local area plan would therefore be justified by the guidelines on building height issued in 2018, in particular SPPR 1 and 3."*

The proposed density of approx. 163 units per hectare for SHD A and 200 units per hectare for SHD B was considered appropriate given the proximity of the site to a railway station, QBC and a new town centre.

The Inspector stated that *"The density of the development proposed in this application is 163 dph, while that of the three concurrent applications is 171 dph. This would bring the overall density at Clongriffin to 84 dph, which is appropriate for an area with a railway station and a new town centre"*.

In relation to both applications, DCC in turn stated that *"The density of the proposed development would be in line with the advice in the National Planning Framework having regard to the site's proximity to a railway station and a Quality Bus Corridor"*.

The permitted car parking rate was 0.48 per dwelling (673 spaces) for SHD A, and 0.52 per dwelling (357 spaces) in SHD B. This was considered acceptable given the accessibility of the area. The stated rate in the application was higher; however, the Inspector discounted the visitor spaces in his calculation. The Applicant submitted that this would mitigate the impact that the occupation of the proposed development would be likely to have on the demand for transport by private car on the road network in the area.

4 Consideration of Alternatives

4.1 Introduction

Consideration of alternatives is an important aspect of the EIA process and is necessary to evaluate the likely environmental consequences of a range of development strategies for the Site within the constraints imposed by environmental and planning conditions.

This Chapter provides an overview of alternative designs that have been considered for the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13. It was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin, with input from Henry J Lyons, the Project Architect.

4.2 Legislative Context

Article 5 (1) of the 2014 EIA Directive requires the consideration of reasonable alternatives which are relevant to the project and taking into account the effects of the project on the environment. It states under Article 5 (1) (d) that the information contained in the EIAR shall include:

> *"… 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."*

Part 1 (d) of Schedule 6 of the PDR 2001 (as amended) transposes this requirement, stating that an EIAR shall include:

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

In accordance with 2017 EPA Draft EIAR Guidelines, different types of alternatives may be considered at several key stages during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered early on in the process, or alternative mitigation options may need to be considered towards the end of the process. The EPA Draft Guidelines (2017) state that:

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

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

4.3 Alternatives Examined

This Chapter provides an outline of the main alternatives examined during the design phase and sets out the main reasons for choosing the proposed Project. The alternatives may be described at five levels:

1. 'Do-Nothing' Alternative
2. Alternative Locations
3. Alternative Layouts
4. Alternative Designs
5. Alternative Processes.

4.3.1 'Do-Nothing' Alternative

The 'Do-Nothing' alternative considers the likely scenario that would arise, assuming the proposed Project were not progressed, i.e. if nothing were done. Note that this Chapter discusses the Do-Nothing scenario in terms of development (or lack thereof) in the absence of the proposed Project. The likely impacts of a Do-Nothing scenario in relation to the various environmental topics (e.g. cultural heritage, biodiversity, traffic and so on) are discussed in the respective chapters of this EIAR.

In this case, the Do-Nothing scenario might entail:

a) A continuation of the existing status of the lands, i.e. privately owned greenfield site with some limited infrastructure in place, closed to the public. Considering the ongoing housing crisis in Dublin, this scenario is regarded as socially suboptimal. The opportunity cost, in this scenario, would include the 1,221 proposed residential units.

b) Development (likely residential) under the scope of a separate application / proposal, at some point in the future. This scenario is also possible, considering the zoning of the lands for residential development under the *Baldoyle-Stapolin Local Area Plan* (2013) (LAP) and the wider context in terms of housing policy and significant demand for housing in the Dublin Metropolitan Area.

4.3.2 Alternative Locations

As detailed in Chapter 3 (Planning & Development Context), the majority of the Site is zoned 'RA', Residential Area under the current Fingal Development Plan. The objective of RA zoned lands is to "*provide for new residential communities subject to the provision of the necessary social and physical infrastructure"* (p. 390). The vision for RA lands is to *"Ensure the provision of high quality new residential environments with good layout and design, with adequate public transport and cycle links and within walking distance of community facilities. Provide an appropriate mix of house sizes, types and tenures in order to meet household needs and to promote balanced communities"* (ibid.). The proposed Project is consistent with these zoning objectives.

A relatively small portion of the northern margin of the Site is zoned 'HA', High Amenity, for which the objective is to *"Protect and enhance high amenity areas"* (p. 376). The stated vision for these lands is to *"Protect these highly sensitive and scenic locations from inappropriate development and reinforce their character, distinctiveness and sense of place. In recognition of the amenity potential of these areas, opportunities to increase public access will be explored"* (ibid.). The proposed Project is consistent with these zoning objectives.

Based on its statutory zoning, it is considered that the Site is entirely suitable for the proposed nature of this SHD application. It is not considered that the consideration of alternative locations is relevant in this case – there are numerous other locations across the Dublin Metropolitan Area where residential development of a similar nature is being planned and proposed. As stated in the EPA 2017 Draft EIAR Guidelines:

> *"Some locations have more inherent environmental sensitivities than others. Depending on the type of project and the range of alternatives which the developer can realistically*

> *consider, it may be possible to avoid such sites in favour of sites which have fewer constraints and more capacity to sustainably assimilate the project. It can be useful to ensure that a range of options, that may reasonably be available, are included in the evaluation."* (Section 3, p. 36)

It is also stated that *"Clearly in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…"* (Section 3, p. 34). In this case, considering that the lands in question are zoned for the proposed use, and the fact that the environmental sensitivities of the Site are not such as to preclude development *per se*, this category of alternative is not considered relevant.

4.3.3 Alternative Design & Layout

During the design process for the proposed Project a range of design iterations of the proposed Project were considered, as discussed in the following sections.

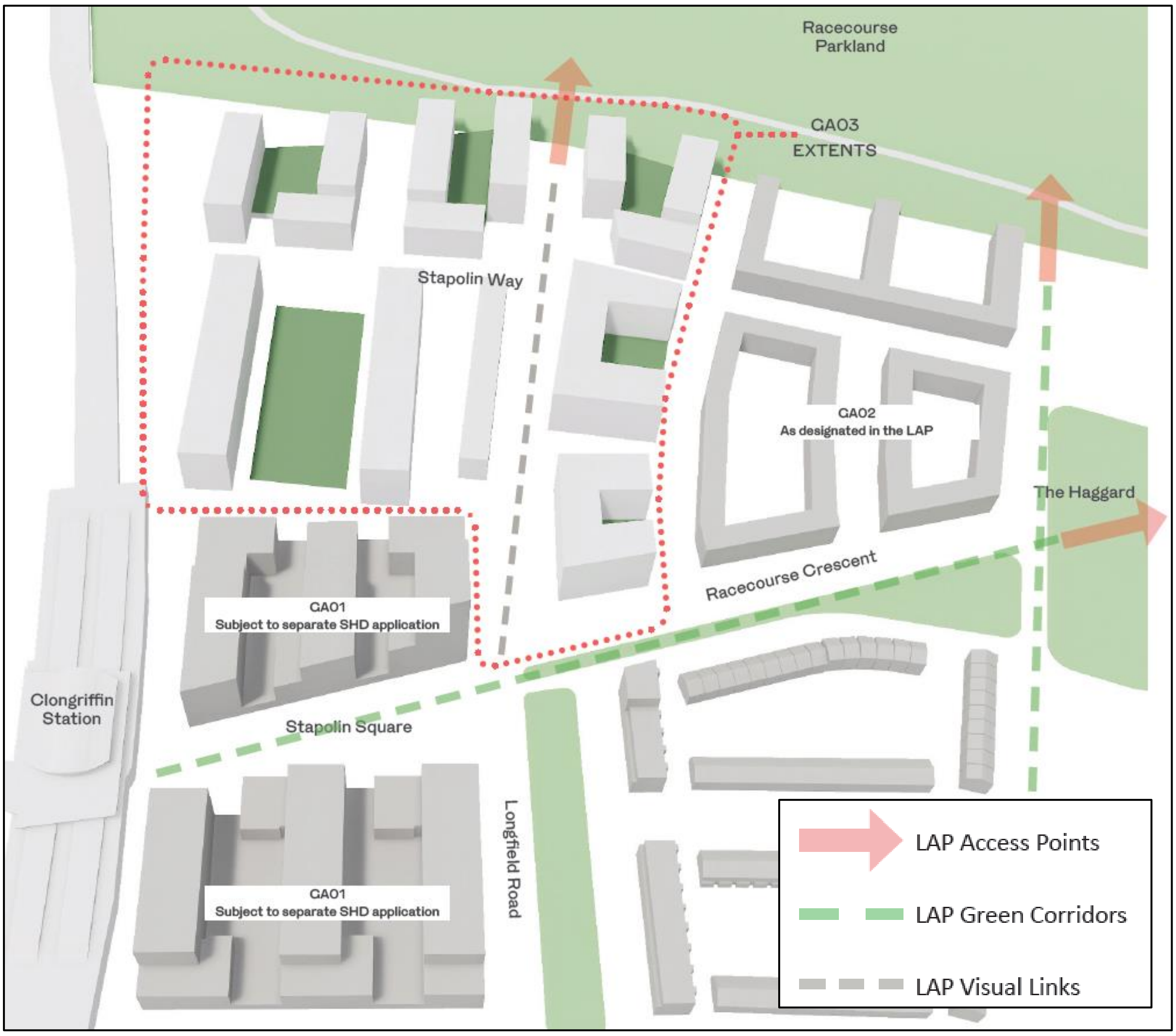
4.3.3.1 Design Alternative 1

The early stage Masterplan for Growth Area 3 saw the scheme evolve from the original urban form set out in the Baldoyle-Stapolin LAP. North-south oriented linear blocks are arranged around two primary streets through the Site; Longfield Road running north-south, and Stapolin Way running east-west. The scheme at this stage aimed to achieve the following:

- To create a distinct neighbourhood in the wider Masterplan and provide a varied character to the blocks;
- To create a large community park at the heart of the scheme;
- To focus on the importance of landscape throughout the Site;
- To create a coherent relationship with the wider Masterplan area; and
- To create a gateway between the Masterplan lands and the Racecourse Park immediately to the north.

Figure 4.1: Design Alternative 01 – Layout

Figure 4.2: Design Alternative 01 – Massing



4.3.3.2 Design Alternative 2

The scheme evolved from the initial conceptual design, following reviews and consultation with the Applicant and design team. Key updates at this stage included:

- Visual linking of the community park with Longfield Road to support the importance of landscaping and create a green artery through the Site.
- Increased permeability by providing smaller pavilion blocks E3 and E4 at the centre of the Site.
- Flipping the orientation of Blocks F1 and F2 at the east of the Site, to provide a better relationship with Longfield Road.
- Consolidation of the G blocks to the north of the Site, to create better urban edges to the street frontage of Stapolin Way.

- Creation of generous courtyards with aspect towards Racecourse Park within the G blocks.

Following initial correspondence and meeting with FCC, further consideration was given to the below-listed environmental aspects and site constraints:

- Proximity to and relationship with the Site boundaries, particularly the railway to the west and Racecourse Park to the north;
- Daylight and sunlight;
- Positioning of the blocks and height / massing;
- Urban environment and interface between public and private spaces; and
- Pedestrian and vehicular circulation through the Site, as well as parking numbers.

Figure 4.3: Design Alternative 02 – Layout

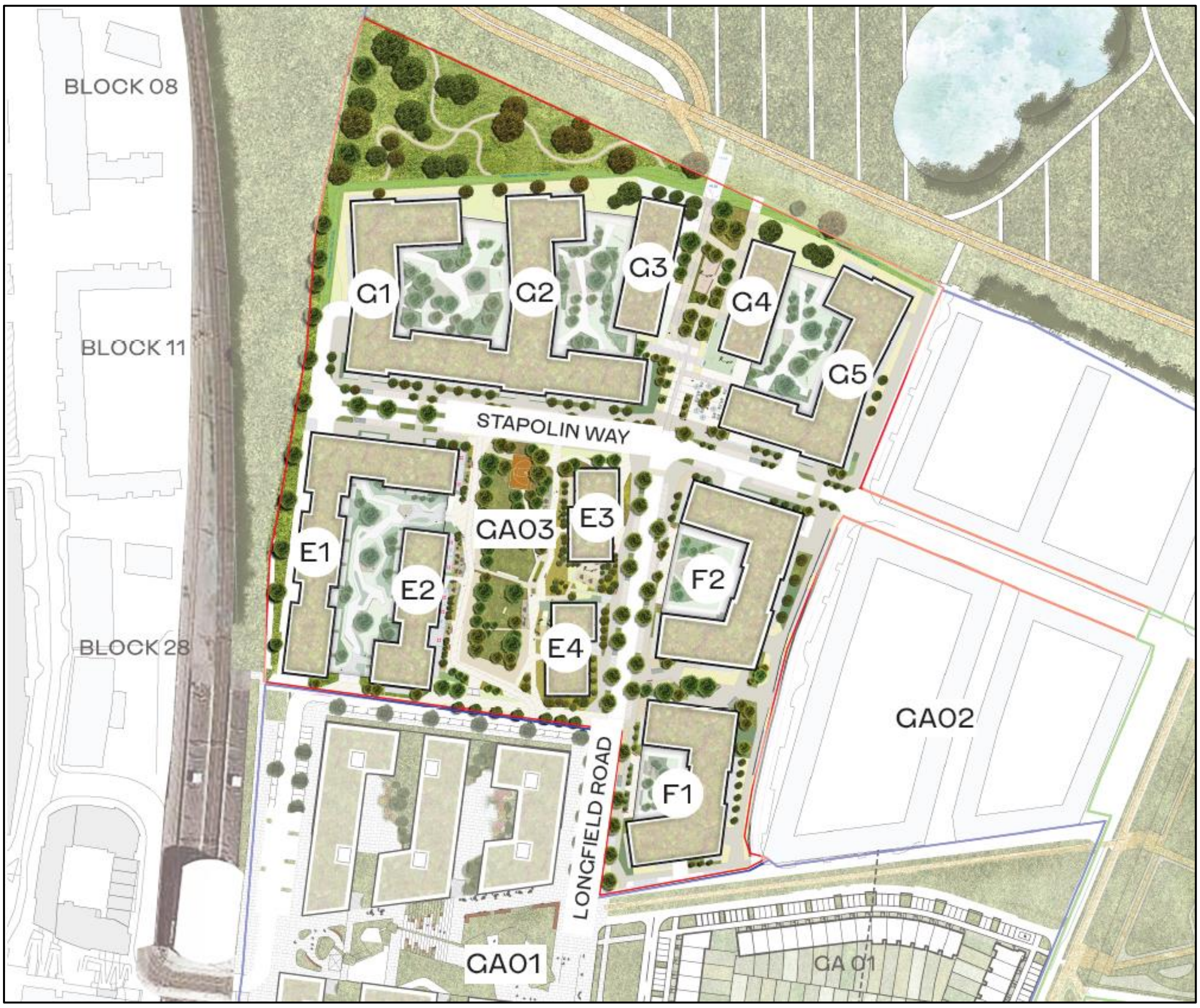
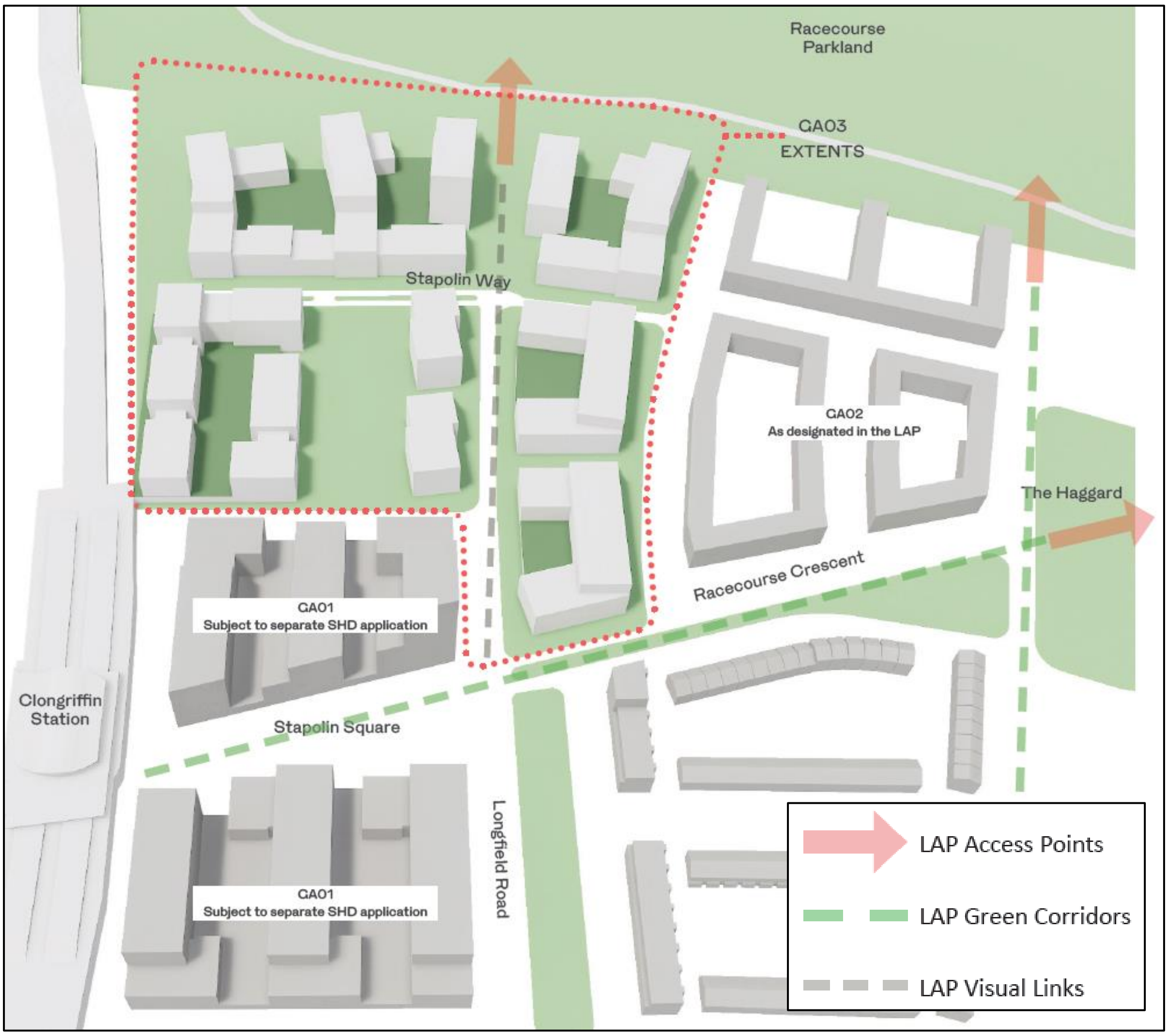


Figure 4.4: Design Alternative 02 – Massing



4.3.3.3 Design Alternative 3

The design as proposed has evolved from the previous iterations on the basis of careful consideration on the part of the design team, and feedback received from FCC and An Bord Pleanála during the Pre-application Consultation process. Key features / considerations of the final design include the following:

- Green artery through the Site, supported by intensive landscaping scheme and linking of public spaces.
- Visual and physical permeability throughout the Site, provided by gaps in blocks and smaller central pavilion blocks at the centre of the Site.
- Height and massing of the blocks, broken down by steps in massing of larger blocks.

- Great care has been taken to provide strong urban form and street edges, and sensitive relationships between the massing and streets.
- Focus on the creation of activity and sense of community through active ground floors with own door units and amenity spaces.
- Generous semi-private open spaces provided as courtyards between the blocks.
- Creation of a distinct neighbourhood in the wider Masterplan and provision of a varied character to the blocks.

Design Alternative 03 forms the selected basis for the proposed Project which is the subject of the planning application to An Bord Pleanála.

Figure 4.5: Design Alternative 03 – Layout

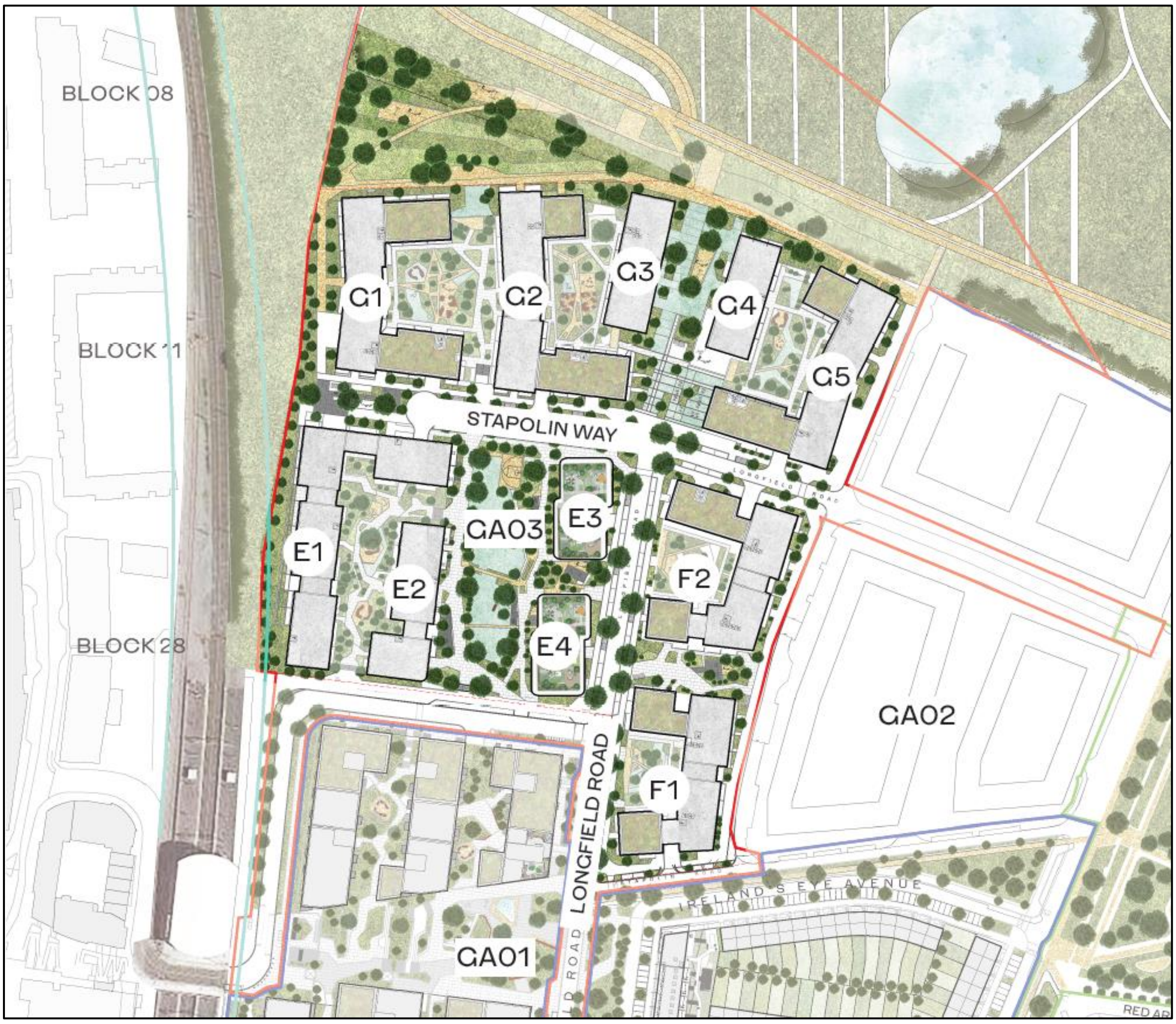
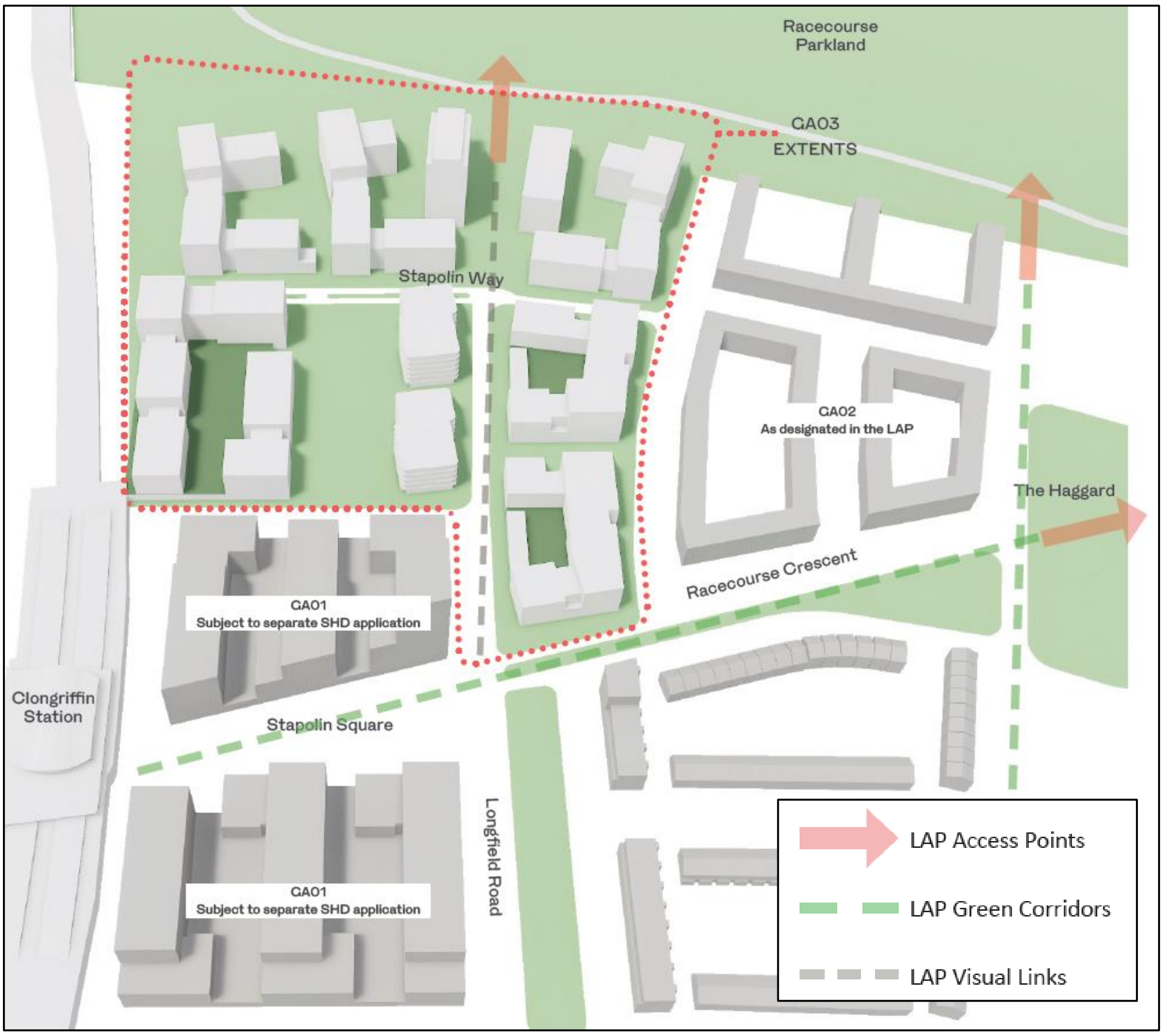


Figure 4.6: Design Alternative 03 – Massing



A detailed description of the proposal if provided in Chapter (5 – Description of the Proposed Project).

4.3.4 Alternative Processes

Having regard to the nature of the proposed Project as a SHD, for which the planning application is being submitted to An Bord Pleanála, this is not considered a relevant class of alternatives in this case.

5 Description of the Proposed Project

This Chapter was prepared in respect of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin, with input from the wider design and planning team.

It provides a general description of the Site and its surrounds, sets out the need for the proposed Project, and describes the proposed Project – its design, construction methodology and envisaged operation. In accordance with Article 5(1)(a) of the 2011 EIA Directive, as amended by Directive 2014/52/EU, the description of a proposed Project should comprise *"…information on the site, design, size and other relevant features"*.

This description provides the basis against which the specialist assessments presented in this EIAR have been undertaken. Note that specific details of the Site and proposed Project that are of relevance to particular specialist topics are set out in the corresponding EIAR chapters.

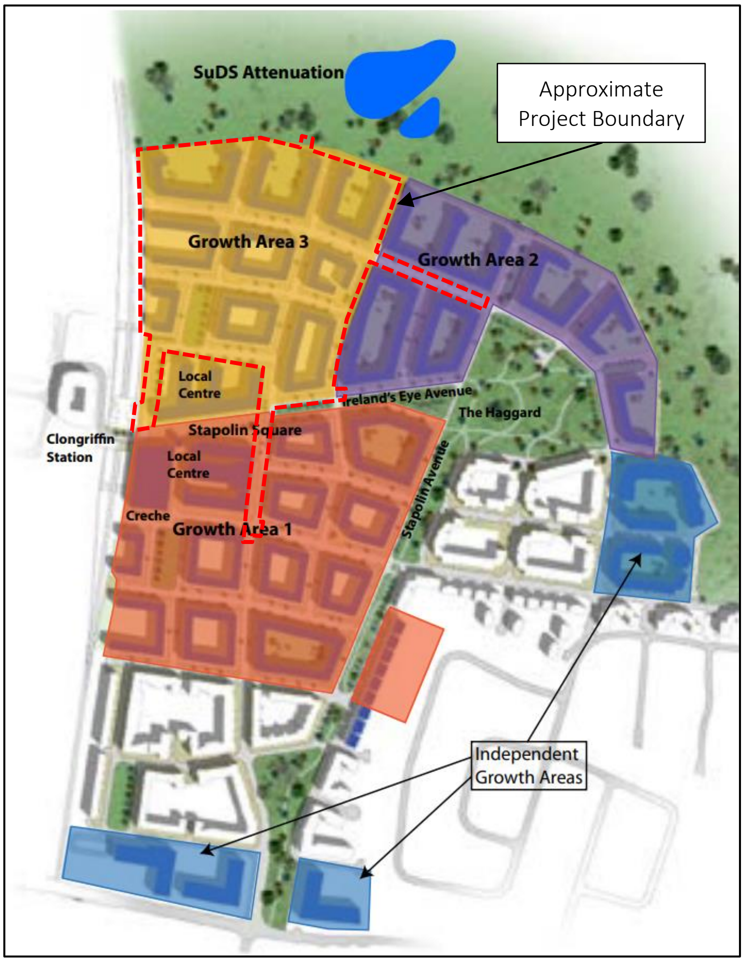
This Chapter should be read in conjunction with the following documents submitted under separate cover as part of the planning application:

- Bernard Seymour Landscape Architects (2021). *Landscape Design Statement*.
- BSM (2021). *Schools Demand and Childcare Facilities Assessment – SHD Baldoyle-Stapolin Growth Area 3, Baldoyle, Dublin 13*.
- Charles McCorkell Arboricultural Consultancy (2021). *Arboricultural Report.*
- CS Consulting (2021). *Engineering Services Report – Strategic Housing Development: Baldoyle-Stapolin Growth Area 3, Baldoyle, Dublin 13.*
- CS Consulting (2021). *Outline Construction Management Plan – Baldoyle-Stapolin Growth Area 3, Baldoyle, Dublin 13.*
- CS Consulting (2021). *Road Infrastructure Design Report – Strategic Housing Development: Baldoyle-Stapolin Growth Area 3, Baldoyle, Dublin 13.*
- Henry J Lyons (2021). *Architectural Design Statement – Strategic Housing Development: Baldoyle Growth Area 3.*
- JBA Consulting (2021). *Shoreline, Baldoyle, Flood Risk Assessment*.

- OCSC (2021). *Energy & Sustainability Report*.

5.1 Site of the Proposed Project

Figure 5.1: Wider Development Lands (Baldoyle-Stapolin LAP (2013))



The Site of the proposed Project ('the Site' hereafter) is located in Baldoyle, Dublin 13, c. 10 km north-east of Dublin City Centre. It is an undeveloped greenfield site that is currently vacant, bounded by hoarding (i.e. closed to the public) and containing basic site infrastructure: a simple network of access roads and utilities infrastructure.

The Site lies within a larger landholding, which is the subject of the Baldoyle-Stapolin Local Area Plan (LAP) 2013. It is situated directly to the south of the future Racecourse Park, east of the Dublin-Belfast / DART railway line and Clongriffin rail station, north of Growth Area 1 (GA1) and west of Growth Area 2 (GA2), as designated in the LAP. The Site of the proposed Project incorporates the entire area known as Growth Area 3 (GA3), as designated in the LAP.

Neighbouring GA1 is the subject of an existing planning permission (FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and F21A/0046) and an ongoing separate SHD application to alter the permitted development (Reg. Ref.: TA06F.310418), which includes a new village centre (Stapolin Square) to serve the wider development lands, as required in the LAP.

The Site is on the edge of the urban extent of Dublin City. It is within the administrative area of Fingal County Council (FCC), and adjacent to the Dublin City Council administrative boundary at Clongriffin to the west. Surrounding land uses to the west, south and east are predominately residential in nature.

To the north and north east is an area designated as 'high amenity', comprised of agricultural fields and land associated with the Baldoyle Estuary and former Baldoyle Racecourse. FCC intends to deliver 'Racecourse Park' as a major regional amenity on these lands under separate consent.

Baldoyle Estuary to the north-east supports an important complex of terrestrial and aquatic habitats. It is designated as a Special Protection Area (SPA) and a Special Area of Conservation (SAC) under the Birds and Natural Habitats Directives, respectively. The associated wetlands are of international importance, and have been designated as a Ramsar site (Baldoyle Bay). Baldoyle Estuary is also designated as a Nature Reserve.

The Site is located in an area well served by public transport services. It is within a few minutes' walk of Clongriffin rail station on the Dublin-Belfast / DART Line. Rail services operating from this station connect the proposed Project directly to Howth and Malahide (and beyond to north county Dublin) to the north, and to Dublin City centre in the south before continuing on to Bray and Greystones.

Bus stops on Grange Road and Clongriffin Main Street are within a 5-minute walk of the Site, and are served by two bus routes (29A and 15) operated by Dublin Bus. It is also planned that Clongriffin will be served by a number of new routes associated with the planned BusConnects project.

The Site is within short walking distance of the Baldoyle Industrial Estate providing a large amount of employment and commercial activity, and is also within convenient commuting distance of Dublin City Centre. Commercial centres in the vicinity include Baldoyle (c. 2 km) and Donaghmede (c. 2 km).

Figure 5.2: Location of the Proposed Project – Distal (© OpenStreetMap 2021)

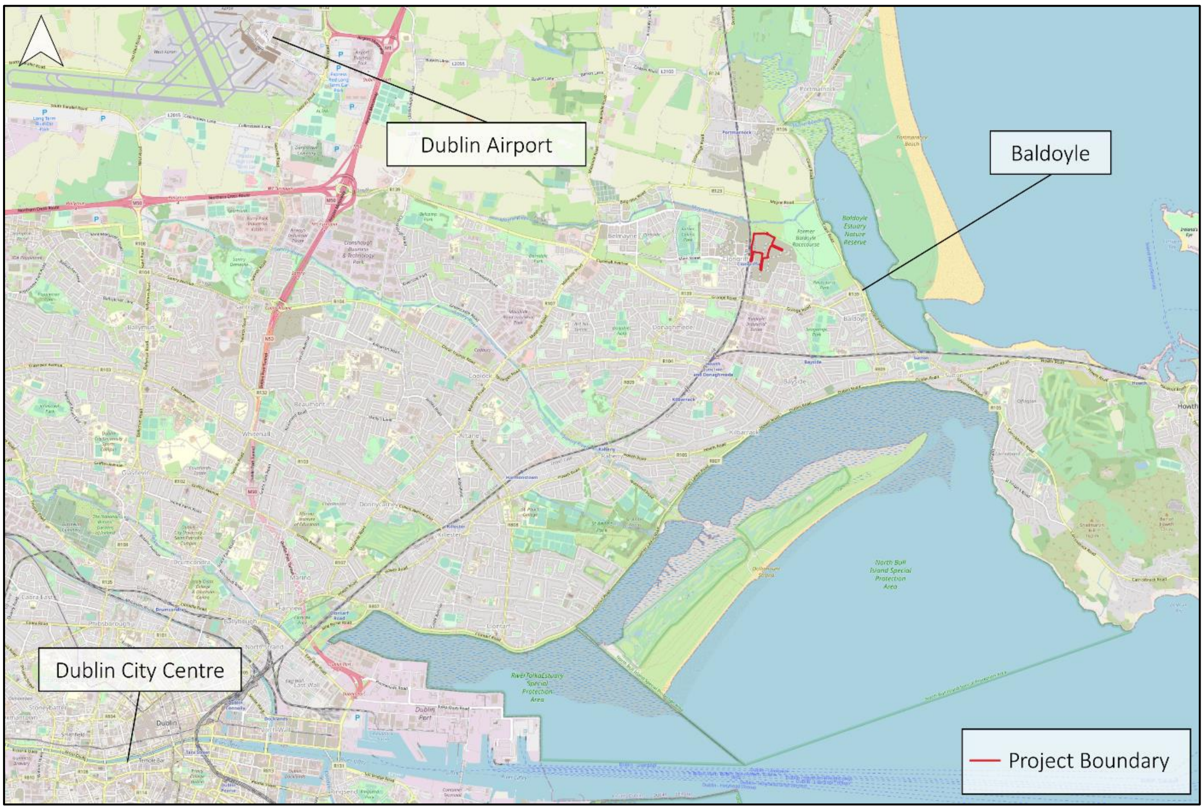
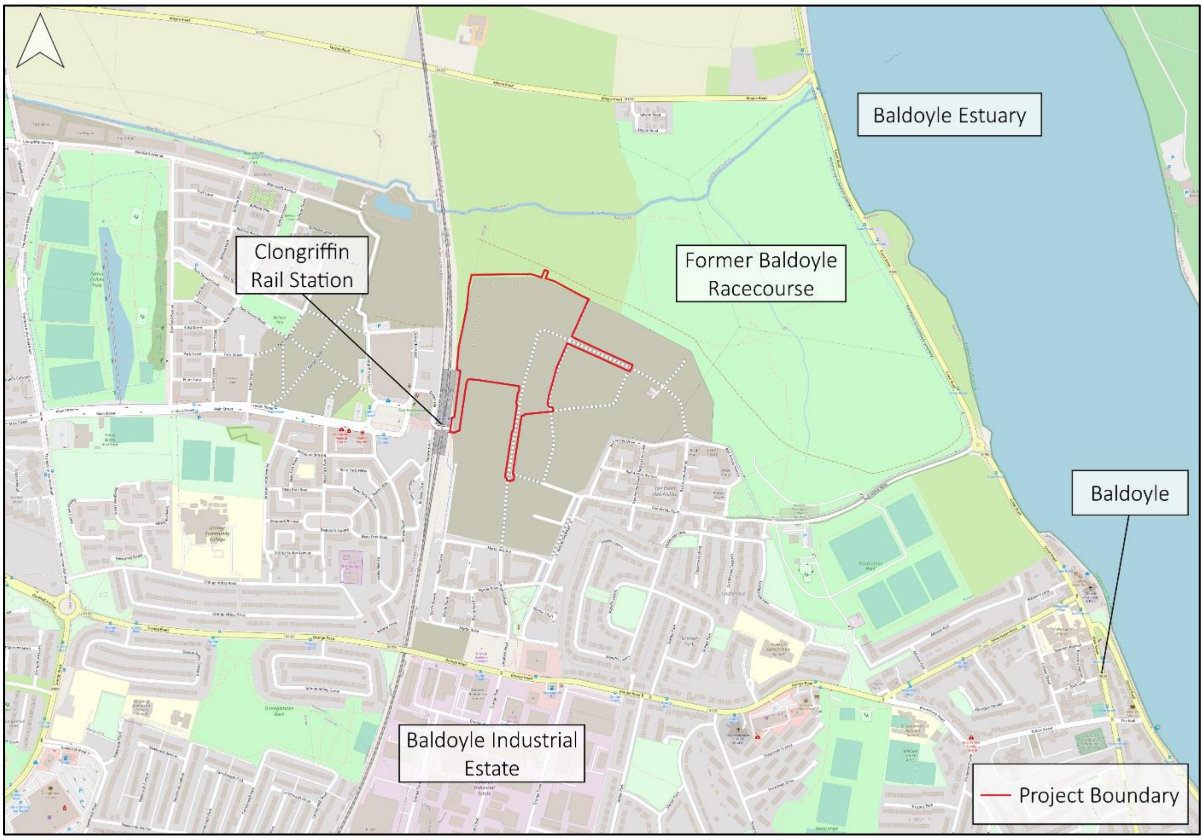


Figure 5.3: Location of the Proposed Project – Proximate (© OpenStreetMap 2021)



5.1.1 Site Specific Flood Risk Assessment (SSFRA)

In accordance with the OPW guidelines, *The Planning System and Flood Risk Management – Guidelines for Planning Authorities* (2009), a Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the proposed Project by JBA Consulting, and has been submitted as part of the planning application under separate cover. Its objectives were to (i) identify potential sources of flood risk, (ii) confirm the level of flood risk and identify key hydraulic features, (iii) assess the impact that the proposed development has on flood risk, and (iv) develop appropriate flood risk mitigation and management measures which will allow for the long-term development of the Site.

Its findings may be summarised as follows:

- A review of historic information found no history of flooding at the Site, although a number of historic flood events were identified in the surrounding areas, including at a number of locations in Baldoyle, and at Donaghmede, Raheeny and Portmarnock. The nearest of these was at Coast Road, c. 600 m east of the Site.
- A review of predictive flood mapping was carried out. The *Fingal East Meath Flood Risk Assessment and Management Study* places the entirety of the Site in Flood Zone C, and outside of the 0.1% Annual Exceedance Probability (AEP) tidal flood extents. The findings of the *FloodResilienCity* project indicate that pluvial flooding occurs within the Site during the 10% AEP event.
- There is no recorded risk of groundwater flooding at the Site, and a lack of karst features indicate an overall low risk to groundwater flooding.
- In order to confirm the fluvial and tidal flood risk to the proposed Project from climate change and residual risks, it was necessary to undertake hydraulic modelling. This exercise has found that the proposed Project is not at risk of inundation from the modelled flood events and further confirms that the site is in Flood Zone C.
- It has been concluded that the proposed Project is appropriate for residential development. All of the proposed residential units will be protected from inundation up to the 0.1% AEP High-End Future Scenario (HEFS) tidal flood event. The proposed finished floor levels are 150 mm higher than ground levels for pluvial flood risk mitigation. Access to basement level has been provided at 4.5 mOD, which is protected by the freeboard of 0.3 m over the 0.5% AEP HEFS tidal event.

- It was also found that the proposed Project will have no impact on stormwater discharge on the Site, i.e. will not exacerbate downstream flooding.

For further detail, please refer to the SSFRA submitted with the planning application under separate cover, and / or to Chapter 10 (Hydrology) herein.

5.2 The Need for the Proposed Project

The proposed Project is in accordance with national, regional and local planning and development policy, as detailed in Chapter 3 (Planning & Development Context), with the exception of several material contraventions addressed above and in the Material Contravention Statement, submitted under separate cover as part of the planning application.

In accordance with the Government's *National Planning Framework (2018 – 2040)*, the Eastern and Midland Regional Assembly's *Regional Spatial and Economic Strategy (2019 – 2031)* and FCC's *Development Plan (2017 – 2023)* and *Baldoyle-Stapolin LAP* (2013 – 2019, extended); the proposed Project will deliver a significant number of new, high quality residential units in a compact and sustainable manner, in an area well served by public transportation and proximate to centres of employment and commerce.

There is a need for residential development of this nature and scale and at strategic locations such as this in the context of an ongoing housing crisis in the Dublin Metropolitan Area. There is significant demand for rented accommodation and for a wider variety of housing types, including units for smaller households. For more information, refer to Chapter 3 (Planning & Development Context).

5.3 Main Features of the Proposed Project

5.3.1 Overview

The proposed Project will consist of the development of 1,221 no. residential apartment / duplex dwellings in 11 no. blocks ranging in height from two (2) to 15 storeys and including for residential tenant amenity, restaurant / café, crèche, car and bicycle parking and public realm, over a Site area of c. 6.89 ha.

The proposed 1,221 no residential apartment / duplex dwellings will be set out as follows:

- Block E1, ranging in height from 5 to 8 storeys, providing 157 no. apartment units with balconies, and solar panels at roof level.
- Block E2, at 5 – 6 storeys, providing 68 no. apartment units with proposed balconies, and solar panels at roof level.
- Block E3, at 6 storeys, providing 45 no. apartment units with proposed balconies, external roof terrace and solar panels at roof level.
- Block E4, at 5 storeys, providing 36 no. apartment units with proposed balconies, external roof terrace and solar panels at roof level.
- Block F1, ranging in height from 2 to 5 storeys, providing 91 no. apartment units with proposed balconies, external roof terrace, and solar panels at roof level.
- Block F2, ranging in height from 2 to 6 storeys, providing 122 no. apartment units with proposed balconies, and solar panels at roof level.
- Block G1, ranging in height from 4 to 10 storeys, providing 170 no. apartment units with proposed balconies, and solar panels at roof level.
- Block G2, ranging in height from 4 to 10 storeys, providing 175 no. apartment units with proposed balconies, and solar panels at roof level.
- Block G3, ranging in height from 7 to 15 storeys, providing 124 no. apartment units with proposed balconies, and solar panels at roof level.
- Block G4, at 7 storeys, providing 60 no. apartment units with proposed balconies, and solar panels at roof level.
- Block G5, ranging in height from 4 to 10 storeys, providing 173 no. apartment units with proposed balconies, and solar panels at roof level.

It is proposed to provide residential tenant amenity facilities of c. 2,301 m² located in Blocks E3, E4, G3, G4 and G5; and external communal amenity space of c .10,263 m² provided at ground, podium and terrace levels throughout the proposed Project.

A crèche of c. 452 m² (in addition to outdoor play space of c. 123 m²) is proposed for the ground floor of Block G4. A restaurant / café unit of c. 205 m² is proposed for the ground floor of Block E3.

Car parking is provided in a mix of undercroft for Blocks E1 - E2, F1 and F2, and at basement level for Blocks G1 - G3 and G4 - G5, with a total parking of 632 spaces for residential units with

33 spaces at surface level for residential use and 8 spaces (4 staff in G4 / G5 and 4 drop-off) associated with the proposed crèche. Additionally, 2,021 cycle parking spaces are proposed to be provided for residents, and 312 for visitor and commercial uses, in secure locations and within the public realm throughout the proposed Project.

A new central public space between Blocks E1 - E2 and E3 and E4, and a new linear space between Blocks G2 - G3 and G4 - G5 will provide pedestrian and cycle connectivity from Longfield Road to the planned future Racecourse Park to the north.

A new bus, cycle, pedestrian and taxi ramp is proposed on the south of the Site, to the north of Stapolin Square, providing access from Longfield Road to Clongriffin Train Station. Proposed road connections to the Site via the extension of Longfield Road to the south, and eastward through the regrading of the existing road, providing access to the subject Site via these two roads.

The proposed Project will also provide for all associated ancillary infrastructure including ESB sub-stations, bin stores, plant rooms, public lighting, new watermain connection to the north and foul and surface water drainage; internal roads and footpaths; site landscaping, including boundary treatments; associated signage, and all associated engineering and Site works necessary to facilitate the proposed Project.

The proposed Project is designed to integrate with and continue both the existing permitted development on the southern GA1 lands (as permitted under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and F21A/0046), and the current proposed alterations to the GA1 lands (currently subject to a separate SHD application; Reg. Ref.: TA06F.310418).

5.3.2 Design Rationale

The vision for the subject lands is to create a richly landscaped urban setting with an efficient use of land, promoting sustainable densities, with the aim of creating a highly articulated public realm with a broad mix of uses, in a manner that promotes the development of a new vibrant community.

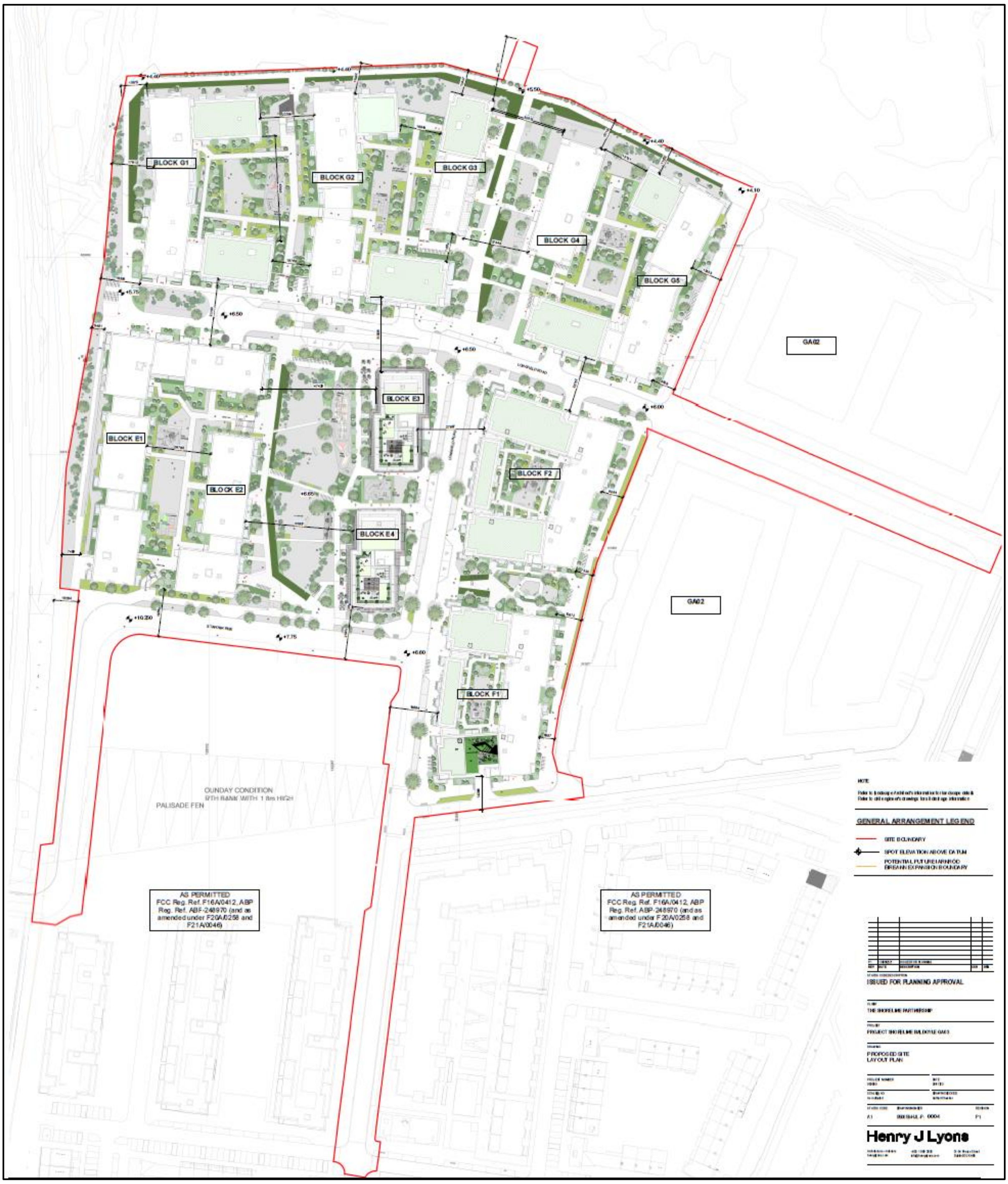
The design of the proposed Project revolves around the concept of pulling the adjacent parkland through the development. It is intended that the proposed Project will provide a transition from the more urban character of the proposed Stapolin Square in GA1 to the open parkland setting of the proposed Racecourse Park.

The streetscape and buildings have been arranged to enhance the sense of connection to the park. The primary ‘green artery’ of Longfield Road will provide a clear, legible orientation towards the Racecourse Park. It will relate physically and visually to a number of public and communal open spaces at ground and podium levels, which will emphasise the position of landscape at the heart of the proposed Project.

The proposed Project gives effect to the Baldoyle-Stapolin LAP (2013). The height and massing is maintained at the extremities of the site, along the railway and park, to allow the open spaces within to breathe. The main thoroughfares are defined and enhanced by special buildings, such as the tower and park pavilions, which orientate the scheme. A variety of materials and design details provide distinctive character to the different areas of the masterplan.

The proposal will provide 1,221 high-quality homes in a mix of own-door duplexes, studio apartments and one-, two- and three-bed apartments. It is proposed that active frontages, own-door duplexes and amenity zones be located at ground floor level, to lend activity, animation and passive surveillance to streets and shared spaces. At ground floor level, ground floor apartments have been avoided in favour of duplex units.

Figure 5.4: Layout of the Proposed Project



5.3.3 Buildings

The proposed buildings are arranged in three zones (E, F and G) and may be summarised as follows:

Table 5.1: Proposed Buildings

Zone	Area	Block	Height (Storeys)	No. Units
E	Urban Park Apartments	E1	6 – 8	157
		E2	6	68
	Park Pavilions	E3	6	45
		E4	5	36
F	Longfield Apartments	F1	2 – 5	91
		F2	2 – 6	122
G	Racecourse Apartments	G1	5 – 10	170
		G2	5 – 10	175
		G3	15	124
		G4	7	60
		G5	5 – 10	173

Blocks E1 and E2 comprise the 'Urban Park Apartments', in the south-western corner of the Site, overlooking the railway line to the west, and immediately west of the community park. Here, a palette of soft grey tone brick bandings are proposed to break down the massing of the blocks.

Blocks E3 and E4 comprise the 'Park Pavilions', which will sit at the centre of the Site, between the community park and Longfield Road. The façades of the Park Pavilions will be given a distinctive design, with continuous balconies wrapping the entire façade, and corrugated fibre cement panel cladding. The entire ground floor levels of these blocks will be given over to amenity space, linking in with the community park.

The Zone F blocks will comprise the 'Longfield Apartments', in the south-eastern corner of the Site. Here, a warm palette of pink bricks will be used to articulate the sculptural form of the blocks and provide a distinctive appearance in the context of the wider Site. Simple detailing in the form of push-pull bricks and shoulder coursing will add interest and variety to the façades. The brickwork will be contrasted with the use of white wet dash render to the rear of the blocks.

The Zone G blocks will comprise the 'Racecourse Apartments', along the northern boundary of the Site, overlooking the Racecourse Park. The orientation of these blocks has been 'splayed out' to maximise views out over the parkland. These will be the densest and highest buildings on the Site, and will include tower block, G3, which at 15 storeys forms the tallest elements of the proposed Project. A variety of palette bricks and wet dash render will be used in Zone G to create a sense of human scale and texture.

The heights of the buildings will range from two to 15 storeys. As discussed in Chapter 3 (Planning & Development Context), in this respect, the proposed Project contravenes the LAP, which stipulates that building heights across the development lands should generally be within the range of two to five storeys. The proposed taller buildings provide a high quality response to the site context providing variation in scale, massing and height at these key locations, and responding to general development patterns in the area, such as the adjacent development at Clongriffin. This has resulted in an attractive streetscape characterised by high quality materials, finishes and palettes. The location of the taller blocks has been carefully considered with regard to residential amenity including overshadowing, daylight / sunlight and microclimate parameters.

In accordance with the LAP, it is proposed that the height and massing of the buildings be intensified along its perimeters – adjacent to the railway line and the Racecourse Park. Building heights have been established to relate well to each other and their surroundings, providing a sense of enclosure to residential streets. The main thoroughfares will be defined and enhanced by special buildings such as the tower and park pavilions, which orientate the proposed Project.

The proposed buildings have been laid out to provide generous spaces between blocks, allowing streets and public spaces to 'breathe'.

5.3.4 Residential Units

The proposed Project will feature 1,221 residential units, comprised of apartments and duplexes, of which:

- One (1 no.) (<1%) will be studios;

- 502 (41%) will be one bed units;
- 636 (52%) will be two bed units; and
- 82 (7%) will be three bed units.

Of the above-listed units, 122 units (10%) will be allocated for Part V social housing in Block F2.

5.3.5 Other Uses

The proposed Project also provides for non-residential uses, including residential tenant amenity and other uses which will provide primarily for the needs of future residents but also some local services for existing residents, and will complement the Village Centre being provided under the scope of the (separate) proposed GA1 development.

It is proposed to provide a 452 m² crèche with an external play area, providing approx. 113 childcare spaces, at ground floor level in Block G4. Parking spaces will be provided for drop-off and staff parking at ground floor level. For more information in relation to the childcare provision, please refer to the Schools Demand and Childcare Facilities Assessment, prepared by BSM and submitted under separate cover as part of the planning application.

It is also proposed to provide a 205 m² café / restaurant at ground floor level in Block E3. A variety of additional amenity spaces will be distributed throughout the proposed Project, with associated external break-out terraces.

5.3.6 Access & Parking

It is envisaged that motor traffic will be present on the Site only where required, with measures taken to prioritise pedestrians and cyclists within the public realm. Longfield Road will be the main north-south route through the Site, and the primary link from the surrounding area to the Racecourse Park. Stapolin Way will run east-west through the Site, crossing Longfield Road. A ‘boulevard’ configuration will be established on Stapolin Way, west of the junction with Longfield Road. The portion of Longfield Road north of Stapolin Way will be ‘Longfield Plaza’, for the use of pedestrians, cyclists and emergency vehicles only.

Once the proposed Project is operational, its internal road network will tie-in with the existing road network at four locations to the south and west, with provision made for a further connection to future road infrastructure immediately to the east. The proposed Project will have three primary access points, as follows:

- The northward continuation of Longfield Road (via adjacent GA1 lands), which originates at Grange Road approx. 440m to the south;
- The westward continuation of Red Arches Road (via adjacent GA1 lands), which originates at Coast Road approx. 1,000m to the east; and
- The continuation to the north and west of the existing Red Arches Avenue (via adjacent GA1 lands), which connects to Red Arches Road.

A further vehicular access point will be located on the western boundary of the proposed Project. Its use will be restricted to service vehicles, cyclists and pedestrians. Here, a ramp will rise to meet the existing podium-level roadway at Clongriffin rail station, providing a link to Station Hill and to Clongriffin Main Street. Provision has also been made for future connectivity to adjacent development lands in GA2, immediately to the east of the Site. For further information in relation to access, refer to Chapter 19 (Material Assets – Services).

It is proposed to provide 2,021 covered and secure resident bicycle parking spaces across the Site, which equates to one space per bedroom; plus 306 visitor bicycle parking spaces (roughly half of which will be covered).

It is proposed to provide car parking spaces at a ratio of 0.54 per residential unit. A total of 673 car parking spaces is proposed, of which 632 will be internal residential, 33 will be external residential (of which 10 will be reserved for the proposed car club), and a further 8 will be allocated to the crèche (for staff and drop-off). Ten per cent of internal residential parking spaces will be allocated to EVs.

5.3.7 Landscape Strategy and Design

The proposed Project will provide c. 1.25 ha of Class 2 public open space, in the form of small parks and pocket parks on the Site; plus an additional c. 1.0 ha semi-private communal open space, in the form of six generous courtyards; as well as private terraces.

The public open spaces will include a mini plaza (‘Longfield Plaza’) and a community / urban park between Blocks E2, E3 and E4. Longfield Plaza (c. 100 m × 30 m) will provide a hard-landscaped open space with pockets of soft landscaping and outdoor seating for the proposed café. The community (c. 100 m × 50 m) park will be predominantly comprised of lawn, with clusters of native trees, ornamental grasses and footpaths; and featuring activity zones, such as playgrounds, climbing areas and kickabout areas.

The semi-private communal courtyards surrounding the apartment buildings at ground and podium levels will provide for recreational activities such as one might enjoy in a garden, incorporating lush planting, seating and play elements, and buffer planting along private terraces and building thresholds.

Communal roof gardens will also be provided on Blocks E3 and E4, featuring lawn strips, raised planters, outdoor kitchens and timber deckings.

The green artery / corridor of Longfield Road will connect the public realm / landscaped areas throughout the proposed Project. It will be planted with large specimen trees, placed in generous islands of planting beds. Buffer planting is also proposed along this thoroughfare to protect and screen private terraces.

Play and activity areas suitable for toddlers, older children and adults will be provided across the public realm areas of the proposed Project, including in semi-private communal areas.

Landscape planting will utilise durable and wildlife-friendly species to minimise maintenance and boost wildlife around the Site. Native species, as well as non-native ornamental species, will be used. A mixture of larger trees, smaller multi-stemmed trees, shrubs, grasses and herbaceous perennials and annuals will be used.

5.3.8 Security Considerations

The design of the proposed Project, with balconies, terraces and amenity / commercial areas overlooking the public realm, provides for passive surveillance of the external spaces, particularly the main central courtyards. Ground floor units will have an external landscaped buffer between their private amenity space and the communal spaces, in order to provide an additional element of separation and security to these apartments.

5.3.9 Water Supply & Wastewater Drainage

Water Supply

The proposed water supply network will be designed and installed to the requirements and specifications set out in the Irish Water *Code of Practice for Water*. It will connect to the existing

300 mm water mains on Myrtle and Stapolin Avenues and to the existing 450 mm water main to the north of the site.

A Pre-connection Enquiry was submitted to Irish Water based on the potable water demand for the proposed Project and a favourable response was received. A Statement of Design Acceptance has also been received from Irish Water in relation to the proposed design.

The proposed potable water infrastructure and routing plan is shown on CS Consulting drawing nos. BD-CSC-ZZ-G3-DR-C-0107 and BD-CSC-ZZ-G3-DR-C-0108. Please also refer to CS Consulting's Engineering Services Report (both submitted as part of the planning application under separate cover) for further information.

Wastewater Drainage

Storm Water

The proposed new storm water drainage arrangements will be designed and carried out in accordance with:

- The Greater Dublin Strategic Drainage Study Volume 2;
- The Greater Dublin Regional Code of Practice for Drainage Works;
- BS EN – 752:2008, Drains & Sewer Systems Outside Buildings;
- The requirements and specifications of FCC; and
- Part H (Building Drainage) of the Building Regulations.

Sustainable drainage systems (SuDS) measures will be incorporated into the stormwater drainage network to improve the quality of stormwater leaving the Site. These will include green roofs, rainwater harvesting, permeable paving, integrated tree pits and bio-retention areas. Petrol interceptors will also be provided in car parking areas. The design is in accordance with the criteria of FCC's SuDS / Green Infrastructure checklist.

The new network will connect to a constructed wetland and associated upstream surface water network, previously permitted under ref. F16A/0412 / ABP ref. 248970 (and amended under F20A/0258 and F21A/0046) and designed to serve the proposed Project in addition to development at Growth Areas 1 and 2. The constructed wetland – which is under construction at the time of application – will feature shallow ponds and marshy areas with a high density of aquatic vegetation. It will detain flows for an extended period, allowing suspended solids to settle out and facilitating treatment of contaminants, before discharging via a weir / spillway into the Mayne River floodplain.

The stormwater drainage network has been designed and modelled for the 100-year storm event. An overflow flood route is also provided within the proposed road network to cater for storms higher than a 100-year event, or if a blockage were to occur in the primary network. The road network will guide excess stormwater away from buildings and towards green / landscaped areas, where it can pond and percolate to ground.

Please refer to CS Consulting drawing nos. BD-CSC-ZZ-G3-DR-C-0103 and BD-CSC-ZZ-G3-DR-C-0104 for the proposed drainage network layout, and to CS Consulting's Engineering Services Report (both submitted as part of the planning application under separate cover) for further information.

Foul Water

All foul effluent generated at the proposed Project during the operational phase shall be collected in new, separate foul pipes and flow, under gravity and via a new connection, to the existing 375 mm diameter foul sewer in the north-eastern corner of the Site. Grease traps will be provided on foul sewers, where required.

The foul drainage network for the proposed development has been designed in accordance with:

- The Regional Code of Practice Drainage Works;
- The Greater Dublin Strategic Drainage Study;
- Part H (Building Drainage) of The Building Regulation; and
- Irish Water Code of Practice for Wastewater Infrastructure.

A Pre-connection Enquiry was submitted to Irish Water on the basis of the foul water flows for the proposed Project, and a favourable response was received. A Statement of Design Acceptance has also been received from Irish Water in relation to the proposed design.

Please refer to CS Consulting drawing nos. BD-CSC-ZZ-G3-DR-C-0103 and BD-CSC-ZZ-G3-DR-C-0104 for the proposed drainage network layout, and to CS Consulting's Engineering Services Report (both submitted as part of the planning application under separate cover) for further information.

5.3.10 Resource Efficiency

The proposed Project will comply with Part L 2019 (NZEB[7]) for residential and Part L 2017 (NZEB) for non-residential. The design of the proposed Project is targeting an A2 / A3 Building Energy Rating (BER) for residential and A3 for non-residential.

A range of energy efficiency measures are proposed for the buildings, including the following:

- High performance U-values, improved air tightness and improved thermal transmittance and thermal bridging design to minimise heat loss.
- Maximising natural daylighting to reduce demand for electrical lighting.
- Use of clean technology / low energy building plant (e.g. variable speed drive motors).
- Use of energy efficient light fittings throughout.
- Use of a Building Energy Management System (BEMS) to monitor and manage energy systems throughout the proposed Project.
- Use of renewable technologies, including air source heat pumps, solar photovoltaic (PV) panels, and Variable Refrigerant Flow (VRF) systems.

Measures are proposed to minimise water use during the operational phase, including low consumption sanitary fittings, leak detection systems and rainwater harvesting.

5.4 Construction Phase

This section provides an overview of the proposed construction phase insofar as it relates to the EIA. For a more detailed description of the proposed works and construction management measures, please refer to CS Consulting's Outline Construction Management Plan, submitted under separate cover as part of the planning application.

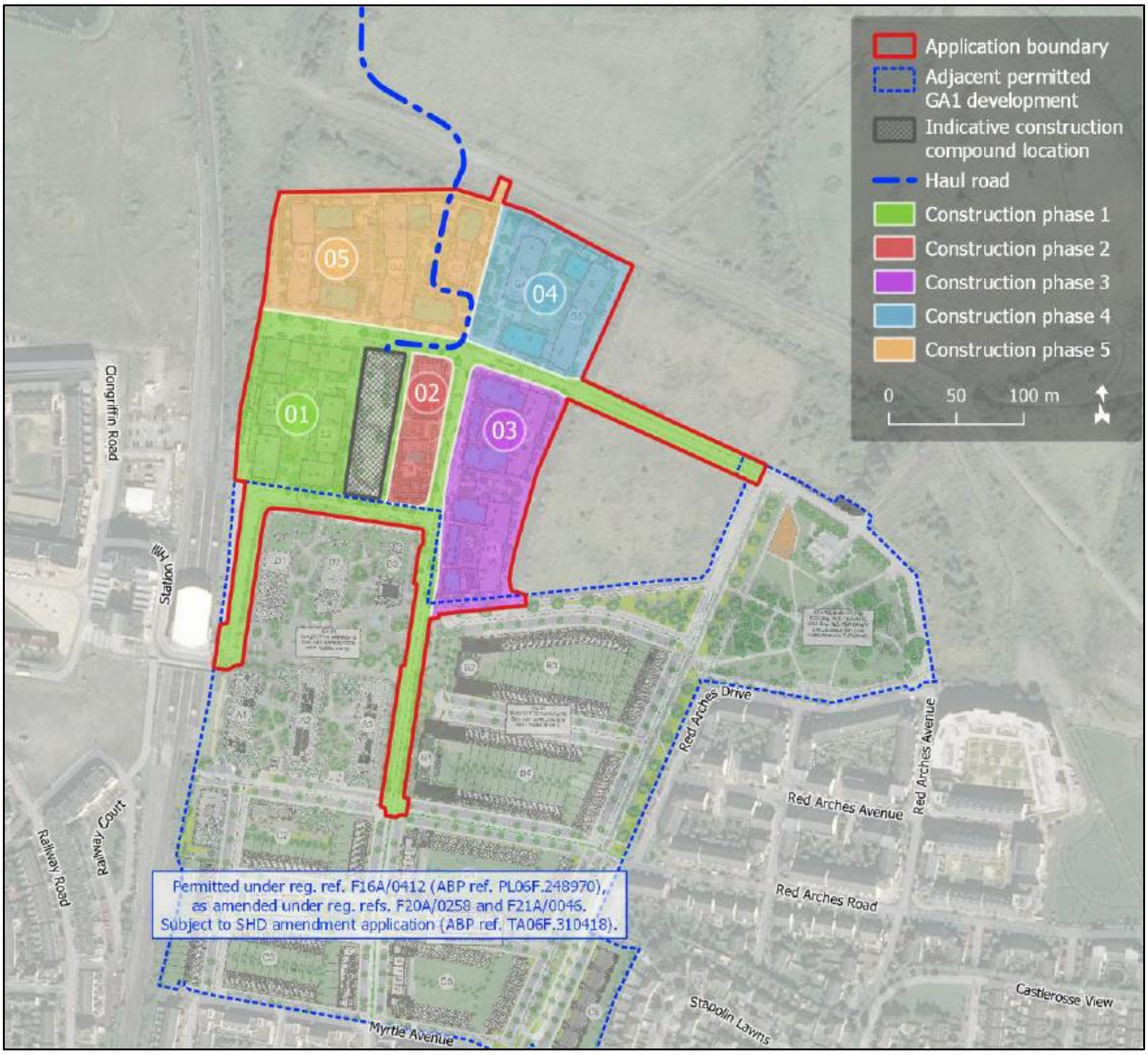
5.4.1 Phasing

It is anticipated that the proposed Project will be constructed in five phases, as illustrated in Figure 5.5, the details of which will be agreed with FCC. Construction phases shall run in the numerical order given, although it is anticipated that phases may overlap. Phase 1 shall include the construction of the principal road infrastructure to be delivered as part of the proposed Project.

[7] Nearly Zero Energy Building

The construction phase is expected to last for c. 54 months (4.5 years), commencing in Q1 2024 and ending in Q3 2028.

Figure 5.5: Indicative Construction Site Phasing, Access and Compound



5.4.2 Proposed Works

The proposed construction works / activities are summarised in Table 5.2, below.

Table 5.2: Overview of Construction Phase Activities

Activity	Description of Activity
Site Setup	At this stage, the construction site is set-up. The site compound, boundary and other necessary facilities are established. All required enabling works and site investigations (including GI) are carried out.
Earthworks	At this stage, earthworks will be completed, using cut-and-fill to bring the Site levels to formation level. It will also be necessary at this stage to remove pyrite

Activity	Description of Activity
	stone from below existing roads. Excess material which cannot be re-used on-Site will be disposed off-Site at a suitably licensed facility in accordance with the Construction and Demolition Waste Management Plan (C&D WMP) (Appendix 18.1).
Structures	This stage involves the construction of the foundations and buildings. To create foundations and basements, piling will be carried out, using a combination (as appropriate) of secant, continuous flight auger (CFA) and driven piles. Buildings will be of reinforced concrete and steel framing, with structural steel framing infill, and brick / render / glass façade. Bolt-on balconies will be attached.
Services	New electricity and telecommunications services infrastructure will be put in place to serve the various buildings. This will be carried out in accordance with the requirements of the various service providers / authorities, working around the existing live gas infrastructure on the Site.
Enclosures	As the proposed Project will be completed in phases, it will be necessary to separate completed and occupied blocks from areas where construction is ongoing using phased hoarding.
Landscaping	Hard and soft landscaping and reinstatement works will be carried out.

5.4.3 Plant & Equipment

Major plant and equipment expected to be used during the works are as follows:

- Articulated and rigid trucks;
- Rigs, bulldozers, excavators, backhoes and ancillary equipment (rock hammers or saws);
- Mobile cranes;
- Concrete delivery trucks;
- Concrete pumps;
- Man and material hoists;
- Scissor, boom and fork lifts.

All plant and equipment will be operated by experienced and qualified personnel with the appropriate registrations.

5.4.4 Vegetation Removal

The site is currently vacant and is made up of overgrown grass fields and scrub, and all trees and hedgerows located within the Site boundary are required to be removed to facilitate the build.

A tree survey and arboricultural impact assessment has been carried out by qualified arborist, Charles McCorkell, in relation to the Site and proposed Project in accordance with BS 5837: *Trees in relation to design, demolition and construction – Recommendations* (2012). It was determined that the proposed works would necessitate the removal of one tree, two groups of trees / shrubs, and the partial removal of three groups of trees / shrubs. Of the six survey entries proposed to be removed or partially removed, five are of low quality (Category C), and one is of poor quality (Category U).

According to the Arboricultural Report (submitted under separate cover), the loss of these trees will have an insignificant impact on the character and appearance of the local area due to their low / poor quality and limited public amenity value. Given the neglected nature of the Site at present, the proposed Project provides a good opportunity to enhance the overall landscape character of the local area by improving the quality and diversity of tree cover.

A detailed landscape plan has been prepared and is submitted under separate cover as part of the planning application for the proposed Project. This design includes the planting of a number of new high-quality trees. This proposed new planting will mitigate the loss of trees required to be removed, and in the medium- to long-term, increase local canopy cover and have a positive impact on the character and appearance of the site and the surrounding local landscape.

5.4.5 Site Access and Egress

Construction site access will be via an existing haulage route running in a north-south direction from an entrance at Moyne Road via a road bridge over the River Mayne (see Figure 5.5). This route will avoid any potential future conflict with users of the proposed Racecourse Park or two-way cycle route under construction to the north-east of the proposed Project. There is an existing field entrance, which will be improved (as described in the Outline Construction Management Plan, submitted under separate cover) to ensure safe access and egress of site vehicles.

All construction traffic will use the haulage route to the north. Later phases will utilise Longfield Road only to access incomplete phases and only via the haulage road from the north. Construction traffic will not be permitted to use Red Arches Road to the east or Grange Road to the south unless agreed with FCC in exceptional circumstances.

Construction-related vehicle movements will be minimized through:

- Consolidation of delivery loads to / from the site and scheduling of large deliveries to occur outside of peak periods.
- Use of precast / prefabricated materials, where possible.
- Reuse of 'cut' material generated by the construction works on site, where possible, through various accommodation works.
- Provision of adequate storage space on-site.
- Development of a strategy to minimise construction material quantities as much as possible.
- Promotion of public transport use by construction personnel, in order to minimise staff vehicle movements.

All deliveries to site will be scheduled to ensure their timely arrival and to avoid the need for storing large quantities of materials on site and the possibility of wastage. Deliveries will be scheduled outside of rush hour traffic to avoid disturbance to pedestrian and vehicular traffic in the vicinity of the site.

The construction site will be secured with hoarding, fencing and lockable gates, as appropriate, in accordance with the specifications of the final Construction Management Plan (CMP) and any requirements of the relevant authorities and statutory provisions.

Truck wheel washes will be provided at site entrances, and any specific FCC recommendations regarding construction traffic will be adhered to.

5.4.6 On-site Facilities

On-site facilities shall include:

- Materials and equipment storage areas;
- A site office;
- Staff welfare facilities (e.g. toilets, drying room, canteen, etc.); and
- Employee and visitor parking.

Site offices and compound will be located within the site boundary / lands made available to the successful contractor. An indicative site compound location is shown in Figure 5.5.

The site will be able to accommodate employee and visitor parking on temporary hardstanding areas. Sufficient on-site parking will be provided during the construction phase in order to ensure no overflow onto the local road network. To the extent possible, personnel will be encouraged to use public transport to access the site. Cycle parking spaces will be provided on the site for construction personnel. In addition, lockers will be provided to allow cyclists to store their cycling clothes. Car sharing among construction personnel will be encouraged (to the extent permitted by public health restrictions).

Electricity will be provided to the site via the national grid. Water supply to the site will be provided by means of a temporary connection to a public water main. Similarly, a temporary connection for foul water drainage will be made to the public network.

5.4.7 Good Housekeeping

The following housekeeping measures will be taken to ensure that the site, public roads and surroundings are kept clean and tidy:

- A regular program of site tidying will be established to ensure a safe and orderly site.
- Scaffolding will have debris netting attached to prevent materials and equipment being scattered by the wind.
- Food waste will be strictly controlled on all parts of the site.
- Mud spillages on roads and footpaths outside the site will be cleaned regularly and will not be allowed to accumulate.
- Wheel wash facilities will be provided for vehicles exiting the site.
- In the event of any fugitive solid waste escaping the site, it will be collected immediately and removed.

5.4.8 Working Hours

The following site operating hours are proposed:

- Monday to Friday: 07:00 – 19:00
- Saturdays: 08:00 – 14:00
- Sundays & Bank Holidays: Works not permitted

It may be necessary for some construction operations to be undertaken outside these times, e.g. for service diversions and connections, concrete finishing and fit-out works, etc. There may also be occasions where it is necessary to make certain deliveries outside these times, e.g. where large loads are limited to road usage outside peak times. In such cases, works outside the above-stated hours will only be permitted with the prior consent of FCC.

5.4.9 Coordination with Adjacent Development

It is anticipated that the construction of the adjacent (and slightly overlapping) GA1 development will proceed in tandem with that of the proposed Project, and the site establishment and access arrangement for the two will be carried out so as to allow efficient and streamlined operation of both sites. All works within the areas of overlap between the two developments will be programmed to satisfy the logistical requirements of both sites, in accordance with the final planning permissions for these developments.

5.4.10 Relevant Plans

A suite of construction phase plans will be implemented during the proposed works, including the following of relevance to the EIA:

- Construction Management Plan (CMP)
- Construction Environmental Management Plan (CEMP)
- Arboricultural Report
- Dust Management Plan
- Construction Traffic Management Plan (CTMP)
- Construction & Demolition Waste Management Plan (C&D WMP)

5.4.10.1 Construction Management Plan (CMP)

An Outline CMP has been prepared by CS Consulting in respect of the proposed Project, and submitted under separate cover as part of the planning application. It provides an overview of the processes to be employed during the construction phase, and addresses issues that can arise during construction, including noise and vibration; traffic management; working hours; pollution control; dust control; road cleaning; compound / public health facilities; and staff parking. The CMP is to be updated by the successful contractor in agreement with FCC in advance of the construction phase.

5.4.10.2 Construction Environmental Management Plan (CEMP)

An Outline Construction Environmental Management Plan (CEMP) has been prepared by Altemar Marine & Environmental Consultancy in respect of the proposed Project, and submitted under separate cover as part of the planning application. It provides details of proposed mitigation measures during Site clearance, enabling works and construction, including proposals for noise and dust reduction, in addition to surface water run-off treatment and details on how the proposed Project is intending to use a comprehensive and integrated approach to protecting the Mayne River and other sensitive environmental receptors including downstream Natura 2000 sites.

A final CEMP will be prepared by the appointed Contractor prior to work commencing on-Site. The final CEMP shall contain the mitigation measures identified in this EIAR and ensure that they are fully implemented during the construction phase, to prevent or reduce the impacts identified herein. The final CEMP will not contain additional mitigation measures necessary to the protection of Natura 2000 Sites, beyond those outlined in the accompanying NIS, submitted under separate cover as part of the planning application.

5.4.10.3 Arboricultural Report

An Arboricultural Report has been prepared by Charles McCorkell Arboricultural Consultancy and is submitted under separate cover as part of the planning application. The proposed works shall be carried out in accordance with all recommendations contained in this document and its appendices.

5.4.10.4 Dust Management Plan

A Dust Management Plan has been prepared by AWN Consulting and is appended to this EIAR (Appendix 11.3). It contains a suite of measures to control dust at the construction site to ensure that no significant nuisance occurs at nearby receptors, and has been informed by international best practice guidance documents on this topic. The plan will be implemented in full during the proposed works. For further information, refer to Chapter 11 (Air Quality & Climate).

5.4.10.5 Construction Traffic Management Plan

Prior to the commencement of the proposed works, a Construction Traffic Management Plan (CTMP) will be developed by the successful contractor in consultation with the design team and FCC, and in accordance with the relevant requirements of the following:

- Department of Transport (2019). *Traffic Signs Manual* – Chapter 8: Temporary Traffic Measures and Signs for Roadworks.
- Department of Transport, Health & Safety Authority, National Roads Authority & Local Government Management Services Board (2010). *Guidance for the Control and Management of Traffic at Road Works*.
- Department of Transport & Department of Environment, Community and Local Government (2013). *Design Manual for Urban Roads and Streets* (DMURS).
- UK Design Manual for Roads and Bridges (DMRB).

The CTMP will seek to avoid / minimise impacts associated with construction traffic. The following mitigation measures will be incorporated into the CTMP:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- The surrounding road network will be signed to define the access and egress routes for the proposed Project.
- The traffic generated by the construction phase of the proposed Project will be strictly controlled in order to minimise the impact of this traffic on the surrounding road network.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- All employees and visitor vehicle parking demands will be accommodated on-site.
- A programme of street cleaning if / when required.
- Any associated directional signage.
- Any proposals to facilitate the delivery of abnormal loads to the site.
- Measures to obviate queuing of construction traffic on the adjoining road network.

5.4.10.6 Construction & Demolition Waste Management Plan (C&D WMP)

A Construction & Demolition Waste Management Plan (C&D WMP) has been prepared by AWN Consulting and is appended to this EIAR (Appendix 18.1). It includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of C&D waste to be generated by the proposed Project and makes recommendations for management of different waste streams. The finalised C&D WMP shall be implemented in full during the proposed works.

5.5 Operational Phase

The most significant environmental effects are expected to arise during the construction phase. The operational phase of the proposed Project – which will entail aspects associated with the standard operation of a large-scale, residential, apartment development with public realm and crèche, café and residential amenity areas – is therefore relatively benign. Relevant aspects of the operational phase are discussed in the respective specialist chapters, as appropriate.

6 Consultation

6.1 Introduction

This Chapter was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin. It describes the consultation process for the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13.

The 2014 EIA Directive places emphasis on effective public participation in the decision-making procedures for EIA cases. Early involvement of the public and other stakeholders ensures that the views of groups and individuals are taken into consideration throughout the preparation of the EIAR.

It was recognised at an early stage of the proposed Project that stakeholder engagement is a critical component to the process. The structure and presentation of the EIAR, the Non-Technical Summary of the EIAR, as well as public access to the documents, all facilitate the dissemination of the information contained in the EIAR. The core objective is to ensure that the public and local community are aware of the *likely environmental effects* of projects prior to the granting of consent.

Informal scoping of potential environmental impacts was undertaken with Fingal County Council through pre-application meetings. Direct and formal public participation in the EIA process will be through the statutory planning application process under the SHD procedures.

Section 4(1) of the Planning and Development Act 2016 provides that an application for permission for a SHD shall be made directly to An Bord Pleanála (ABP) and not to a Planning Authority, as was the case previously. The SHD process comprises three mandatory stages, which are outlined in Table 6.1.

Table 6.1: Strategic Housing Development (SHD) Consultation Stages[8]

Stage	Description
Stage 1	**Consultation** with the Planning Authority (under *Section 247 of the Planning & Development Act, 2000, as amended*).

[8] An Bord Pleanála (2017).

Stage	Description
Stage 2	**Pre-Application Consultation** with ABP (under *Section 6 of the Planning & Development (Housing) and Residential Tenancies Act, 2016*).
Stage 3	**Planning Application** to be submitted directly to ABP.

6.2 Consultation – Stage 1

Pre-application Consultation is a new and mandatory step required prior to making an application for a SHD to ABP. Both the context and approach to the development and the emerging design rationale for the proposed Project, have been subject to considerable consultation with the Planning Department under *Section 247*.

A series of meetings have been held with Fingal County Council Planning, Transport, Parks and Water Departments as formal pre-application discussions on the substance of the proposed Project. The pre-application attendees and dates of these meetings are listed in Table 6.2.

Table 6.2: List of Consultation Meetings

Date	Attendees
17th of December 2019	Kathy Tuck / Sean Walsh (Planning) Linda Lally (Transport) Mark Finnegan (Parks) Damien Cox (Water)
29th of January 2020	Kathy Tuck / Sean Walsh (Planning) Niall Thornton (Transport)
16th of April 2020	Kathy Tuck / Sean Walsh (Planning) Niall Thornton (Transport) Mark Finnegan (Parks)
17th of September 2020	Kathy Tuck / Sean Walsh (Planning) Niall Thornton (Transport) Mark Finnegan (Parks) Damien Cox (Water)

6.3 Pre-Application Consultation – Stage 2

The new SHD Pre-Application process requires a number of key steps to be completed which are:

- **Request for a Pre-Application Consultation** meeting by the prospective applicant to ABP.

- **Planning Authority** submits their opinion and Section 247 records to ABP, following request for a Pre-Application Consultation.
- **Pre-Application Consultation Meeting** will be held with ABP, the Planning Authority and the prospective applicant.
- **Record** of the Pre-Application Consultation.
- **Forming and Issuing of Opinion** by ABP.

Following the Pre-application Consultation meeting, an Opinion was received from ABP in March 2020 (ref. ABP-308743-20), which stated that *"An Bord Pleanála has considered the issues raised in the pre-application consultation process and, having regard to the consultation meeting and the submissions of the planning authority, is of the opinion that the documents submitted with the request to enter into consultations constitute a reasonable basis for an application for strategic housing development".*

The Opinion also provided a list of specific information to be submitted with the application (which has been referred to in preparing the planning application), and named the Prescribed Bodies to be notified of the application, which are as follows:

- Irish Water
- National Parks & Wildlife Service (NPWS)
- The Commission for Railway Regulation
- Iarnród Éireann
- Transport Infrastructure Ireland (TII)
- National Transport Authority (NTA)
- Fingal County Childcare Committee
- Irish Aviation Authority
- Department of Education and Skills

6.4 Planning Application – Stage 3

Before lodging this planning application, information in relation to the EIAR was uploaded to the Department of Housing, Planning and Local Government (DoHPLG) EIA Portal, an online map-based website that provides users with access to application for development consent containing an EIAR.

The planning application will then be submitted to An Bord Pleanála (with copies also submitted to the above-listed Prescribed Bodies and FCC), and this stage allows for further consultation. The application and all accompanying documents will be available on public display for review by the public and interested parties. Submissions on any aspect of the proposed Project may be made to An Bord Pleanála and such submissions will be taken into account in the determination of the application by the Board.

This proposed Project has a dedicated website as set out in the planning notices.

7 Population & Human Health

7.1 Introduction

This Chapter of the EIAR was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin.

This Chapter provides a description of the local population / community in the vicinity of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13. It considers and assesses the potential effects of the proposed Project on the people and businesses in the surrounding community, during the construction and operational phases. There is significant potential for interactions between population and human health and other environmental topics addressed in the EIAR, since socioeconomic and human health impacts can arise due to effects of a proposed Project on traffic and transportation, air quality and climate, noise and vibration, landscape and visual amenity, material assets and flood risk, among others. These interactions are addressed in this Chapter and in the relevant specialist chapters of this EIAR.

The proposed Project is described in Chapter 5 (Description of the Proposed Project), and is only described herein insofar as is relevant to the assessment of impacts on population and human health.

The 2014 EIA Directive updated the list of topics to be addressed in an EIAR and has replaced '*Human Beings*' with '*Population and Human Health'*. The term '*human health'* is not defined in the 2014 EIA Directive; however, the European Commission (EC) *Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)* (2017) states 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 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" (p. 37).

The EPA *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2017) 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 this EIAR e.g. under the environmental factors of air, water, soil etc."* (p. 29)

This Chapter also meets the requirement for assessment of '*Human Beings'* as per Schedule 6 of the PDR 2001.

7.2 Methodology

The assessment considers attributes and characteristics associated with population, community and residential settlement, economic activities and employment, community infrastructure and tourism and recreation. It has been carried out in accordance with the following guidance, and tailored accordingly based on professional judgement:

- EPA (2017). *Guidelines on the Information to be Contained in Environmental Impact Statements*;
- EPA (2015). *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*;
- IEMA (2017). *Health in Environmental Impact Assessment: A Primer for a Proportionate Approach*.

An extensive desktop study was carried out to characterise the environment in relation to human beings including the receiving population, to identify neighbouring industry and dwellings and to assist in the characterisation of land use. The following sources were referred to:

- Central Statistics Office (CSO). Census data from 2011 and 2016;
- CSO (2020). *Quarterly Labour Force Survey Q4 2020;*
- CSO Small Area Population (SAP) Statistics;
- Fingal County Council. *Fingal Development Plan 2017 – 2023;*

- Department of Housing, Planning & Local Government (DHPLG) (2020). My Plan map-viewer;
- Eastern & Midlands Regional Assembly (2019). *Regional Spatial and Economic Strategy 2019 – 2031*; and
- The World Health Organisation (WHO) (2020).

The design team carried out a number of site visits at different stages throughout the design process, which have also informed the assessment herein.

A Schools Demand and Childcare Facilities Assessment (2021) and Community Infrastructure Overview (2021), both of which have been prepared by BSM and are submitted under separate cover as part of the planning application, have also been referred to in the preparation of this Chapter.

This assessment has also considered the potential indirect and direct socio-economic impacts of the construction and operation of the proposed Project.

Receptors were identified and assessed for sensitivity, magnitude and significance to provide an appropriate and adequate assessment of how they could be impacted by the construction and operational Phases of the proposed Project. Impacts have been characterised in terms of quality, significance and duration, in accordance with the definitions set out in Section 1.6 in Chapter 1, as per the EPA 2017 EIAR guidelines.

7.3 Baseline Environment

This Section provides a description of the relevant aspects of the baseline environment in relation to population and human health.

The Site of the proposed Project is located in Baldoyle, Dublin 13, c. 9 km north-east of Dublin City Centre. It is c. 6.7 ha in size. Baldoyle is a coastal suburban area on the northern fringe of the Dublin Metropolitan Area. Key sites / areas in the vicinity include Sutton to the east; Clongriffin and Donaghmede to the west; Portmarnock to the north; and Kilbarrack and North Bull Island to the south. This area is subject to the objectives of the Fingal Development Plan (2017 – 2023) ('the Development Plan') and the Baldoyle-Stapolin Local Area Plan (2013) ('the LAP').

The Development Plan provides a description of Baldoyle as follows:

> *"Baldoyle is a suburb within the Metropolitan Area, with an original village core along the coast which has community infrastructure and limited retail and commercial facilities. The wider Baldoyle area hosts a range of urban services such as schools, retail facilities at Racecourse Shopping Centre, medical and community facilities to meet the needs of the existing and expanding populations. Baldoyle core is designated as an Architectural Conservation Area (ACA) and Baldoyle Estuary is designated as a Special Area of Conservation (SAC) and a Special Protection Area (SPA). Unlike other established settlements in the area it also provides a significant, dedicated employment base in the form of the Baldoyle Industrial Estate and lands around the rail line."* (p. 115)

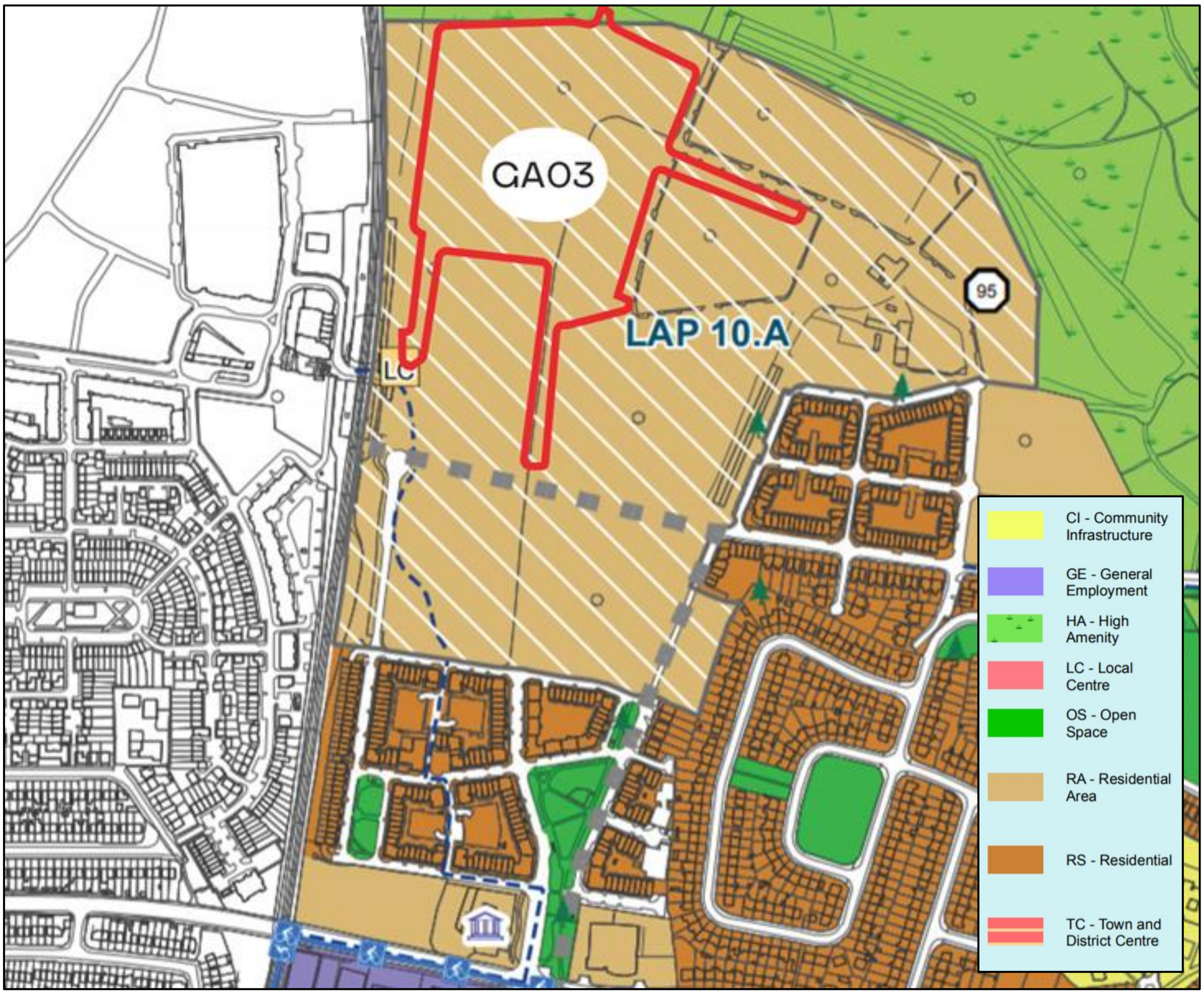
The Baldoyle-Stapolin area is further described in the LAP as *"one of Dublin's larger new development areas […] strategically located in terms of transportation linkages being approximately 9km southeast of Dublin Airport, and adjacent to the main Dublin-Belfast railway line"* (p. i).

The Balydoyle area has been designated as 'Consolidation Area within the [Dublin] Gateway' in the Development Plan. The 'Dublin Gateway' refers to Dublin City Centre and its immediate suburbs, as described in the Settlement Heirarchy of the Regional Planning Guidelines for the Greater Dublin Area (2010 – 2022). As stated in the Development Plan:

> *"The policy approach in [Baldoyle, Castlenock, Clonsilla, Howth, Mulhuddart, Portmarnock, Sutton, and parts of the city suburbs located close to the M50 motorway] will be to gain maximum benefit from existing transport, social, and community infrastructure through the continued consolidation of the city and its suburbs. Future development will happen in a planned and efficient manner utilising opportunities to achieve increased densities where appropriate."* (p. 45)

This intention is reflected in the Development Plan Objectives SS15, to *"Strengthen and consolidate existing urban areas adjoining Dublin City through infill and appropriate brownfield redevelopment in order to maximise the efficient use of existing infrastructure and services"* and Objective SS16, to *"Examine the possibility of achieving higher densities in urban areas adjoining Dublin City where such an approach would be in keeping with the character and form of existing residential communities, or would otherwise be appropriate in the context of the site"* (ibid).

Figure 7.1: Land Use Zoning at the Proposed Project Site (Fingal Development Plan 2017 – 2023)



As shown in Figure 7.1, above, the proposed Project Site is largely zoned as 'RA – Residential Area' in the Development Plan, for which the zoning objective is to *"Provide for new residential communities subject to the provision of the necessary social and physical infrastructure"*. The northern margin of the Site, which ties in with the future Racecourse Park, is zoned as 'HA – High Amenity', for which the zoning objective is to *"Protect and enhance high amenity areas".*

In the Development Plan, a number of specific objectives are set out in relation to Baldoyle, including Objective 'BALDOYLE 3', to *"Prepare and/or implement a Local Area Plan for lands at Baldoyle / Stapolin to provide for the strategic development of the area as a planned sustainable mixed use residential development subject to the delivery of the necessary infrastructure (Refer to Map Sheet No. 10, LAP 10.A)"* (p. 116).

As discussed in Chapter 3, the policy period of the pre-existing Baldoyle-Stapolin LAP from 2013 was extended to 2023 by the Councillors, making it the extant LAP for the Baldoyle-Stapolin development lands. The vision for Baldoyle-Stapolin set out in the LAP is:

> *"… to create a place to live that is appealing, distinctive and sustainable, with minimal impact on the surrounding environment and the coast. It is envisaged that Baldoyle-Stapolin will develop as a sustainable community comprised of new homes, community, leisure and educational facilities based around an identifiable and accessible new village centre which will form the heart of the area. With a range of different sizes and types of homes, as well as integrated amenities and excellent public transport, this will be a fledgling neighbourhood with a varied social mix and will embody the principles of sustainability, sustainable communities and inclusiveness."* (p. i)

In order to deliver the planned residential development of these lands, the LAP has divided them into separate 'growth areas', as illustrated in Figure 5.1 in Chapter 5 (Description of the Proposed Project). The proposed Project relates to Growth Area 3 (GA3).

The baseline environment (in terms of population and human health) is further detailed below under the following headings:

- Social patterns (population);
- Land use and settlement patterns;
- Economic and employment activity;
- Tourism;
- Community amenities; and
- Human health.

7.3.1 Social Patterns (Population)

The CSO provides data on population and socio-economic aspects of the population at different levels from the State, County, Local Electoral Area (LEA), individual Electoral Districts (ED) to Small Areas (SA) within each County. The most recent census by the CSO was undertaken in 2016. A new Census was due to take place in April 2021, but this has been deferred until April 2022 in light of the ongoing Covid-19 pandemic and associated public health restrictions.

The CSO Census data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.7%, bringing the total population of the Irish State to 4,757,976 (see Table 7.1, below). The rate of growth slowed from 8.1% in the previous census, attributable to the slower economic activity in the early part of the Census period resulting in a reduced level of immigration, albeit offset to a degree by strong natural increase. The economy has recovered in recent years with consequent population growth predominantly attributed to natural increase, greater economic activity, increased job opportunities and continued immigration.

In relation to population and demographics in the Baldoyle-Stapolin area, the LAP states that:

> *"From 1996-2006 there was a steady decrease in population in [the Baldoyle Electoral Division]. This was most likely because the area is largely settled with older households, borne out by the fact that the proportion of the population aged between 55 and 64 in the area tripled in the past 20 years. However data from the 2011 Census shows an increase in population of 928 persons (15.6%). A significant portion of this increase is attributable to the recent residential development on the Baldoyle-Stapolin LAP lands."* (p. 9)

More recent CSO Census data from 2016 indicate that this growth trend has continued in the Baldoyle Electoral Division (ED) with an increase of 6.9% to 2016; which is broadly in line with growth trends in the wider Howth-Malahide Local Electoral Area (LEA), the Fingal County Council administrative area, and the State (Table 7.1).

Figures 7.2 and 7.3, below, provides an overview of household numbers and sizes in the ED, as recorded during the 2016 census.

Table 7.1: Population Change: State, LEA and ED: 2011 – 2016 (CSO 2011 and 2016 Census Data)

Area	Number of Persons		
	2011	2016	Change
Ireland – State	4,588,252	4,757,976	+3.7%
Fingal County Council Administrative Area	273,991	296,020	+8.0%
Howth-Malahide LEA	54,949	59,794	+8.8%
Baldoyle (ED)	7,050	7,538	+6.9%

Figure 7.2: Housing Types by Household – Baldoyle ED (CSO 2016 Census)

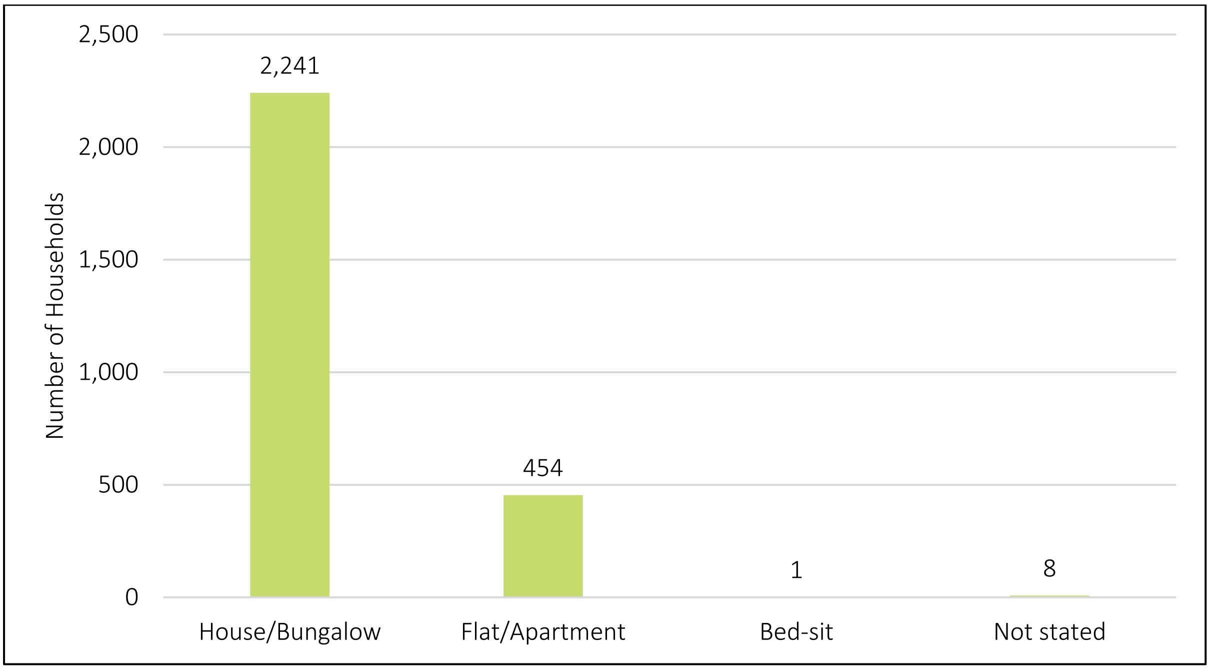
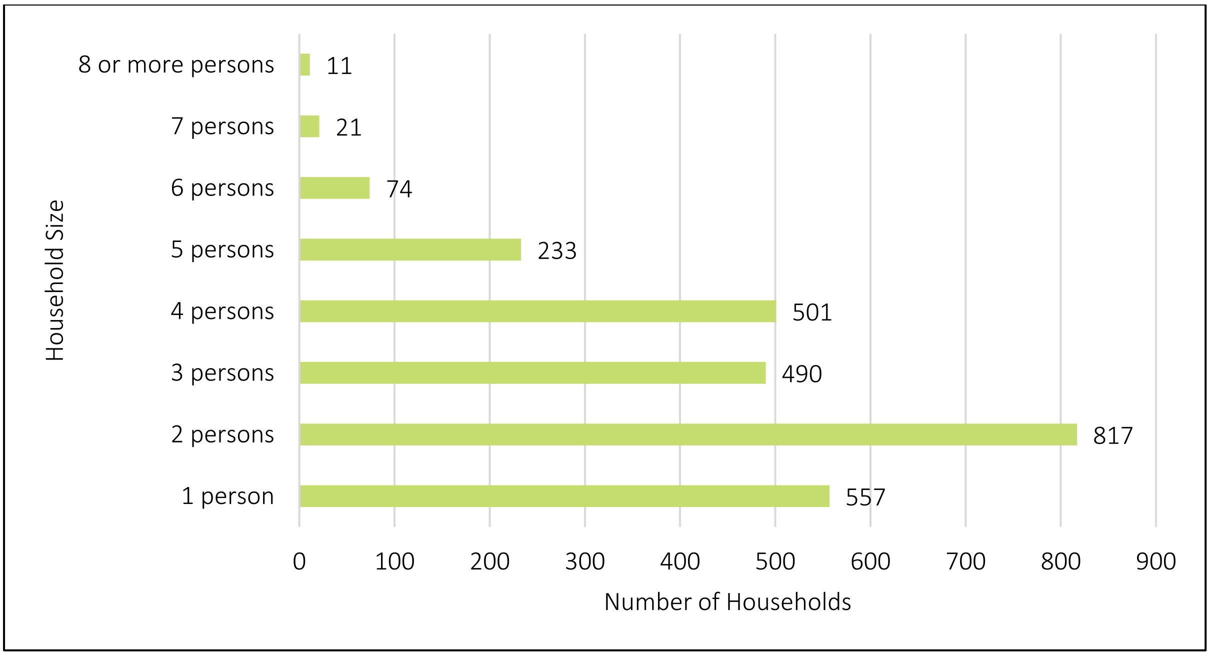


Figure 7.3: Household Size – Baldoyle ED (CSO 2016 Census)



7.3.2 Land Use and Settlement Patterns

The Site of the proposed Project is largely an undeveloped greenfield site with basic infrastructure (roads and services) in place, bounded by hoarding and not in use by the public.

Immediately to the west of the Site is an active railway line and Clongriffin rail station, which serves the Dublin – Dundalk and DART commuter services, providing access to and from the

City Centre. Land uses in the surrounding areas are predominantly low- to mid-rise residential, with scattered commercial / amenity uses, and significant commercial / industrial activity at Baldoyle Industrial Estate, c. 300 m to the south. There is also a significant amount of recreational parkland in the immediate environs; with the site of the former Baldoyle Racecourse immediately to the north, and Father Collins Park, Trinity Sports Club and Donaghmede Park all within 1 km to the west.

In terms of land use in the Baldoyle-Stapolin area, the LAP states that:

> *"The Plan lands comprise the site of the former Baldoyle Racecourse and Stapolin House. However, little is left of either of these historical land uses. The area today is characterised by the recent residential developments of Myrtle and Red Arches which form two phases of the overall six phases of development envisaged within the plan lands…"* (p. i).

7.3.3 Economic and Employment Activity

The CSO's Labour Force Survey (LFS) is the official source of labour market statistics for Ireland, including the official rates of employment and unemployment. The LFS data are based on the International Labour Organisation (ILO) concepts and definitions. Because the ILO approach does not fully capture the impact of the ongoing Covid-19 pandemic on the labour market, the most recent LFS data (for Q4 of 2020) provide Covid-19 adjusted estimates, which have accounted for the number of persons in receipt of the state Pandemic Unemployment Payment (PUP). The Covid-19 adjusted LFS data for Q4 of 2020 are presented in Table 7.2, below. Note that these are representative of the baseline scenario in Ireland plus the significant economic impacts of the ongoing Covid-19 pandemic and associated public health restrictions.

Table 7.2: Labour Force Survey Data for Ireland (CSO Labour Force Survey Data)

Indicator	Status	
	Q4 2020 (Covid-19-adjusted)	Q4 2019
Employment rate among 15 – 64 year olds	57.5%	69.6%
Unemployment rate among 15 – 74 year olds	19.4%	4.7%

It is estimated that employment fell by 2.3% over 2020. This compares with an annual increase of 3.5% in 2019, reflecting the unprecedented impact of the pandemic on economy and employment in Ireland in spite of positive economic performance in the preceding months and years. Up until and including Q4 2019, unemployment rates had decreased for 30 successive quarters. Loss of employment as a result of the pandemic has not been spread evenly across all sectors: employment decreased in 7 of the 14 sectors assessed, with the 'Administrative and support service activities sector' worst affected; while employment increased in the remaining 7, with the 'Information and communication sector' seeing the greatest gains. Note that the Covid-19 adjusted LFS unemployment figures do not account for persons availing of the pandemic wage subsidy schemes.

As the rollout of the Covid-19 vaccine ensues and public health restrictions are eased, positive trends in economic activity and employment are forecast for the second half of 2021 (Ibec, 2021) (Table 7.3). The Economic & Social Research Institute (ESRI)'s Quarterly Economic Commentary for Spring 2021 forecasts that, assuming another Level 5 lockdown is not on the horizon, Irish GDP is expected to increase by 4.4% in 2021, with unemployment expected to peak at 25% in Q1 2021 before falling to just over 10% by the end of the year (McQuinn *et al.*, 2021).

Table 7.3: Ibec Quarterly Economic Outlook – Q1 2021

Indicator	2020	2021 (Forecast)	2022 (Forecast)
Consumer spending	-9.0%	+9.0%	+5.5%
Annual Average Unemployment	16.7%	15.6%	9.3%

Figure 7.4, below, provides an indication of the employment status of the population in the local area, presenting the principal economic status of residents of the Baldoyle ED at the time of the 2016 Census. Note that these data do not reflect the economic impacts of the ongoing Covid-19 pandemic. Figure 7.5, below, presents the occupational classes of residents in the ED at the time of the 2016 Census.

There are a number of important employment hubs in the local area. As stated in the Development Plan, *"Baldoyle has two key employment centres, at Baldoyle Industrial Estate and Kilbarrack Industrial Estate, both providing significant employment for the wider area"* (p. 235). By virtue of its location immediately adjacent to the Clongriffin rail station, the location of the proposed Project is also within commuting distance of employment hubs in Dublin City Centre and its other suburbs.

Figure 7.4: Principal Economic Status – Baldoyle ED (2016 Census)

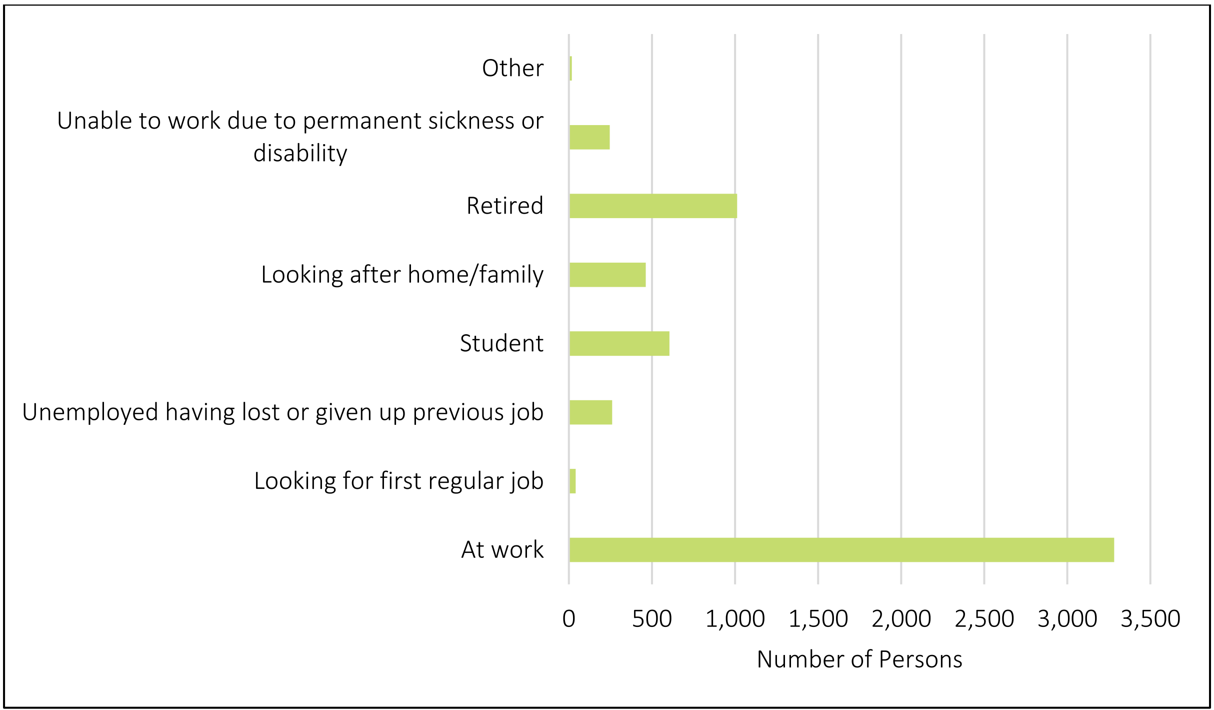
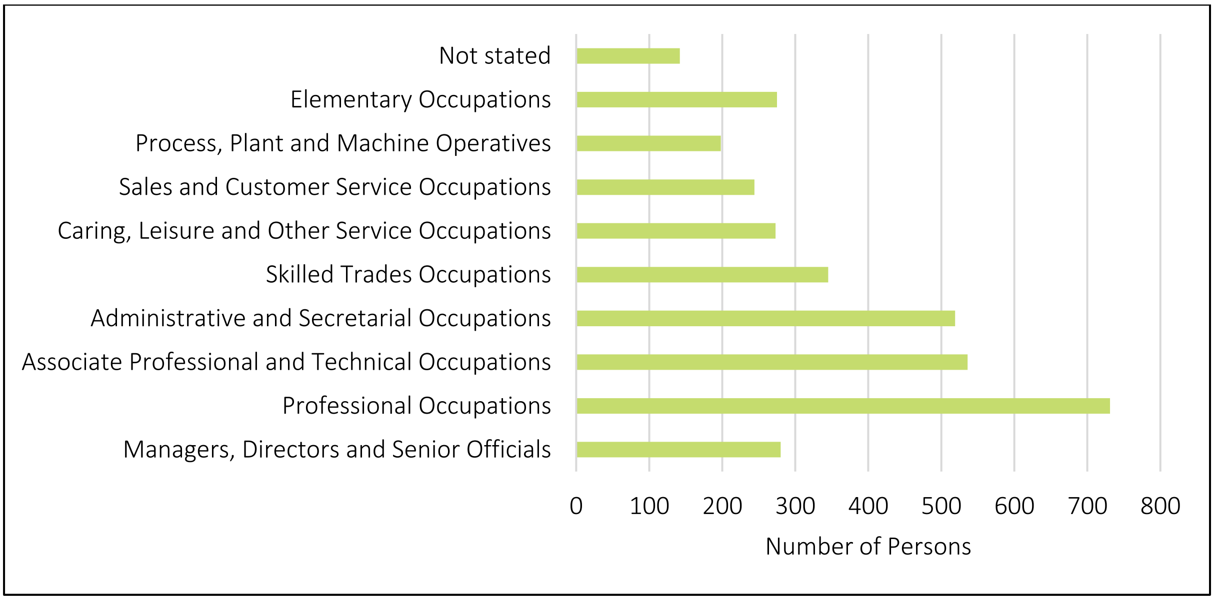


Figure 7.5: Occupation – Baldoyle ED (2016 Census)



7.3.4 Tourism

Tourism has been identified as one of the country's most important economic sectors and is credited with playing a significant role in the economic recovery in recent years. Tourism is particularly important in that it can assist in providing business and employment opportunities across regions and leads to jobs across the spectrum of skills requirements. In 2015 the national policy framework for the tourism sector '*People, Place and Policy: Growing Tourism to*

2025', was published with a strong focus on developing the sector to attract ten million overseas visitors, create a range of direct and indirect enterprise opportunities and to grow employment in the sector to 250,000 persons by 2025.

Fingal's close proximity to Dublin City centre and the location of Dublin Airport within its environs offers significant opportunities to expand the existing tourism offer and brand for the county. With Dublin's increasing importance as a popular destination for city-breaks, Fingal's coastal offering and rich built and natural heritage provide opportunities to attract visitors from Dublin City. Furthermore, the county can benefit from the constrained capacity of Dublin City and act as an accommodation base for those visiting Dublin and the wider area. Fingal's attractions include the coastal scenery and harbour towns, as well as the experiences of outdoor activities, food and drink. These include golf, equestrian, adventure centre and walking and cycling, farmhouse accommodation, open-farms, bird watching and eco, geo and green tourism.

The *Fingal Tourism Strategy 2015–2018*, seeks to provide an attractive, vibrant and sustainable tourism destination delivering a distinctive experience for local residents, domestic and international visitors.

While Dublin City Centre is the most important tourist destination in Ireland, the Baldoyle area does not currently feature any major tourist destinations, nor is it an important area in terms of tourist accommodation. However, there are a number of visitor attractions in the wider area, such as Portmarnock Golf Club (c. 1.5 km linear distance), Portmarnock Beach (c. 2 km linear distance), Malahide Golf Club (c. 2 km linear distance), Sutton Golf Club (c. 2.5 km linear distance), Howth (c. 4 km linear distance) and North Bull Island (c. 4 km linear distance).

7.3.5 Community Amenities

Please note that healthcare facilities are addressed in the following section.

Leisure amenities in the immediate area include:

- Parkland and other outdoor recreational amenities, such as the Racecourse Park (immediately north), Father Collins Park and Clongriffin Skate Park (all c. 650 m linear distance to west), Donaghmede Park (c. 700 m linear distance to north-west), Seagrange

Park (c. 1 km linear distance to south-east), and the seafront at Baldoyle (c. 1.2 km linear distance to east);

- Scattered cafés, bars and restaurants; and
- Scattered sporting clubs, facilities and gyms.

FCC intends to develop the former Baldoyle Racecourse grounds (c. 112 ha), situated immediately north of the proposed Project Site, into a public park. In May 2019, the Council opened a public consultation period in relation to a Draft Development Plan for the park, welcoming public comments on the proposed landscape masterplan for the park. Drawings published as part of the public consultation information pack indicate that it is intended to incorporate sports pitches, playgrounds, extensive pedestrian and cycle tracks, allotments and semi-natural grassland habitats into the parkland. While the design has not been finalised, it is clear that the Racecourse Park will provide a major, positive community amenity for neighbouring areas.

Other community amenities within a 1 km radius include:

- Scattered retail units (groceries, a shopping centre, auto service stations, hair and beauty studios, a garden centre);
- A post office and credit union; and
- Educational and childcare facilities (crèches / pre-schools, primary schools, secondary schools).

BSM has prepared a Schools Demand and Childcare Facilities Assessment in respect of the proposed Project, submitted under separate cover as part of the planning application. It has found that the area is well served by childcare and schools provision:

- Within a 2 km radius of the Site, there are 34 no. childcare facilities, with a total capacity of 1,762;
- There are a number of additional permitted and proposed childcare facilities in the vicinity;
- Within a 2 km radius of the Site, there are 13 no. primary schools;
- Within a 5 km radius of the Site, there are 44 no. primary schools, with a total capacity of 11,631;
- Within a 2 km radius of the Site, there are 6 no. post-primary schools;

- Within a 5 km radius of the Site, there are 18 no. post-primary schools, which cater for 9,074 no. pupils;
- There are a number of additional permitted primary and post-primary schools in the vicinity; and
- The Department of Education and Science has earmarked 1 no. primary school and 2 no. post-primary schools for future delivery in the wider area.

Baldoyle town centre (a c. 20 minute (1.7 km) walk from the Site of the proposed Project) also features a range of community amenities. As stated in the Baldoyle-Stapolin LAP:

> *"Baldoyle has a wide variety of established community facilities including the Baldoyle Community Hall, located on Strand Road, which is utilised for a range of activities i.e. boxing, drama, ballet. Baldoyle Library is also an important community resource. In terms of sports and recreation, Baldoyle is home to the International Badminton Centre, Arabian Knights Gymnastic Club and Baldoyle United Association Football Club, and there are a number of playing pitches in Seagrange and Racecourse Parks.*
>
> *Providing social infrastructure, there are a number of crèches, Montessori schools and medical practices at key locations throughout the area. The area is also currently well served by schools, both primary and post-primary in the form of:*
>
> - *St. Mary's Secondary School for girls, Main Street, Baldoyle;*
> - *St. Peters and Pauls Boys National School, Brookstone Road;*
> - *St. Mary's Girls National School, Grange Road; and*
> - *Pobalscoil Nessan Community School, Warrenhouse Road.*
>
> *There are additional educational facilities located within the wider area, including Clongriffin-Belmayne, Portmarnock and Sutton and while many of these schools would be beyond the desired 10 minute walking distance (approximately 800m) they can be accessed by a short car or bicycle journey, if so required."* (p. 9)

The wider area also features larger shopping centres, such as those at Donaghmede and Clare Hall.

The area is well served by transport infrastructure and public transport services. The Dublin – Belfast railway line and Clongriffin station are situated immediately west of the Site. This provides frequent DART and suburban rail services to Malahide (and further north) and to the City Centre. The journey time from Clongriffin to Connolly Station (in the City Centre) is approximately 19 minutes on the DART.

A number of public Dublin Bus routes also serve the area, including No. 15 (Clongriffin to Ballycullen Rd.) and No 29a (Baldoyle (Coast Rd.) to Lower Abbey St.). The planned Bus Connects project will also serve the Site, providing links between Clongriffin and Griffeen Avenue via City Centre (Route No. D1), St. Cuthbert's Road via City Centre (Route No. D3) and Abbey Street Lower (Route No. H1).

In relation to the existing road network, the LAP states the following:

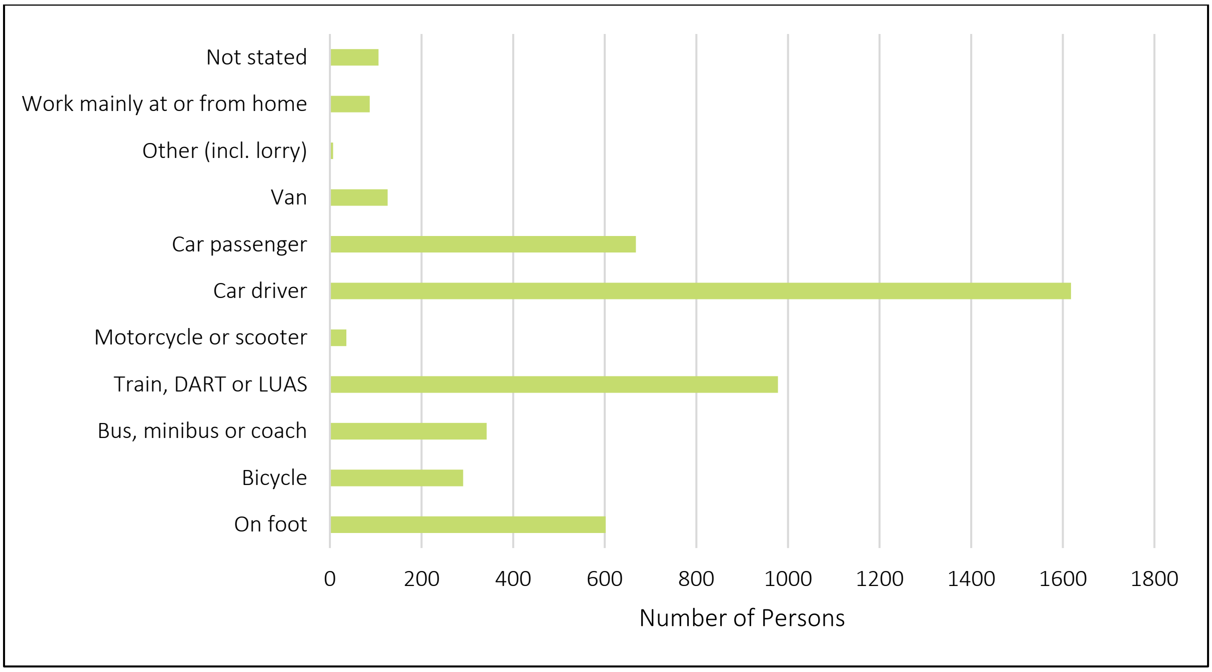
> *"Baldoyle-Stapolin is well situated in close proximity to the strategic national road network. The main road network in the immediate vicinity of the LAP lands includes Grange Road which runs to the south of the plan lands. Grange Road provides the strategic link to the N32, Malahide Road, and M50/M1 to the west and to the R106 Stand Road/Coast Road to the east. The Coast Road/Strand Road runs along the eastern perimeter of the plan lands and links the northern villages of Portmarnock and Malahide, via Baldoyle, with Sutton Cross and the Dublin Road (Howth – Clontarf) and onwards to the city centre. The Moyne Road, which runs to the north of the site, also provides an access westwards towards the Malahide Road and the M1/M50 Motorways."* (p. 9)

As with the wider Dublin Metropolitan Area, there is a mixed, discontinuous network of cycle lanes linking the Site of the proposed Project with Dublin City Centre. On Google Maps (© 2021), the recommended cycle route between the existing Clongriffin rail station and the City Centre (O'Connell Bridge) is via the R107, 11.4 km in length, and taking approximately 40 minutes.

According to the Baldoyle-Stapolin LAP, there is some degree of existing severance between the Site of the proposed Project and Clongriffin to the west, because of the presence of the railway line.

Figure 7.6, below, shows the principal means of travel to / from work, school and college among persons over the age of five in the ED, as reported in the 2016 census. It indicates that the principal personal mobility mode in the ED (in 2016) was private car (driver or passenger) and rail.

Figure 7.6: Principal Mode of Travel to Work, School or College Among Persons Aged Five Years and Over – Baldoyle ED (CSO 2016 Census)



Please refer to Chapter 17 (Traffic & Transportation) for further information in relation to the existing transport infrastructure at the location of the proposed Project.

The Baldoyle-Stapolin LAP stipulates a number of phasing requirements for the delivery of the planned residential development, in order to ensure that community infrastructure / amenities are delivered in tandem with new residential development. In relation to GA3, the key phasing requirement of the LAP is that a 'village centre' / 'local centre', immediately east of the existing Clongriffin rail station, be completed in advance of or in parallel with the delivery of the GA3 housing. It states that:

> *"If not provided earlier, this phase of development [GA3] will provide for the completion of the village centre to the north of Station Square. Following, or in parallel with, the commencement of construction of the northern half of the village centre the residential sectors will be delivered from the south of the Growth Area northwards ensuring the necessary linkages to existing development."* (p. 70)

As stated in Chapter 5 (Description of the Proposed Project), it is proposed to deliver this village centre under the scope of the GA1 development (which is subject to a separate application). The proposed village centre to be delivered as part of the GA1 development will feature a range of supporting services for the future residents, including a convenience retail store, café, crèche, medical centre, gym and pharmacy. Assuming GA1 is delivered as proposed, these facilities will add to the existing community infrastructure offering in the area.

In addition to this requirement, the LAP also stipulates a comprehensive list of phasing requirements for GA3 in relation to community facilities, as listed in Table 7.4. The LAP also states that GA3 should deliver somewhere in the range of *"300 to 400+ units"* (p. 70).

Table 7.4: GA3 Phasing Requirements – Community Facilities (Baldoyle-Stapolin LAP 2013 – 2023)

Community Facilities	Requirement	Phasing
Crèche within GA1	Provision of crèche facilities of a sufficient size to cater for existing and part of new development within GA1 and GA2	Constructed prior to the occupation of 160 units
Crèche within local centre (northern side) or alternative location within the LAP lands	Provision of crèche facilities of a sufficient size to cater for existing and part of new development within GA2 and GA3	Constructed prior to the occupation of 500 units
Community facilities	Provide appropriate community facilities in the form of a hall or meeting areas or other as demand indicates	Delivery of community facilities within the northern section of the local centre or as part of the delivery of the school (if required), subject to demand and resources
School	A new school on the lands is not identified in the 2012 – 2016 Capital Investment Programme for schools. However, two alternative sites have been reserved for future need, one along Grange Road and the other in the village centre. Only one of these sites will be required.	Delivery based on requirements indicated by Department of Education and Skills

For further information in relation to community amenities, refer to the Community Infrastructure Overview, prepared by BSM and submitted under separate cover as part of the planning application.

7.3.6 Human Health

Health, as defined by the World Health Organization (WHO), is *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"*. The Healthy Ireland Framework 2013 – 2025 defines health as *"everyone achieving his or her potential to enjoy complete physical, mental and social wellbeing"*.

The Department of Health's 2019 report, *Health in Ireland – Key Trends 2019*, provides summary statistics on health and health care in Ireland over the past ten years. The report highlights the following key trends:

- The numbers and proportion of the population in the older **age groups** continues to grow, with the number of people over the age of 65 continuing to increase by over 20,000 a year.
- **Life expectancy** continues to improve in Ireland, while the gap between the life expectancy of men and women also continues to narrow.
- **Mortality rates** have declined 10.5% since 2009. Age-standardised death rates for major causes of death such as cancers and circulatory system diseases have declined by 10% and 25%, respectively, over the past ten years.
- **Lifestyle factors** such as smoking, drinking, levels of physical activity and obesity continue to be issues which have the potential to jeopardise many of the health gains achieved in recent years.

At the national level, population health presents a picture of decreasing mortality rates and high self-perceived health over the past ten years. Ireland has the highest self-perceived health status in the EU, with 82.9% of people rating their health as either 'good' or 'very good'. The number of people reporting a chronic illness or health problem is also better than the EU average, at around 27.7% of the population. However, health status reflects income inequality, with fewer low income earners reporting good health both in Ireland and across the EU. Infant mortality, measured as deaths per 1,000 live births, has also decreased by 5.2% since 2009 and remains below the EU average.

Ireland is currently below the EU average for suicide rates for both men and women. After a rise in the male suicide rate from 2008 to 2012, the three-year moving average has decreased, and in 2015 the rate fell below the EU average for the first time since 2010. However, it should be noted that improvements in mortality rates and high levels of self-rated health can mask variations between regions, age groups and other population subgroups.

Rates of cigarette smoking have decreased since 2000, and alcohol consumption has also decreased over the same period, although not as dramatically.

Human health has the potential to be affected by exposure to toxic substances or pathogens in environmental media, such as air, water and soil. Human health impacts can also arise due to anthropogenic or naturally occurring accidents or disasters; such as landslides, flooding or structural failures. Nuisance and negative psychosocial impacts can also arise as a direct result of environmental factors; e.g. as a result of noise, dust, unsafe environments and / or crime; or indirectly, e.g. as a result of economic hardship. Occupational health and safety risks to construction site personnel are also inherent where demolition and construction works are proposed.

The baseline environments in terms of air, surface water and groundwater / soil are detailed in Chapter 11 (Air Quality & Climate), Chapter 10 (Hydrology) and Chapter 9 (Land, Soils, Geology & Hydrogeology), respectively.

The risks of accidents and disasters are addressed, where relevant, in the various specialist chapters herein. Flood risk, for instance, is addressed in Chapter 10 (Hydrology); while geohazards are addressed in Chapter 9 (Land, Soils, Geology & Hydrogeology). As discussed in Chapter 2, 'Major Accidents & Disasters' has been scoped out of this EIAR.

In relation to the potential human health risks associated with the proposed works, an Outline Construction Management Plan (CMP) has been prepared by CS Consulting and submitted under separate cover as part of the planning application. It outlines how the proposed works will be delivered safely and in a manner which minimises risk to human health, including that of Site personnel.

The Health Services Executive is the primary agency responsible for delivering health and personal social services in Ireland. In recent years, primary care has been identified as the most effective and cost-efficient way to treat patients. This offsets dependence on the hospital system allowing most patient care to take place at local, community locations which feature multi-disciplinary teams of healthcare professionals working together.

Healthcare in the vicinity of the proposed Project includes a number of primary healthcare centres and a pharmacy. The nearest large-scale hospital is Beaumont Hospital, located 5 km to the south-west in Beaumont. There are also a range of primary care centres proximate to the proposed Project at Baldoyle, Portmarnock, Darndale, Raheny, Kilbarrack and Coolock.

Figure 7.7: Self-reported Health Status – Baldoyle ED (CSO 2016 Census)

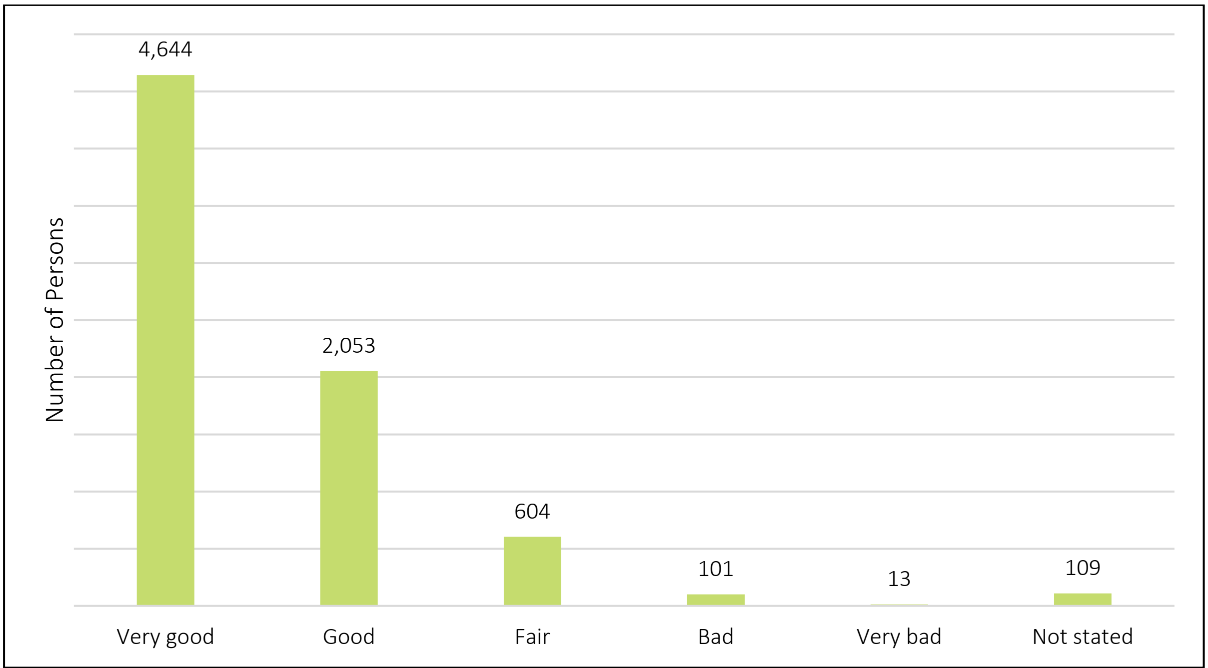


Figure 7.7, above, presents the self-reported health status of the population in the Baldoyle ED, as reported in the 2016 Census. While the data are self-reported and, therefore, do not provide an entirely accurate picture of the health profile of the area, they do indicate a relatively high level of individual wellbeing in the area, with the majority of residents (89%) reporting being in 'good' or 'very good' health.

7.4 Predicted Impacts of the Proposed Project

This section describes the effects that are likely to arise in the absence of mitigation, as a result of the proposed Project, during the construction and operational phases.

It should be noted that all of the specialist chapters which interact with population and human health (as addressed below) have considered the potential for significant cumulative impacts to arise as a result of the proposed Project in combination with one or more other existing / proposed development, including the adjacent permitted and proposed development at GA1.

7.4.1 Construction Phase

The duration of the construction phase is anticipated to be somewhere in the region of 54 months (4.5 years). As such, associated impacts are expected to be short-term in duration. During this time, there will be no severance of land, loss of rights of way or amenities as a result of the proposed Project. As discussed in Chapter 19 (Material Assets – Services), all works related to utilities infrastructure and services will be carried out in accordance with the relevant service provider / authority, such that negative impacts are not expected to arise.

In the absence of mitigation, potential impacts on population and human health as a result of the construction phase of the proposed Project may be summarised as follows:

- Nuisance due to dust generating activities;
- Nuisance and disturbance due to noisy activities;
- Negative impacts on journey characteristics and noise due to construction traffic;
- Negative visual impacts due to presence of construction site;
- Positive direct and indirect economic impacts due to construction employment and increased demand for local businesses, suppliers and other supporting services; and
- Negative impacts on Site personnel and local community due to improper construction site waste management.

These are discussed and characterised, where relevant, in the following sections.

7.4.1.1 Dust

Dust-generating activities during the proposed works may create nuisance and human health impacts for local residents, workers and passers-by in the immediate vicinity of the proposed Project Site.

As stated in Chapter 11 (Air Quality & Climate) construction dust may be deposited within 350 m of a site, but the majority of deposition tends to occur within a 50 m radius. For a proposal of this nature and scale, it has been determined that significant PM_{10} emissions can occur within 15 m of the site.

Chapter 11 has rated the overall sensitivity of the area to human health impacts due to dust as being 'low', and determined that, in the absence of mitigation, there is the potential for ***short-term, negative, slight*** effects to nearby sensitive receptors as a result of construction dust emissions. Accordingly, the air quality specialist has determined that, in the absence of mitigation, there is the potential for ***imperceptible, negative, short-term*** impacts to human health.

In short, as per Chapter 11, ***no significant negative impacts*** on population and human health are anticipated in relation to air quality effects during the construction phase.

7.4.1.2 Noise & Vibration

Noisy aspects of the proposed works have the potential to create nuisance and disturbance for local residents and workers in the vicinity of the proposed Project Site.

Chapter 12 has identified the nearest noise sensitive receptors as (1) apartments at Station Street, c. 105 m to the west, (2) houses at Red Arches Drive, c. 180 m to the east, and (3) a halting site on Moyne Road, c. 370 m to the north. Daytime noise levels from an indicative construction period on-site at the receptors were calculated, and it was determined that the predicted noise levels would be comfortably below the noise criteria for all construction works, indicating a ***slight to moderate, negative, short-term*** effect in terms of noise.

It has also been determined that vibration levels at nearby receptors are not expected to pose any significance in terms of cosmetic or structural damage, and are not expected to be perceptible to occupants of closest buildings.

In short, as per Chapter 12, ***no significant negative impacts*** on population and human health are anticipated in relation to construction noise or vibration.

7.4.1.3 Traffic

Additional traffic on the road network as a result of the proposed works has the potential to cause or exacerbate congestion, resulting in impacts on journey characteristics (i.e. amenity, duration and / or length) for local residents, workers and road users.

As stated in Chapter 17 (Traffic & Transportation), during the construction phase, traffic is expected to peak during site clearance and basement excavation works. The maximum estimated potential construction-related vehicle movements in the peak hours is 101

Passenger Car Units (PCU). As stated in Chapter 5 (Description of the Proposed Project), all construction traffic shall be routed via a haulage route to the north, thereby avoiding junctions on Grange Road and Coast Road, which have the greatest potential to be adversely affected by construction traffic.

As per Chapter 5 (Description of the Proposed Project), Chapter 17 (Traffic & Transportation) and the Outline Construction Management Plan (submitted under separate cover), construction traffic management measures are proposed, such that ***significant negative impacts on journey characteristics are not expected to occur*** as a result of construction traffic.

7.4.1.4 Landscape & Visual Amenity

As stated in Chapter 13 (Landscape and Visual), the transformation of the existing Site into a substantial construction Site for the duration of the proposed works will result in ***significant, negative, short-term*** impacts on landscape character and visual amenity.

7.4.1.5 Economic Impacts

The proposed works have the potential to affect local businesses and employment both positively and negatively.

It is estimated that somewhere in the region of 450 persons will be employed on-Site during the proposed works. This job creation will result in a ***positive, local to regional, moderate, short-term*** socioeconomic impact.

The presence of these Site personnel in the area during the construction phase will create additional demand in the area for services, particularly for food from local shops, restaurants and cafés. There will also be economic benefits for providers of construction materials and other supporting services, e.g. quarries. This is predicted to result in a ***positive, local to regional, indirect, slight to significant, short-term*** socioeconomic impact.

Nuisance created by construction works (e.g. noise, dust, litter and other visual impacts) have the potential to negatively affect general amenity in an area, thereby diminishing the attractiveness of certain local businesses (cafés, restaurants, etc.), particularly where proper construction good practice and good housekeeping measures are not implemented. Access / egress issues associated with construction works can also negatively affect local businesses. In this case, however, significant negative impacts of this nature are not expected to arise, considering that:

- Access and egress will be maintained to all local businesses throughout the proposed works;
- Standard good construction practice and good housekeeping measures will be implemented throughout, as detailed in Chapter 5 (Description of the Proposed Project); and
- There are relatively few such businesses in the immediate vicinity of the Site which could be affected.

7.4.1.6 Waste

During the construction phase, improper storage and management of on-Site waste materials can result in negative impacts on Site personnel and neighbouring population, e.g. due to vermin, odour, litter and / or exposure to hazardous materials, such as asbestos.

As stated in Chapter 18 (Material Assets – Waste), in the absence of proper waste management during the construction phase, the effect on the local and regional environment is likely to be ***short-term, significant and negative.***

7.4.2 Operational Phase

The duration of the operational phase of the proposed Project (as proposed) is assumed to be long-term in duration, as per the definitions in the EPA 2017 draft EIAR guidelines (Table 1.4 in Chapter 1 – Introduction).

The proposed Project will comply with the statutory land use zoning policies and objectives of the *National Planning Framework (2018 – 2040)*, *Fingal Development Plan (2017 – 2023)* and the *Baldoyle-Stapolin LAP (2013 – 2019)*, as extended; with the exception of a number of material contraventions, as addressed in Chapter 3 (Planning & Development Context) and the Material Contravention Statement, submitted under separate cover. Refer to Chapter 3 for an in-depth discussion of the proposed Project's consistency with national and regional planning and development policy.

In the absence of mitigation, potential impacts on population and human health as a result of the operation of the proposed Project may be summarised as follows:

- Nuisance and disturbance of residents due to noisy building services plant and vehicular deliveries / collections within the Site, and due to operation of nearby railway line and Dublin Airport in wider area;
- Negative impacts on journey characteristics due to additional operational phase traffic generated by the proposed Project;
- Positive impacts on pedestrians and cyclists due to enhanced permeability and provision of public realm which prioritises these users;
- Nuisance and disturbance due to increased traffic volumes arising from operation of proposed Project;
- Visual impacts due to completion of proposed Project, establishing significant new residential development;
- Direct and indirect positive socioeconomic impacts due to employment opportunities and increased demand for goods and services from local businesses;
- Positive socioeconomic impacts due to provision of significant additional housing; and
- Negative impacts on residents and local community due to improper waste management.

These are discussed and characterised, where relevant, in the following sections.

7.4.2.1 Noise

Noisy building services plant (e.g. heating and cooling plant, pumps and extraction units) and on-Site vehicular deliveries and collections have the potential to create nuisance and disturbance (potentially including sleep disturbance) among on-Site residents and neighbouring sensitive receptors during the operational phase. The cumulative operational noise level at the nearest noise sensitive location within the proposed Project (e.g. apartments, etc.) will be designed / attenuated to meet the relevant BS 4142 noise criteria for daytime and night-time periods, such that ***significant, negative impacts are not anticipated***.

There is also the potential for negative 'inward' noise impacts on residents at the proposed Project during the operational phase, due to noise generated by the operation of the adjacent railway line and Dublin Airport. Noise from rail traffic was measured during the baseline noise survey, and an assessment was carried out to ensure that internal noise levels in apartments / duplexes meet the appropriate criteria such that residential amenity would not be negatively affected. Noise zone maps for the future development of the North Runway at Dublin Airport were also consulted. Cumulative noise levels at the façades of proposed buildings were estimated, and range from 55 – 57 dB $L_{Aeq,T}$ in the night-time, and 63 – 65 dB $L_{Aeq,T}$ during the daytime. Accordingly, the proposed Project has been categorised as being of 'Medium' risk in relation to operational phase noise, and an Acoustic Design Statement has been incorporated into Chapter 12.

7.4.2.2 Traffic

Additional traffic generated by a residential development has the potential to create or exacerbate congestion on the local road network, resulting in negative impacts on journey characteristics (i.e. amenity, duration and length) for other road users.

Chapter 17 (Traffic & Transportation) has modelled the future traffic volumes on the surrounding road network (including the proposed Project and all committed development plus the proposed amendments to GA1 (the subject of a separate, ongoing application)) and concluded that, during the operational phase, the proposed Project will have an overall ***long-term, moderate, adverse*** impact, which should be considered ***reversible*** to a certain degree, in that there is the possibility that future measures would be introduced that would reduce traffic volumes, e.g. improvements in public transport or cycling infrastructure, junction redesign or introduction of traffic restrictions.

Increased volumes of traffic as a result of the operation of the proposed Project also have the potential to increase the background noise levels on the surrounding network, with the associated potential for negative impacts on population and human health. Chapter 12 (Noise & Vibration) has considered the potential for such impacts. On all roads considered, the predicted impacts were assessed as being ***neutral, imperceptible and long-term;*** with the exception of one road ('Link A'), where the associated impact was assessed as being ***imperceptible to slight, negative and long-term.***

The proposed Project will also result in positive impacts on pedestrians and cyclists due to enhanced permeability for these users across the Site and wider area, and provision of public realm and facilities (e.g. ample bicycle parking) which prioritises these users. The associated predicted impact is ***localised, slight positive and long-term***.

In short, ***no significant negative impacts*** on population and human health are anticipated to occur during the operational phase in relation to traffic.

7.4.2.3 Landscape & Visual Amenity

As stated in Chapter 13 (Landscape & Visual), the completion of the proposed Project has the potential to result in negative impacts on landscape character and visual amenity due (among other factors) to its scale and character, the contrast between the proposed Project and the surrounding environment, and interruption of existing views.

However, it is also stated that the overall residual impact (in terms of landscape character) will be profoundly positive, transforming a disturbed / neglected urban infill site into an attractive contemporary urban neighbourhood, and providing a more 'complete' urban landscape, reducing the existing unfinished character of the immediate area. It is also noted that the proposed Project will be complementary to adjacent existing and proposed development.

In terms of visual amenity, the predicted residual impacts of the proposed Project are mostly positive or neutral. It is noted that, for neighbouring residential areas, the completed proposed Project will remove vacant development land and replace it with attractive new residential streetscapes with a diversity of building types and extensive soft landscaping.

In short, ***no significant negative impacts*** on population and human health are anticipated to occur during the operational phase in relation to landscape and visual amenity. Visual impacts perceived by individual persons are highly subjective and difficult to characterise; however, it is considered that the overall impact on the community will be ***neutral to positive*** and ***long-term***.

7.4.2.4 Economic Impacts

While an estimate of on-Site staff numbers is not available at this early stage, there will be a number of workers employed on-Site (e.g. estate manager, residents manager, concierges, caretaker, crèche and retail premises employees), partly on-Site (e.g. contract cleaners, security and occasional maintenance staff), or as off-Site support staff (e.g. finance and administrative staff) during the operational phase. This job creation will result in a ***positive, moderate and long-term*** socioeconomic impact.

Additionally, the proposed Project is expected to increase the local population significantly, creating additional demand for goods and services in the local area, benefitting local businesses and resulting in a ***positive, moderate and long-term*** socioeconomic impact.

7.4.2.5 Community Amenities & Facilities

In terms of population, the proposed Project will deliver a significantly greater residential population on the GA3 lands than are recommended in the LAP. The LAP states that GA3 should deliver somewhere in the range of *"300 to 400+ units"* (p. 70) but the proposed Project that is the subject of the planning application will deliver 1,221 units. Additionally, as discussed in the Material Contravention Statement, it has been estimated that the completion of the proposed Project (coupled with permitted and proposed development) would result in an exceedance of the total envisaged capacity of the wider Baldoyle-Stapolin development lands (as set out in the Development Plan) by somewhere in the region of 160 units.

In this context, it is important to ensure that the new residential population associated with the proposed Project does not exceed the capacity of the existing community infrastructure. As detailed in Section 7.3, above, the area is well served by existing public transport services, community amenities (including childcare and healthcare facilities) and employment opportunities. In this regard, the Schools Demand and Childcare Facilities Assessment (submitted under separate cover) has concluded that:

> *"Considering the proposed development's characteristics, namely unit mix; the demographic profile of the area; and, the existing (total capacity of c.1,762 No places), planned and permitted provision of childcare facilities; and the scale of development existing, under construction and permitted for the area, we submit that the proposed childcare facility is sufficient to meet the demand of the future population created by the proposed development.*
>
> *The provision of a crèche of 452 sqm (equating to approx. 113 no. child spaces), in combination with planned, recently permitted and existing childcare facilities in the area, meets the requirements of delivering this proposed scheme of development.*
>
> *We submit that a school is not required in the proposed development given the current provision of schools in the area; the future pipeline; the demographic profile and the expected demand to be generated by the development.*

> *The proximity of the site to suburban areas, and its highly accessible nature on rail and bus routes, mean that there are many primary and secondary schools to accommodate the future residents of the proposed development of school going age."*

Furthermore, the Community Infrastructure Overview (submitted under separate cover) has concluded that:

> *"We submit that the provision of community infrastructure proposed within this development, complements the range of infrastructure already provided, or planned for delivery, and will assist in creating a quality community and environment for future residents in Baldoyle-Stapolin, and will contribute to the achievement of community objectives."*

On the basis of these assessments and the characteristics of the receiving environment as described in Section 7.3, above, it is considered that the existing and proposed community amenities and services are sufficient to support the residential population of the proposed Project without the occurrence of significant negative impacts on the existing or future populations in the area.

7.4.2.6 Housing

The most significant positive impact of the proposed Project will be the provision of a large number (1,221) of high quality apartments / duplexes with supporting amenities and facilities, providing a high standard of rented housing for a variety of household sizes. In the context of the ongoing housing crisis in Dublin City, the predicted impact is ***positive, moderate to significant and short-term*** (in that it the units are likely to be filled in the short-term) at the regional (Dublin Metropolitan Area) level.

7.4.2.7 Waste

During the operational phase, improperly managed on-Site residential facilities can lead to negative impacts on human health and residential amenity. Improper storage and disposal of solid waste, for instance, can result in issues with vermin, odour and litter.

As stated in Chapter 18 (Material Assets – Waste), in the absence of proper waste management during the operational phase, there is the potential for ***short-term, significant, negative effects*** to arise at the local and regional scales.

7.4.3 Overview

Overall, the proposed Project is expected to result in a net positive impact on population and human health once operational, principally in that it will deliver a high volume of high-quality rented housing in the context of an ongoing housing crisis, in a manner that is broadly consistent with national and regional-level policy[9].

Notwithstanding the proposal's positive impacts, in the absence of mitigation, there is the potential for negative impacts on population and human health to arise. These are largely associated with the construction phase of the proposed Project, which may result in some disruption and / or nuisance among local residents and businesses, due to dust, noise, construction traffic, visual impacts, etc. However, these impacts will be short-term and reversible in nature, and are commensurate with a project of this nature and scale.

Predicted impacts are predominantly not characterised as being significant, with the exception of waste-related impacts. In the absence of proper waste management, there is the potential for significant, negative impacts to arise, e.g. due to the presence of litter, vermin, odours, etc.

7.5 Mitigation Measures

7.5.1 Construction Phase

Mitigation measures have prescribed elsewhere in this EIAR in order to avoid / minimise the predicted impacts detailed above. In order to avoid, where possible, and in other cases minimise, negative impacts on population and human health, it is imperative that all of the mitigation measures set out in this EIAR are properly implemented in full. These mitigation measures (set out elsewhere in this EIAR) are summarised as follows, insofar as they relate to population and human health:

- An Outline Construction Management Plan (CMP) has been prepared by CS Consulting in respect of the proposed Project, and submitted under separate cover as part of the planning application. This CMP includes measures which seek to avoid / minimise negative impacts on the neighbouring population. For instance, the Outline CMP includes measures in relation to good housekeeping, hoarding, security, construction traffic management, pollution control and public safety. It will be a requirement of the

[9] With the exception of the material contraventions addressed previously. Refer to Chapter 3 (Planning & Development Context) and the Material Contravention Statement (submitted under separate cover).

successful Contractor that they finalise the CMP in advance of the commencement of any on-Site works, and implement it fully throughout the proposed works.

- Chapter 11 (Air Quality & Climate) includes a Dust Management Plan (Appendix 11.3) which sets out comprehensive measures to minimise dust generation during the construction phase of the proposed Project. The mitigation measures set out in Chapter 11 and Appendix 11.3 shall be implemented in full.

- Chapter 12 (Noise & Vibration) includes a suite of mitigation measures to minimise noise and vibration and associated impacts during the construction phase of the proposed Project. Mitigation measures are included in relation to selection of quiet plant, noise control at source, piling, screening, liaison with the public, coordination with the neighbouring construction site and adherence to standard working hours.The mitigation measures set out in Chapter 12 shall be implemented in full.

- Chapter 13 (Landscape & Visual) includes a number mitigation measures to minimise the impacts of the proposed works on townscape and visual amenity. These include measures in relation to Site hoarding, good housekeeping and traffic management; and shall be implemented in full.

- Chapter 17 (Traffic & Transportation) includes a suite of measures in relation to construction traffic management, good housekeeping and community liaison. The mitigation measures set out in Chapter 17 shall be implemented in full.

- Chapter 18 (Material Assets – Waste) and Appendix 18.1 (Construction & Demolition Waste Management Plan) include a suite of mitigation measures to promote best practice construction waste management and avoid / minimise waste-related impacts. The mitigation measures set out in Chapter 18 and Appendix 18.1 shall be implemented in full.

7.5.2 Operational Phase

- Chapter 12 (Noise & Vibration) includes a suite of mitigation measures to minimise noise and vibration and associated impacts during the operational phase of the proposed Project. These include measures in relation to minimising the noise levels of operational plant and sound insulation of residential units to achieve recommended internal noise criteria. The mitigation measures set out in Chapter 12 shall be implemented in full.

- Chapter 17 (Traffic & Transportation) includes a number of mitigation measures to minimise the impacts of the proposed Project on the surrounding road network during the operational phase. It refers to the Residential Travel Plan (submitted under separate cover) and mandates the appointment of a Residential Travel Plan Coordinator, to ensure that sustainable transport options are promoted as alternatives to single-occupant car journeys among residents of the proposed Project. The mitigation measures set out in Chapter 17 and the Residential Travel Plan shall be implemented in full.

- Chapter 18 (Material Assets – Waste) and Appendix 18.2 (Operational Waste Management Plan (OWMP)) include a suite of mitigation measures to promote best practice on-Site waste management and avoid / minimise waste-related impacts during the operational phase of the proposed Project. The OWMP details the waste storage and collection provisions that the building management company will need to put in place for the use of residents and commercial tenants. The mitigation measures set out in Chapter 18 and Appendix 18.2 shall be implemented in full.

7.6 Residual Impacts

Assuming the proper and full implementation of the mitigation measures in this EIAR (summarised above in relation to population and human health), the following ***significant negative residual*** impacts are expected to occur:

- As stated in Chapter 13 (Landscape and Visual), even with all reasonable mitigation measures in place, construction activities will most likely result in ***significant negative***

short-term impacts on visual amenity in the immediate vicinity (at neighbouring buildings, streets and open spaces). These impacts will be short-term (for the duration of the proposed works) and commensurate with projects of this nature and scale.

- As stated in Chapter 13 (Landscape and Visual), while the majority of operational phase visual impacts of the proposed Project will be positive or neutral – and the overall impact of the proposed Project in this respect is predicted to be positive – a ***significant negative residual cumulative*** impact is predicted on Photomontage View 16 (from the public footpath on the R106 at Portmarnock). However, it is noted that *"extensive future development is anticipated in the middle-ground that will fundamentally change this view. Part of the Portmarnock South LAP area lies between the viewer and the proposed Project, which will result in a significant new urban neighbourhood screening most, if not all, of the GA1 and GA3 Masterplan areas along with the Gannon Homes Scheme permitted under SHD Reg. Ref 305316. In this context, visual impacts from the proposed Project are likely to be negligible or none"*.

Otherwise, ***no significant negative residual impacts*** are predicted to occur in relation to population and human health as a result of the proposed Project.

7.7 Monitoring

Monitoring and maintenance recommended in Chapters 12, 17 and 18 shall be implemented in full during the construction and / or operational phases of the proposed Project, as specified in those respective Chapters. Beyond that which has been recommended elsewhere in this EIAR, no additional monitoring is considered necessary in respect of population and human health.

7.8 Interactions

Population and human health is an EIA topic which tends to interact with numerous other environmental topics / media addressed elsewhere in the EIAR. Where the potential for impacts on population and human health has been identified as a result of such interactions, these have been addressed comprehensively in Section 7.4, above.

In respect of the proposed Project, the noteworthy interactions with population and human health and other topics / media are summarised below. All of these interactions have been addressed above and, where feasible, appropriate mitigation measures have been prescribed in the corresponding specialist Chapter.

Note that there is also an interaction between (i) Noise & Vibration and (ii) Traffic & Transportation, due to vehicular noise, which is of relevance to the assessment of impacts on population and human health.

All of the specialist chapters listed below have considered the potential for significant cumulative impacts to arise as a result of the proposed Project in combination with one or more other existing / proposed development, including the adjacent permitted and proposed development at GA1.

Air Quality & Climate (Chapter 11)

- Potential for nuisance impacts due to dust-generating activities of proposed works.

Noise & Vibration (Chapter 12)

- Potential for nuisance and disturbance due to noisy elements of proposed works;
- Potential for nuisance and disturbance due to construction traffic noise;
- Potential for nuisance and disturbance due to noisy plant, services, deliveries, and operation of railway line and Dublin Airport during operational phase; and
- Potential for nuisance and disturbance due to additional traffic during operational phase.

Landscape & Visual (Chapter 13)

- Potential for negative impacts on landscape character and visual amenity due to presence of construction site; and
- Impacts on visual amenity and landscape during the operational phase due to completion of proposed Project.

Traffic & Transportation (Chapter 17)

- Potential for negative impacts on journey characteristics due to additional (construction) traffic on road network during proposed works;
- Potential for nuisance and disturbance due to construction traffic noise;

- Potential for negative impacts on journey characteristics due to additional traffic on road network during the operational phase; and
- Potential for nuisance and disturbance due to operational traffic noise.

Material Assets – Waste (Chapter 18)

- Potential for negative impacts due to improper waste management during construction phase; and
- Potential for negative impacts due to improper on-Site waste management during operational phase.

7.9 Cumulative Impacts

The potential for cumulative impacts to arise as a result of the proposed Project in combination with other existing / proposed plans and projects, as listed in Tables 21.1 and 21.2 in Chapter 21 (Cumulative Impacts) in respect of the EIA topics and environmental media of relevance to population and human health, has been discussed in the respective EIAR Chapters – refer to Chapters 11, 12, 13, 17 and 18.

Of particular relevance is the adjacent permitted development at Growth Area 1 (GA1), as designated in the Baldoyle-Stapolin LAP (2013 – 2019) (extended), which it is currently proposed to amend (under the scope of a separate, ongoing application). It is envisaged that the construction phase of GA1 (permitted or as proposed at present) will overlap with that of the proposed Project, meaning there is the potential for the accumulation of effects in relation to noise, dust generation, construction traffic, visual impacts, etc., associated with the works; all of which have the potential to negatively affect local residents and businesses.

In order to ensure that significant cumulative impacts do not arise as a result of the concurrent works at the GA1 and GA3 lands (the latter being the subject of the planning application), mitigation measures have been set out, both to (i) ensure the coordination of these works to avoid cumulative impacts, insofar as practicable, and (ii) minimise the individual environmental effects of the construction phase of the proposed Project (at GA3). Available information associated with the GA1 development (existing and proposed), including the EIAR for the proposed amendments, have been reviewed, and it is considered that the overlap of the associated works will give rise to ***cumulative negative or neutral, reversible*** impacts on the local community ranging from ***momentary to short-term*** and ***imperceptible to moderate*** (i.e. not significant). These impacts will be experienced, if at all, as nuisance / disruption / loss of visual or residential amenity, commensurate with the nature and scale of the projects.

In short, ***significant negative cumulative impacts on population and human health are not likely to occur*** as a result of the proposed Project in combination with one or more of the plans / projects set out in Chapter 21 (Cumulative Impacts).

7.10 'Do-Nothing' Impact

As discussed in Chapter 4 (Consideration of Alternatives), two potential Do-Nothing scenarios have been considered:

1. A continuation of the existing status of the lands, i.e. privately owned greenfield site with some limited infrastructure in place, closed to the public.
2. Development (likely residential) under the scope of a separate application / proposal, at some point in the future.

Considering the ongoing housing crisis in Dublin, Scenario 1 is regarded as socially suboptimal. The opportunity cost, in this scenario, would include the 1,221 proposed residential units which would otherwise provide high-quality rental accommodation to a significant number of persons. In this scenario, the long-term impacts associated with the operation of the proposed Project on population and human health (as assessed below) would not arise. The short-term construction phase impacts (as assessed below) would also be avoided.

The latter scenario is also likely considering the zoning of the lands for residential development under the *Baldoyle-Stapolin Local Area Plan* (2013) (LAP) and the wider context in terms of housing policy and significant demand for housing in the Dublin Metropolitan Area. It is not possible to assess the likely impacts of Scenario 2 on population and human health, as the nature and scale of any potential future proposals for the Site (in the absence of the proposed Project) are not known.

7.11 Difficulties Encountered in Compiling the Chapter

No particular difficulties were encountered in the preparation of this Chapter.

7.12 References

- CSO (2012). *Census 2011 Small Area Population Statistics (SAPS).*

- CSO (2017). *Census 2016 Small Area Populations Statistics.*
- CSO (2020). *Quarterly Labour Force Survey Q4 2020.*
- Eastern & Midlands Regional Assembly (2019). *Regional Spatial and Economic Strategy (2019 – 2031).*
- EPA (2015). *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.*
- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*
- European Commission (2017). *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU).*
- Government of Ireland (2013). *Healthy Ireland: A Framework for Improved Health and Wellbeing (2013 – 2025).*
- Ibec (2021). *Ibec Quarterly Economic Outlook – Q1 2021.*
- IEMA (2017). *Health in Environmental Impact Assessment: A Primer for a Proportionate Approach.*
- McQuinn, K., O'Toole, C., Kostarakos, I. & Coffey, C. (2021). *Quarterly Economic Commentary: Spring 2021. Report prepared for the ESRI.*
- WHO (1946). *World Health Organisation Constitution.*

8 Biodiversity

8.1 Introduction

This Chapter of the EIAR was prepared by Altemar Ltd. and assesses the biodiversity value of the location of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, and the potential impacts of the proposed Project on the ecology of the surrounding area within the potential zone of influence (ZOI). The proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle-Stapolin Growth Area 3 (GA3), Baldoyle, Dublin 13.

This Chapter also outlines the standard construction, operational and monitoring measures that are proposed to minimise potential impacts and to improve the biodiversity potential of the Site of the proposed Project.

Desk studies were carried out to obtain relevant existing biodiversity information within the Potential Zone of Influence (ZOI). The assessment extends beyond the immediate proposed Project Site to include those species and habitats that are likely to be impacted upon by the proposed Project.

The Site lies within a larger landholding, which is the subject of the Baldoyle-Stapolin Local Area Plan (LAP) 2013. It is situated directly to the south of the future Racecourse Park, east of the Dublin-Belfast / DART railway line and Clongriffin rail station, north of Growth Area 1 (GA1) and west of Growth Area 2 (GA2), as designated in the LAP. The Site of the proposed Project incorporates the entire area known as Growth Area 3 (GA3), as designated in the LAP.

The Site is on the edge of the urban extent of Dublin City. It is within the administrative area of Fingal County Council (FCC), and adjacent to the Dublin City Council administrative boundary at Clongriffin to the west. Surrounding land uses to the west, south and east are predominately residential in nature.

The proposed Project is designed to integrate with and continue both the existing permitted development on the southern GA1 lands (as permitted under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and F21A/0046), and the current proposed alterations to the GA1 lands (currently subject to a separate SHD Application; Reg.

Ref.: TA06F.310418), for which an overall total of 981 units are either under construction or proposed. The infrastructure and road elements of the F16A/0412 / ABP Reg. Ref. ABP-248970 (and as amended under F20A/0258 and F21A/0046) have commenced, along with 99 housing units at Blocks C4, C5 and C6, which will provide for both services and roads connectivity to the GA3 lands along, as the proposed extended, Longfield Road. More details on the background and Site history is provided in Chapter 5 (Description of the Proposed Project).

The programme of work in relation to biodiversity aspects of the EIAR have been designed to identify and describe the existing ecology of the area and detail sites, habitats or species of conservation interest. It also assesses the significance of the likely impacts of the proposed Project on the biodiversity elements and outlines measures to alleviate identified impacts. Full details of all the mitigation measures and the phasing of the proposed Project are contained in the accompanying preliminary Construction Environmental Management Plan (CEMP). A Wintering Bird Survey Report has also been prepared and included at Appendix 8.1.

Altemar Ltd. is an established environmental consultancy that is based in Greystones and has been in operating in Ireland since 2001. Refer to Table 1.3 of Chapter 1 (Introduction) for full details on the author of this Chapter. Appendix 8.1 contains the Wintering Bird Survey Report, which was prepared by Patrick Manley (B.Sc.) an Ornithologist with MKO, Ian Hynes (B.Sc.) and Senior Ornithologist, Padraig Cregg (M.Sc.).

A separate Appropriate Assessment (AA) Screening and Natura Impact Statement (NIS), in accordance with the requirements of Article 6(3) of the EU Habitats Directive, has been produced. It was determined that:

> "*Following the implementation of the mitigation measures outlined, the construction and presence of this development would not be deemed to have a significant impact on the integrity of Natura 2000 sites. No significant impacts are likely on Natura 2000 sites, alone and in combination with other plans and projects based on the implementation of standard construction phase mitigation measures.*
>
> *On the basis of the content of this report, the competent authority is enabled to conduct an Appropriate Assessment and consider whether, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites' conservation objectives, will adversely affect the integrity of the European site.*

No significant effects are likely on Natura 2000 sites, their features of interest or conservation objectives. The proposed project will not will adversely affect the integrity of European sites."

8.2 Methodology

A pre-survey data search (desktop study) was carried out. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), and Environmental Protection Agency (EPA); in addition to aerial, 6-inch maps and satellite imagery. Field surveys were carried out based on the schedule of fieldwork elements outlined in Table 8.1. The assessment was carried out in accordance with the following best practice methodology: Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports , Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment , Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission and Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland / The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland .

Table 8.1: Fieldwork Dates

Survey	Dates
Flora / Habitat	02/08/2020, 11/09/2020
Wintering Bird	18/12/2019, 23/12/2019, 15/01/2020, 15/01/2020, 28/01/2020, 28/01/2020, 10/02/2020, 24/02/2020, 24/02/2020, 11/03/2020, 11/03/2020, 24/03/2020, 24/03/2020.
Bat Survey	11/09/2020
Mammal Survey	24/03/2020

Figure 8.1: Satellite Image of the Site of the Proposed Project

8.2.1 Proximity to Designated Conservation Sites and Habitats or Species of Conservation Interest

Designated conservation sites within 15 km of the Site boundary were studied. This included sites of National importance ((Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA) and Ramsar sites, in addition to Natura 2000 sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPAs)). There is no direct or indirect pathway to designated sites beyond 15 km. These sites are outside the ZOI and no impacts are foreseen.

Up to date geographic information systems (GIS) data (NPWS Web Map Service (WMS) data in addition to shapefiles) were acquired and plotted against 5 km, 10 km and 15 km buffers from the Site of the proposed Project. Where there was a potential for the ZOI to be influenced by natural biodiversity corridors (e.g. rivers or woodland), these were also take into account and the assessment extended. A data search of rare and threatened species within 5 km of the Site was provided by NPWS. Additional information on rare and threatened species was obtained through the NBDC maps data search and previous planning applications in the vicinity.

8.2.2 Habitats, Flora and Avian Ecology

Following the desktop study (as described above), walk-over assessments of the Site were carried out on the 24 March 2020, 2 August 2020 and on the 11 September 2020. Habitat mapping was carried out according to Fossitt (2000), using AcrGIS 10.5 and displayed on Bing satellite imagery.

The flora and habitat assessments were carried out on the 2 August 2020 and 11 September 2020. The bat assessment was carried out on the 11 September 2020. Any rare or protected species were noted. Additional observations were noted on species within the field and additional records were noted. A survey for mammals was carried out on the 24 March 2020 by means of a thorough search within the study area. The presence of mammals is indicated principally by their signs, such as resting areas, feeding signs or droppings – though direct observations are also occasionally made. The survey also included a search for habitats suitable for amphibians and reptiles.

8.2.3 Bat Fauna

A bat assessment was undertaken on 11 September 2020 by Bryan Deegan, within the optimal survey period. The on-Site habitats were visually assessed for their favourability for bats. No artificial structures or trees of bat roosting potential were identified on-Site. The Site survey was supplemented by a review of BCIreland *National Bat Records Database*. The bat assessment was undertaken within the active bat period (March – October) when a detector survey is possible. Temperatures were 13°C after sunset. Winds were light and there was no rainfall.

8.2.4 Invasive Species

On the 11 September 2020, the Site of the proposed Project was surveyed and an assessment carried out for the presence of invasive species that are listed under the European legislation, the Birds and Natural Habitats Regulations 2011 (S.I. No. 477 of 2011), Section 49(2) which prohibits the introduction and dispersal of species listed in the Third Schedule whereby "*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence*".

It should be noted that an invasive plant survey (for Japanese Knotweed) was also carried out on the 9 August 2019 by Knotweed Surveyor Ronnie Murphy of Knotweed Control Ireland and this report is included in Appendix 8.2. This included a survey of areas outside the Site boundary, where Japanese Knotweed has been noted.

8.3 Baseline Environment

8.3.1 Designated Conservation Sites

Designated sites are presented in Figures 8.2 (SAC within 15 km), 8.3 (SPA within 15 km), 8.4 (NHA and pNHA within 5 km), 8.5 (Ramsar sites within 15 km), 8.6 (watercourses in proximity to the Site), 8.7 (watercourses and SAC within 1 km), 8.8 (watercourses and SPA within 1 km), 8.9 (watercourses and pNHA within 1 km), and 8.10 (watercourses and Ramsar sites within 1 km).

It should be noted that the Site of the proposed Project is not wholly or partly within a designated conservation site. The closest Natura 2000 site is Baldoyle Bay SAC, which is 235 m from the proposed Project. The nearest SPA is the Baldoyle Bay SPA, which is located 615 m from the Site. There are no designated NHA within a 15 km radius; however, the nearest pNHA (Baldoyle Bay) is 235 m from the Site. The nearest Ramsar site (Baldoyle Bay) is 660 m from the Site. The distance and details of the conservation sites within 15 km of the proposed Project are presented in Table 8.2. There is a direct pathway from the proposed Project to the Baldoyle Bay SAC, SPA and pNHA via the existing attenuation pond and the Mayne River.

Table 8.2: Distances to Designated Conservation Sites within 15 km

Name	Distance (km)	Type
SAC		
Baldoyle Bay SAC	(235m)	SAC
North Dublin Bay SAC	(1.8km)	SAC
Malahide Estuary SAC	(3.4km)	SAC
Howth Head SAC	(4.4km)	SAC
Ireland's Eye SAC	(4.8km)	SAC
Rockabill to Dalkey Island SAC	(4.8km)	SAC
South Dublin Bay SAC	(6.8km)	SAC
Rogerstown Estuary SAC	(10km)	SAC
Lambay Island SAC	(11.6km)	SAC
SPA		
Baldoyle Bay SPA	(615m)	SPA
North Bull Island SPA	(1.8km)	SPA
Malahide Estuary SPA	(4.1km)	SPA
Ireland’s Eye SPA	(4.6km)	SPA
South Dublin Bay and River Tolka Estuary SPA	(5.1km)	SPA
Howth Head Coast SPA	(5.9km)	SPA
Rogerstown Estuary SPA	(9.8km)	SPA
Lambay Island SPA	(11.5km)	SPA
Dalkey Islands SPA	(13.9km)	SPA
NHA / pNHA / Ramsar		
Baldoyle Bay pNHA	(235m)	pNHA
Sluice River Marsh pNHA	(1.6km)	pNHA
North Dublin Bay pNHA	(1.8km)	pNHA
Malahide Estuary pNHA	(3.4km)	pNHA
Feltrim Hill pNHA	(3.9km)	pNHA
Howth Head pNHA	(4.4km)	pNHA
Ireland's Eye pNHA	(4.8km)	pNHA
Santry Demesne pNHA	(6.1km)	pNHA
South Dublin Bay pNHA	(6.8km)	pNHA
Dolphins, Dublin Docks pNHA	(7.2km)	pNHA
Royal Canal pNHA	(8.1km)	pNHA
Portraine Shore p	(8.2km)	pNHA
Grand Canal pNHA	(8.5km)	pNHA
Rogerstown Estuary pNHA	(10km)	pNHA
Booterstown Marsh pNHA	(10.5km)	pNHA
Lambay Island pNHA	(11.7km)	pNHA
Dalkey Coastal Zone and Killiney Hill pNHA	(12.1km)	pNHA
Liffey Valley pNHA	(14.5km)	pNHA
Baldoyle Bay	(660m)	Ramsar site
North Bull Island	(1.8km)	Ramsar site
Broadmeadow Estuary	(5.1km)	Ramsar site
Sandymount Strand/Tolka Estuary	(6.8km)	Ramsar site
Rogerstown Estuary	(10.3km)	Ramsar site

Figure 8.2: SAC within 15km of the Site

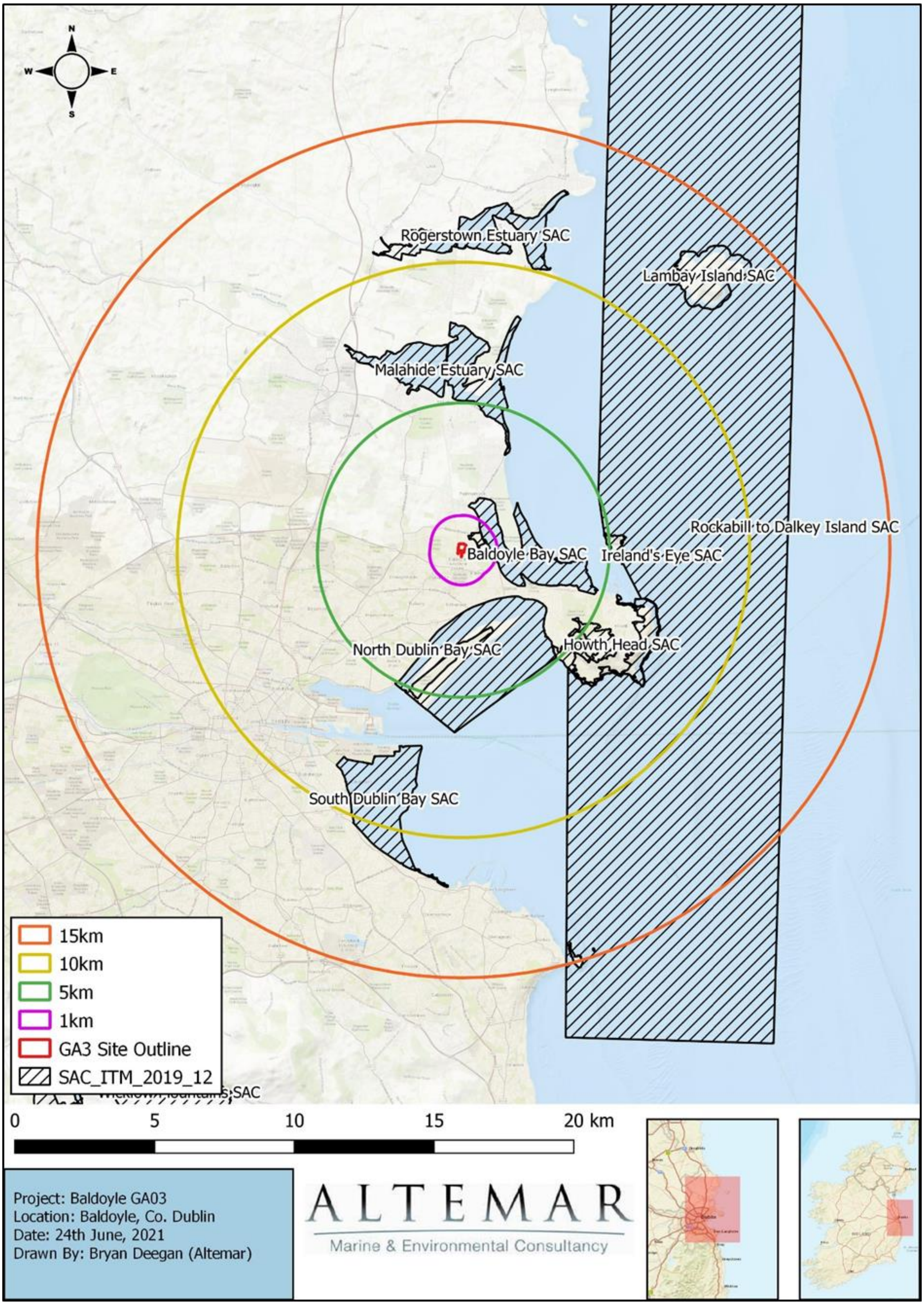


Figure 8.3: SPA within 15km of the Site

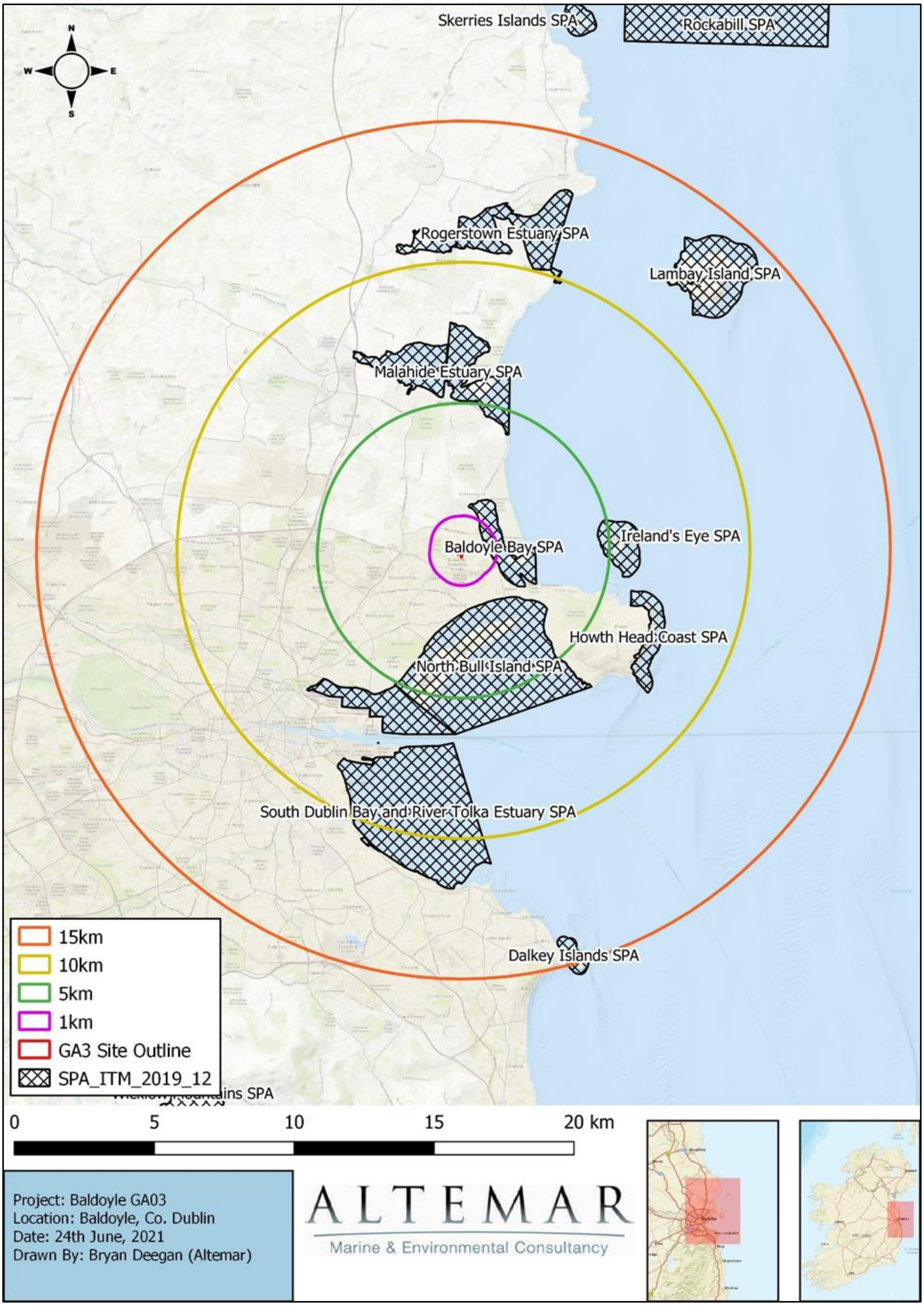


Figure 8.4: NHA and pNHA within 5 km of the Site

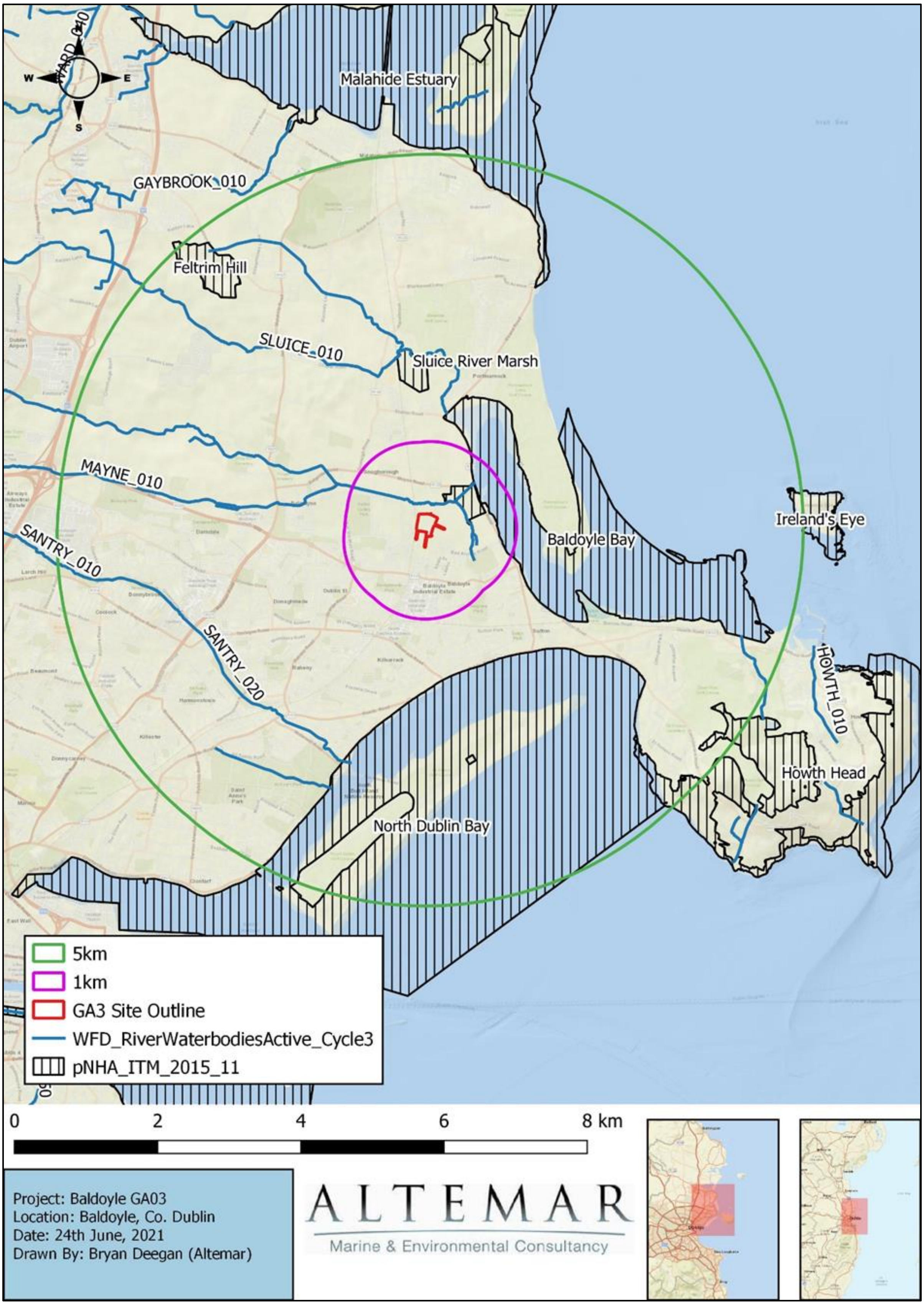


Figure 8.5: Ramsar sites within 15 km of the Site

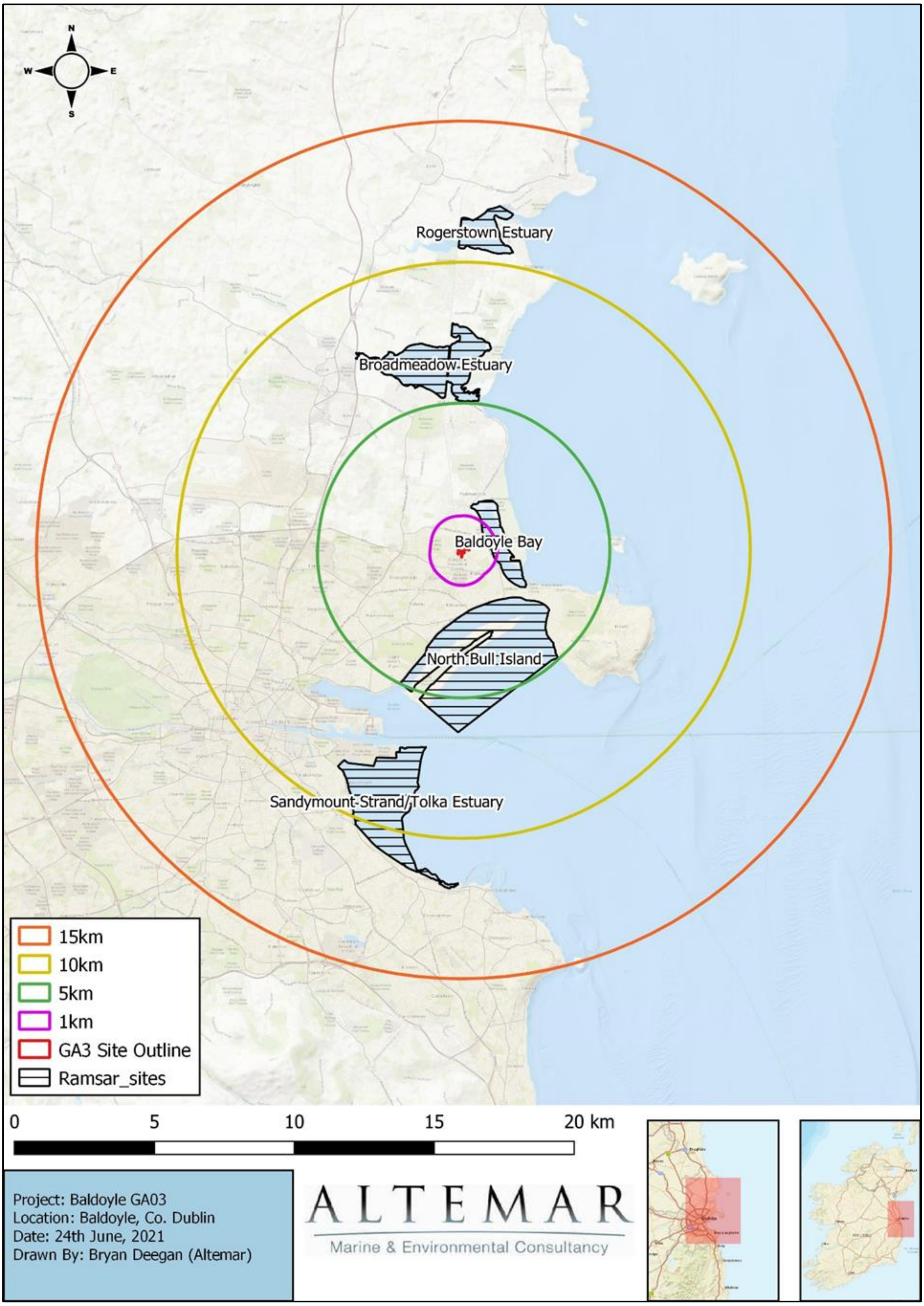


Figure 8.6: Waterbodies within 1 km of the Site (EPA-WFD)

Figure 8.7: Waterbodies and SAC within 1 km of the Site (EPA-WFD)

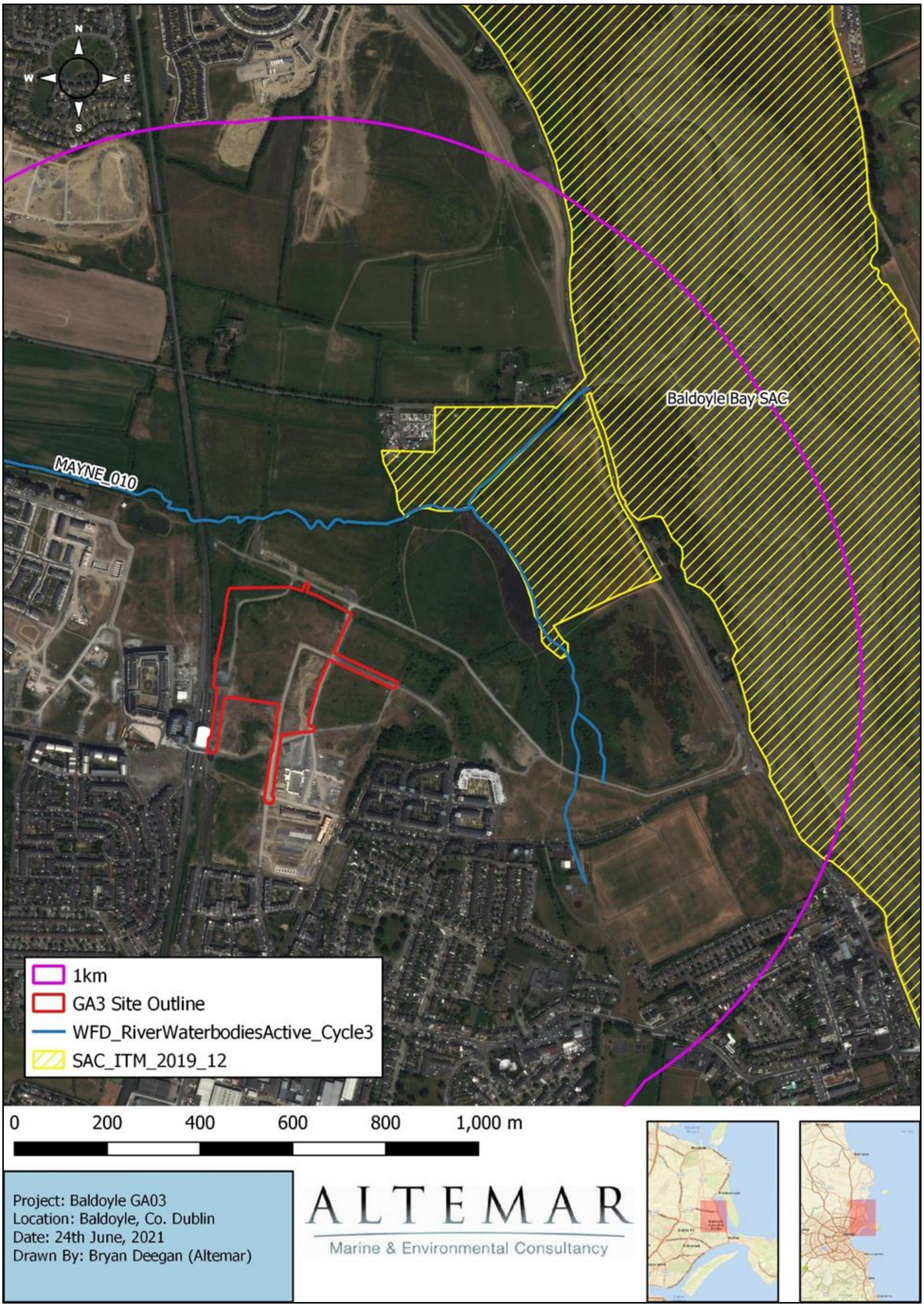


Figure 8.8: Waterbodies and SPA within 1 km of the Site (EPA-WFD)

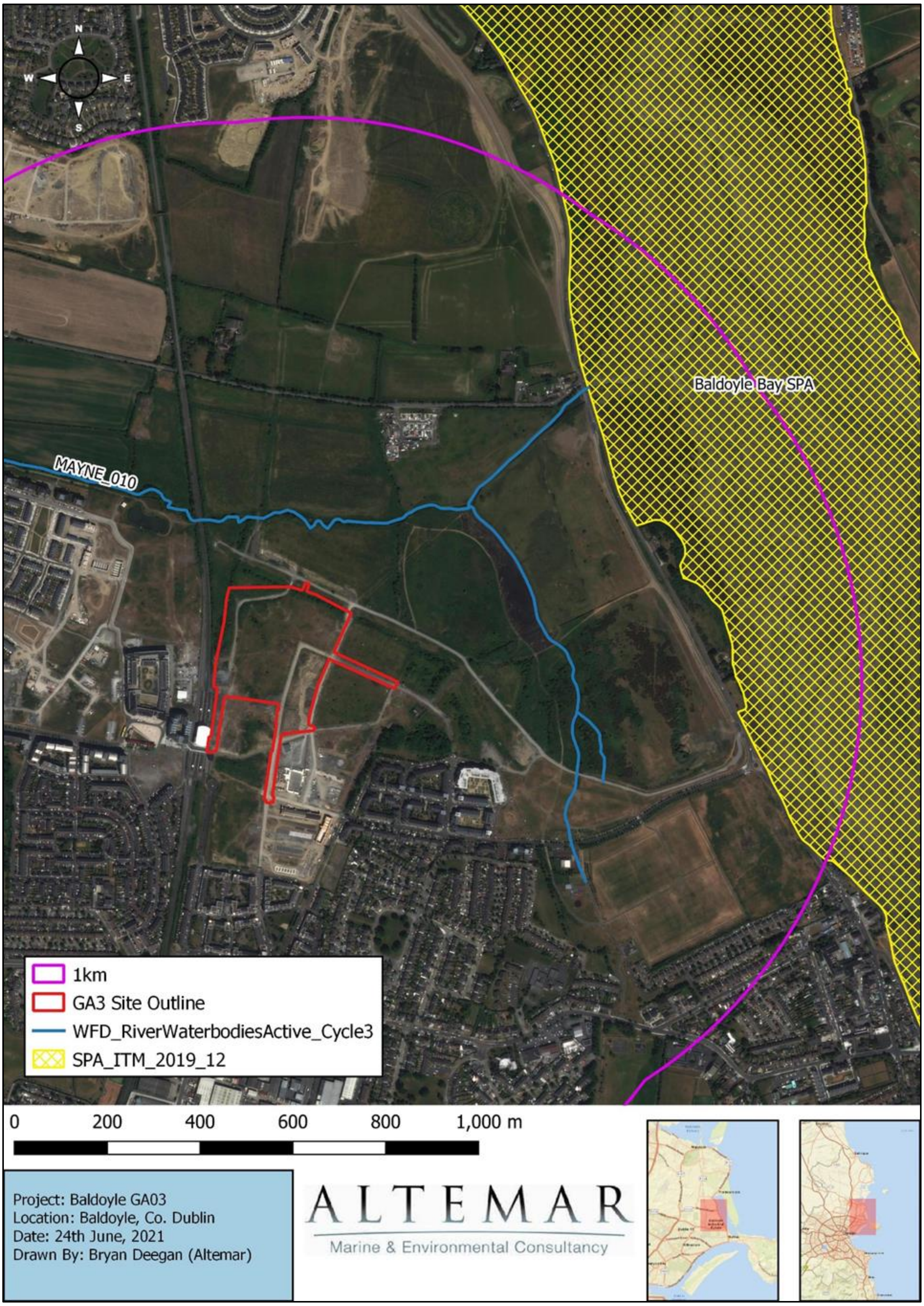


Figure 8.9: Waterbodies and pNHA within 1km of the Site (EPA-WFD)

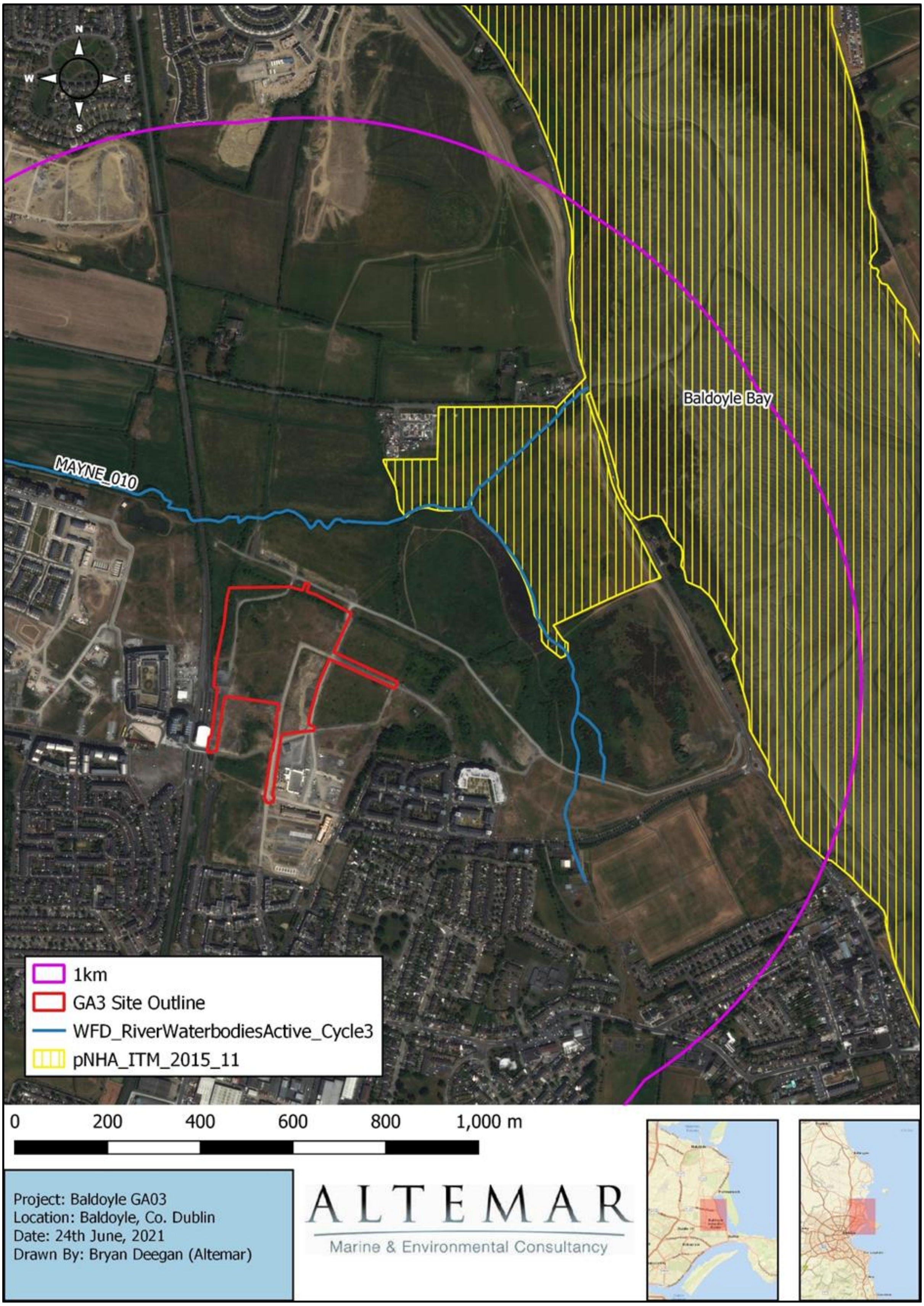
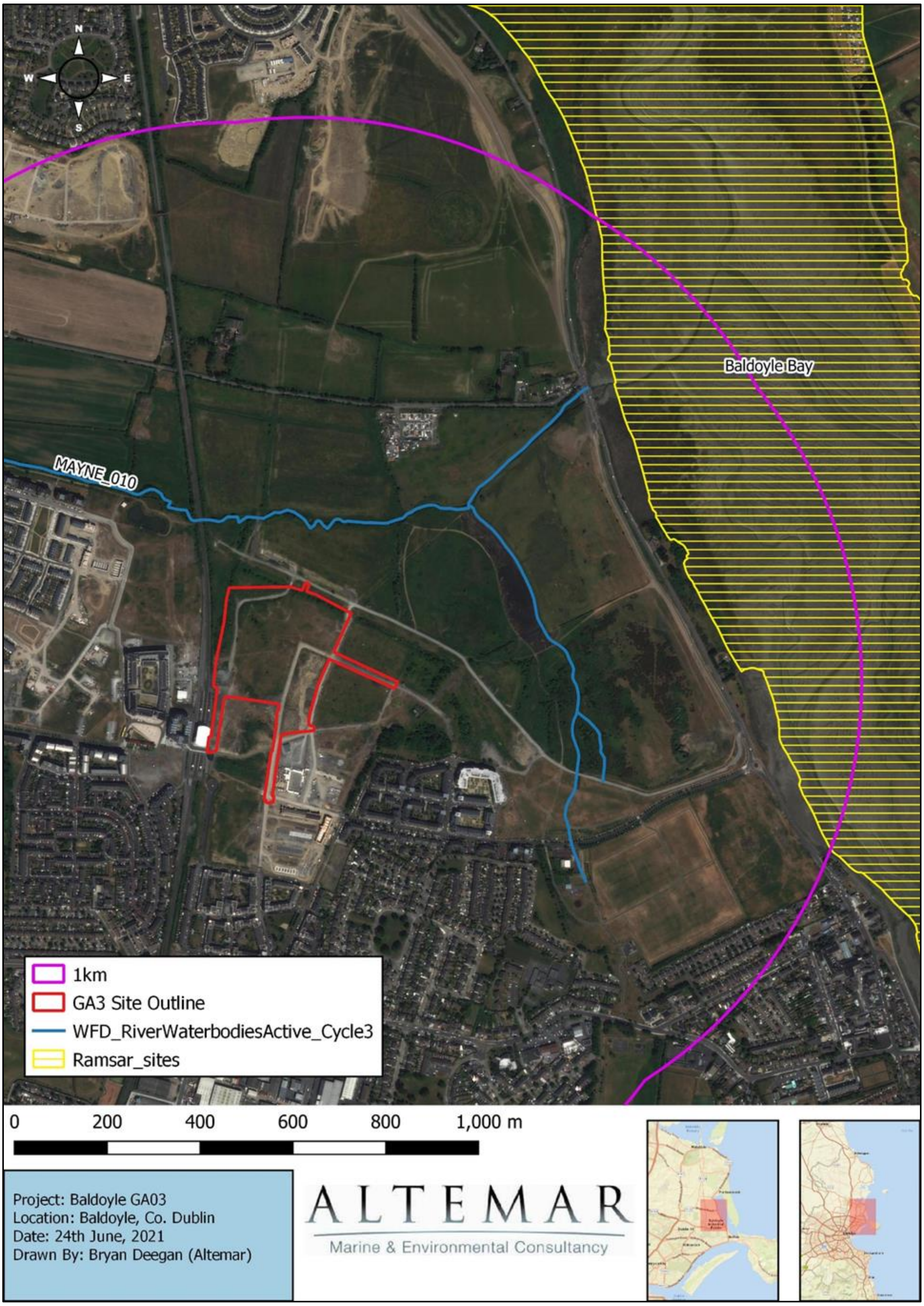


Figure 8.10: Waterbodies and Ramsar sites within 1 km of the Site (EPA-WFD)



8.3.2 Biodiversity Records

The NBDC's online viewer was consulted in order to determine the extent of biodiversity and species of interest in the area. An assessment of the Site specific area was carried out and it recorded no species of interest. Following this, a 2 km^2 grid was assessed (O24F). Table 8.3 provides a list of all species recorded in the 2 km^2 grid area.

Table 8.3: NBDC Records of Rare, Protected and Invasive Species within the 2 km^2 grid (O24F)

Common Frog (*Rana temporaria*) Barn Swallow (*Hirundo rustica*) Black-headed Gull (*Larus ridibundus*) Black-tailed Godwit (*Limosa limosa*) Brent Goose (*Branta bernicla*) Common Kestrel (*Falco tinnunculus*) Common Linnet (*Carduelis cannabina*) Common Redshank (*Tringa totanus*) Common Shelduck (*Tadorna tadorna*) Common Snipe (*Gallinago gallinago*) Common Starling (*Sturnus vulgaris*) Common Swift (*Apus apus*) Common Wood Pigeon (*Columba palumbus*) Eurasian Curlew (*Numenius arquata*) Eurasian Oystercatcher (*Haematopus ostralegus*) Eurasian Teal (*Anas crecca*) Eurasian Tree Sparrow (*Passer montanus*) Eurasian Wigeon (*Anas penelope*) Eurasian Woodcock (*Scolopax rusticola*) Great Cormorant (*Phalacrocorax carbo*) Herring Gull (*Larus argentatus*) House Martin (*Delichon urbicum*) House Sparrow (*Passer domesticus*) Little Egret (*Egretta garzetta*) Mallard (*Anas platyrhynchos*) Mew Gull (*Larus canus*) Mute Swan (*Cygnus olor*)	Northern Lapwing (*Vanellus vanellus*) Rock Pigeon (*Columba livia*) Short-eared Owl (*Asio flammeus*) Sky Lark (*Alauda arvensis*) Spotted Flycatcher (*Muscicapa striata*) Stock Pigeon (*Columba oenas*) Yellowhammer (*Emberiza citrinella*) Bombus (*Bombus lucorum*) Large Red Tailed Bumble Bee (*Bombus (Melanobombus lapidarius*) Moss Carder-bee (*Bombus (Thoracombus) muscorum*) Eurasian Pygmy Shrew (*Sorex minutus*) European Otter (*Lutra lutra*) European Rabbit (*Oryctolagus cuniculus*) Irish Hare (*Lepus timidus subsp. hibernicus*) Irish Stoat (*Mustela erminea subsp. hibernica*) Soprano Pipistrelle (*Pipistrellus pygmaeus*) West European Hedgehog (*Erinaceus europaeus*) *Invasive Species* Butterfly-bush (*Buddleja davidii*) Giant Hogweed (*Heracleum mantegazzianum*) Harlequin Ladybird (*Harmonia axyridis*)

An assessment of files received from the NPWS (Code No. 2020_185), which contain records of rare and protected species and grid references for sightings of these species, was carried out. There are no recorded sightings within the Site itself, however Common Frog (*Rana temporaria*) was noted 180 m and 270 m to the south-west. No other species of conservation importance were noted at high resolution within 1 km^2 based on NPWS records. However, it should be noted that the Baldoyle Bay SAC and SPA are proximate to the Site.

8.3.2.1 Terrestrial Ecology

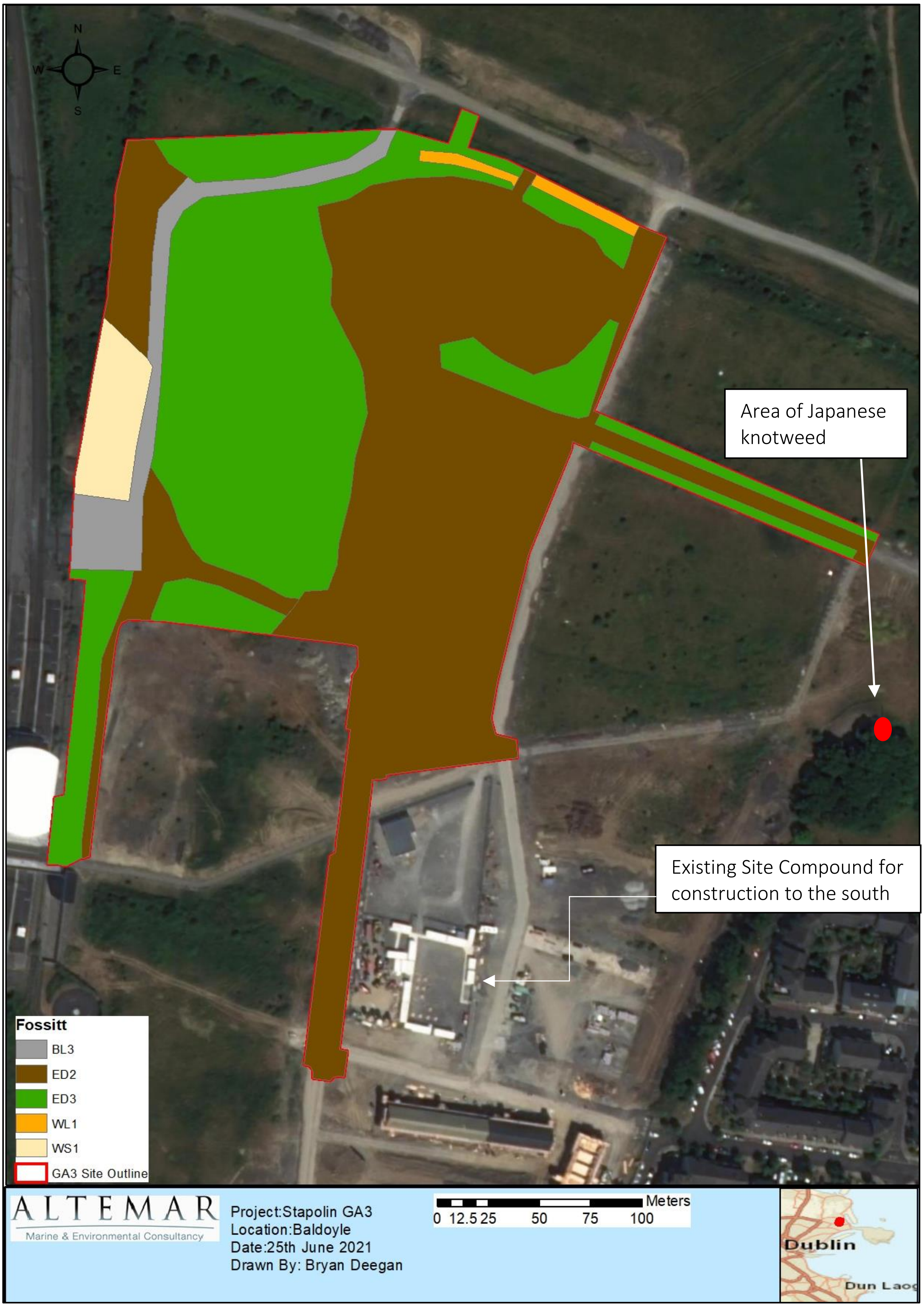
Habitats encountered were classified according to Fossitt (2000) and are presented in Figure 8.11. Each habitat type and species encountered are assessed in detail.

D3- Recolonising Bare Ground/ ED 2- Bare ground

As can be seen from Figure 8.11, the vast majority of the Site of the proposed Project consists of Bare Ground (ED2) and Recolonising Bare Ground (ED3). The Bare Ground primarily consisted of haul roads and active construction activities involving soil movements. In addition, based upon an examination of historic satellite imagery (Google Historic Imagery and Geohive[10]), the Site was originally an agricultural field and it appears that site clearance commenced in January 2005. By May 2009, the vast majority of the Site of the proposed Project was cleared with areas of rubble, roads, bare ground and some areas of recolonisation. Much of the Site appears to have been abandoned since then and is becoming recolonised. However, a site compound and haul roads are present on-Site (refer to Figure 8.9) facilitating construction of a housing development to the south of the Site of the proposed Project

[10] GEOHIVE (2021). Available at: www.geohive.ie

Figure 8.11: Fossitt (2000) Classification of the Site of the Proposed Project



Outside of actively used areas, the Site is being recolonised by opportunistic species such as nettle (*Urtica dioica*), rape (*Brassica napus*), dandelion (T*araxacum spp*.), oxeye daisy (*Leucanthemum vulgare*), red valerian (*Centranthus ruber*), bramble (*Rubus fruticosus agg*.), colt's foot (*Tussilago farfara*), daisy (*Bellis perennis*), common poppy (*Papaver rhoeas*), scarlet Pimpernel (*Anagallis arvensis*), plantains (*Plantago spp*.), thistles (*Cirsium arvense* & *C. vulgare*), creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), docks (*Rumex spp*.), common poppy (*Papaver rhoeas*), cat's-ear (*Hypochaeris radicata*), , common centaury (*Centaurium erythraea*), common ragwort (*Senecio jacobaea*), colt's Foot, Winter heliotrope (*Petasites pyrenaicus*), Creeping Cinquefoil (*Potentilla reptans*), rushes (*Juncus sp*.), , butterfly-bush (*Buddleja spp.* `), self-heal (*Prunella vulgaris*), ivy (*Hedera helix*), common birds-foot-trefoil (*Lotus corniculatus*), gorse (*Ulex spp*), wild carrot (*Daucus carota*), lesser trefoil (*Trifolium dubium*), common vetch (*Vicia sativa ssp. Segetalis*), wild teasel (*Dipsacus fullonum*), and rosebay willowherb (*Chamaenerion angustifolium*).

As seen in the invasive species report, an area of Japanese knotweed (*Reynoutria japonica*) is located just outside the proposed Project area to east of the site. Further assessment and implementation of an Invasive Species Management Plan is recommended prior to construction commencing on-Site.

Figure 8.12: Recolonising Bare Ground

WS1- Scrub

Part of the Site is undergoing succession to scrub. Based on the satellite imagery assessment, this area had also been previously cleared. Species in this area included thistles (*Cirsium sp.*), creeping buttercup (*Ranunculus repens*), common ragwort (*Senecio jacobaea*), colt's foot (*Tussilago farfara*), winter heliotrope (*Petasites pyrenaicus*), blackcurrent (*Ribes nigrum*), wild teasel (*Dipsacus fullonum*), gorse (Ulex sp.), butterfly-bush (*Buddleja davidii*), rosebay willowherb (*Chamaenerion angustifolium*) and Traveller's-joy (Clematis vitalba). Saplings of ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and hawthorn (*Crataegus monogyna*), are also present.

BL-Built Land / ED2-Bare Ground

As seen in Figure 8.1, the eastern part of the Site is being used as compound for a development to the south of the Site. This area also includes access roads from the north. These areas have recently been laid with stone or are current access routes used by construction or pedestrian traffic. No biodiversity was noted in these areas.

Figure 8.13: ED2 Bare Ground

8.3.2.2 Evaluation of Species and Habitats On-site

Evaluation of Habitats

The Site consists of recently cleared land (2009) that is recolonising. Approximately one third of the Site consists of an existing construction compound and access roads. The Site is relatively poor in biodiversity value. No rare or protected habitats were noted.

Plant Species

The plant species encountered at the various locations on-Site are detailed above. No protected species were noted. Records of rare and threatened species from NPWS were examined. No rare or threatened plant species were recorded in the vicinity of the Site of the proposed Project.

Mammals

A mammal survey was carried out. No signs of mammals of conservation importance were noted on-Site. No badger setts or otter holts were noted. There are no watercourses on-Site; however, foxes (*Vulpes vulpes*) and rabbits were noted on-Site. Hedgehogs have been recorded by NBDC within the 10 km square but not within the 2 km square, at a finer resolution. No hedgehogs were seen during the Site visit.

Amphibians

No common frogs (*Rana temporaria*) or newts (*Triturus vulgaris*) were observed on-Site. Frogs have been recorded by the NBDC within the 10 km square grid, but not at finer resolution. Given the presence of a small seasonal areas of water retention on-Site, it is possible that frogs may be present. However, the overall Site would be considered poor foraging habitat. Should amphibians be noted on-Site, the Fingal County Council Biodiversity Officer must be informed, a derogation licence must be acquired from NPWS and the species translocated, prior to any works taking place on-Site.

Bats

A bat survey was carried out, which included a bat emergent and detector survey. There are no buildings or trees of bat roosting potential on-Site. There was no foraging activity on-Site. There are no records of bats utilising the Site.

Avian Fauna

The Site of the proposed Project was previously agricultural land, and based on an examination of satellite imagery, ground clearance works on a previously granted development appeared to continue until 2009, when it appeared to cease. As a result, much of the Site now contains recolonising bare ground.

As seen in the Wintering Bird Survey Report (Appendix 18.1), snipe (*Gallinago gallinago*), which is red-listed (of high conservation concern) per the Birds of Conservation Concern in Ireland (2020 – 2026) ("BoCCI4") and has been noted within the Site of the proposed Project. This species is not a qualifying interest of Baldoyle Bay SPA.

Grey Heron (*Ardea cinerea* – green conservation status) and Herring Gull (*Larus argentatus* – BoCCI4 amber-listed (of medium conservation concern)) have also been observed on-Site. Neither species are recognised as a qualifying interest of Baldoyle Bay SPA. No works are proposed in the vicinity of the Mayne River where roosting habitat was noted. During the non-wintering bird assessments, no birds of conservation importance were noted on-Site. The Site is deemed not to be an important area for wintering or breeding birds.

8.4 Potential Impacts of the Proposed Project

8.4.1 Construction Phase

8.4.1.1 Designated Natura 2000 Sites within 15 km

The proposed Project is not wholly or partly within a designated conservation site. However, Baldoyle Bay SAC, SPA, pNHA and Ramsar site are proximate to the Site, and there is a direct pathway from the proposed Project to the designated sites via the existing attenuation pond and Mayne River.

Noise from the construction phase would be localised to the vicinity of the works and would not impact on the qualifying interests of the Baldoyle Bay SPA, which is 615 m from the Site.

As outlined in Chapter 11 (Air Quality and Climate):

> *"There is the potential for interactions between air quality and biodiversity as the Baldoyle Bay Special Area of Conservation (SAC) and Proposed Natural Heritage Area (pNHA) (site code 000199), along with the Baldoyle Bay Special Protection Area (SPA) (site code 004016) are to the east of the proposed Project. Dust emissions from*

> *construction works have the potential to impact vegetation in the SAC, pNHA and SPA. Once the mitigation measures outlined within Section 11.5 and Appendix 11.3 are implemented, dust related impacts are predicted to be **short-term and imperceptible**.*"

It should also be noted that the existing busy coastal road (R106) is located between the proposed Project and the Baldoyle Bay SPA, which is 615 m from the Site. Ensuring water quality and compliance with the Water Pollution Acts, as set out in the CEMP, would be seen as the primary method of ensuring no significant impact on watercourses and designated sites.

Impacts: ***Negative, slight, short-term, unlikely, localised.*** Mitigation is required.

8.4.1.2 Ecology

The construction of the proposed Project would potentially impact on the existing ecology of the Site and the surrounding area. These potential construction impacts would include impacts that may arise during the Site clearance, re-profiling of the Site, and the building phases of the proposed Project.

Construction phase mitigation measures are required on Site, particularly as significant re-profiling of the Site is proposed, which will remove all existing terrestrial habitats within the Site boundary. Works have the potential to lead to silt-laden and contaminated run-off entering the downstream attenuation pond and Mayne River, with potential downstream impacts on biodiversity.

Impacts: ***Negative, slight, short-term, likely, localised***. Mitigation is required.

8.4.1.3 Terrestrial Ecology

During the Site visits, no protected flora or terrestrial mammalian species of conservation importance were recorded on-Site or in NPWS or NBDC records. Loss of habitat and habitat fragmentation may affect some common mammalian species. No protected mammals were noted on-Site. Frogs and reptiles were not observed on-Site. The common lizard may occur on-Site but, was not observed. The proposed Project will remove some potential foraging habitats on-Site. As a result, a pre-construction survey will be carried out.

Impacts: ***Negative, slight, short-term, unlikely, localised****.* Mitigation is required.

8.4.1.4 Bats

There are no features on-Site that could form a bat roost. Therefore, no significant negative impacts on the roosting of these animals are expected to result from the proposed Project. A bat fauna assessment, including a bat detector survey, was carried out and no bat foraging was noted on-Site. No impact is foreseen on bat fauna.

Impacts: ***Neutral to slight, negative, temporary, localised***. Mitigation is not required.

8.4.1.5 Avian Fauna

As can be seen from Appendix 8.1, the wintering bird survey covered the Site of the proposed Project in addition to the larger land bank area to the boundary with the SAC. It concluded that:

> *"the proposed development area is not within the Baldoyle Bay SPA, however given the proximity of the SPA to the development, there is potential for impacts to result during construction and operational phases of the proposed development. These potential impacts could include:*
>
> - *Disturbance during construction works and the operational phase to Special Conservation Interest of the SPA including through movement of machinery, personnel, noise, vibration and/or noise associated with domestic dwellings.*
> - *Pollution of surface water through accidental spillage or discharge of polluting substances, or via elevated suspended solids and siltation through run-off to watercourses.*
>
> *The maximum likely distance at which disturbance will impact SCIs from the Baldoyle Bay SPA is 300m (Cutts et al., 2013). The magnitude of this impact and its potential significance will require further consideration at the assessment stage of any future planning application.*
>
> *The proposed housing scheme may result in disturbance of SCI's of the adjacent SPA. However, it is likely that habituation will occur to this new source of disturbance given that the SCIs of the SPA are already accustomed to the disturbance associated with Baldoyle village and existing surrounding housing developments. This should be considered in further detail at the assessment stage of any future planning application.*

> *A wide range of environmental factors are required to support water bird species including good water quality and clarity and a good supply of food resources. Thus, water quality impacts resulting from the proposed development (i.e. during the construction and operational phases) could result in a reduction in the availability of suitable habitat for water bird species. The effect of such a reduction in water quality has the potential to be ecologically significant. However, it is likely that best practice design and mitigation can be implemented that would avoid or reduce such impacts. This should be considered in greater detail at the assessment stage of any future planning application*."

It should be noted that the proposed Project is 615 m from the Baldoyle Bay SPA (at its closest). Based on the fact that the "*maximum likely distance at which disturbance will impact SCIs from the Baldoyle Bay SPA is 300m*"[11], disturbance from the proposed works would not be expected. Snipe (*Gallinago gallinago*) is red-listed (BoCCI4) and has been noted within the Site of the proposed project. This species is not a qualifying interest of Baldoyle Bay SPA[12]. Grey Heron (*Ardea cinerea* – green conservation status) and Herring Gull (*Larus argentatus* – amber-listed (BoCCI4)) have also been observed on-Site. Neither species are recognised as a qualifying interest of Baldoyle Bay SPA. No works are proposed in the vicinity of the Mayne River, where roosting habitat was noted. However, there is potential pollution of surface water through accidental spillage or discharge of polluting substances, or via elevated suspended solids and siltation through run-off to watercourses. Scrub is also noted on-Site and there is potential for breeding birds on-Site. Mitigation measures will be required to protect wintering birds (Snipe) and breeding / nesting birds.

Impacts: ***Negative, slight, short-term, likely, localised***. Mitigation is required.

8.4.2 Operational Phase

Once constructed, all on-Site drainage will be connected to separate foul and surface water systems. Surface water run-off will comply with SUDS. The biodiversity value of the Site would be expected to improve as the landscape measures mature. It would be expected that the localised ecological impacts in the long-term would be neutral once the landscape has established.

[11] Cutts et al., (2013).
[12] Snipe is suffering severe declines and now red-listed is a result.

8.4.2.1 Designated Conservation Sites within 15 km

The proposed Project must comply with drainage requirements and the Water Pollution Acts. As outlined in the CEMP, measures will be in place to prevent downstream impacts. No significant impacts on designated sites are likely during operation. The presence of additional residents in the vicinity of Baldoyle Bay may result in an increase of disturbance of biodiversity within the Baldoyle SPA and SAC. By the very nature of the estuarine and saltmarsh environment within Baldoyle Bay it would be expected that the increase in human disturbance would not be within the estuarine environment of Baldoyle Bay itself, but on the surrounding roads and on Portmarnock Beach. As a result the impact in relation to increased activity in the area would be seen as minor adverse but not significant.

Impacts: ***Negative, slight, short-term, likely, localised.*** Mitigation is required in relation to surface water.

8.4.2.2 Terrestrial Ecology

As the landscape measures improve with maturity, it would be expected that the biodiversity value of the Site to birds and flora would also increase. Mitigation is not required in relation to the operational impacts on terrestrial ecology.

Impacts: ***Localised, likely. Slight negative in the short-term, to slight positive in the long-term / permanent time frame.*** Mitigation is not required.

8.4.2.3 Bats

The proposed Project will result in increased roosting opportunities for bats, but would also see an increase in lighting in the area. The buildings are solid structures with strong reflective properties and would be expected to be clearly visible to bats. Bat collisions with the buildings would not be expected.

Impacts: ***Neutral to slight negative; permanent, localised.*** Mitigation is not required.

8.4.2.4 Avian Fauna

The presence of additional residents in the vicinity of Baldoyle Bay may result in an increase of disturbance of biodiversity within the Baldoyle Bay SPA and SAC. By the very nature of the estuarine and saltmarsh environment, it would be expected that the increase in human disturbance would not be within the estuarine environment of Baldoyle Bay itself, but may result in an increase in activity on the surrounding roads and on Portmarnock Beach. As a result the impact in relation to increased activity in the area would be seen as minor adverse but not significant. The presence of buildings and landscaping on-Site could result in increased nesting opportunities.

Impacts: ***Negative, slight, long-term, likely, localised.*** Mitigation is not required.

8.5 Mitigation Measures

8.5.1 Construction Phase

Mitigation measures will be incorporated into the proposed Project to minimise the potential negative impacts on the ecology within the ZOI. These measures are outlined below in sequence, and incorporate elements outlined elsewhere in this EIAR and in the CEMP. It should be noted, however, that additional measures may be incorporated into the proposed Project following detailed discussions with Fingal County Council, including the Biodiversity Officer.

As the main potential vector for impacts to designated sites and aquatic ecology outside the proposed Project Site would be via the direct pathway to the Mayne River via the existing attenuation pond, measures should be in place to protect the biodiversity downstream of the pond from in-stream pollution and dust. No additional mitigation measures are required besides those outlined below, during the construction phase of the proposed Project, to protect against potential negative impacts on designated conservation sites.

An Ecologist will be appointed to oversee works and will be appointed prior to works commencing on-Site.

A preliminary Construction Environmental Management Plan (CEMP) accompanies this planning application (under separate cover). The CEMP shall be finalised by the appointed Contractor (in agreement with FCC and the Project Ecologist) prior to the commencement of works, and shall be implemented throughout the proposed works. It shall include but not be limited to the following measures:

8.5.1.1 Storm Water and Waste Management

Storm water and wastewater management will be constructed as per the conditions of the approved planning permission F16A/0412. Wetlands have been constructed under approved planning permission F16A/0412. The purpose of these procedures is to ensure that storm water and wastewater run-off is managed and that there is no off-Site environment impact caused by overland storm water flows. Refer to Chapter 10 (Hydrology) for further mitigation measures.

The preliminary CEMP addresses the following:

- Silt control on the roads;
- Discharge of water from dewatering systems;
- Diversion of clean water;
- Treatment and disposal of wastewater from general clean-up of tools and equipment;
- Spills control;
- A buffer zone of at least 20 m separating working machinery from pathways to watercourses;
- A prohibition on machinery entering watercourses;
- Refuelling of machinery off-Site or at a designated bunded refuelling area; and
- Silt trapping and oil interception (to be considered where surface water run-off may enter watercourses).

8.5.1.2 Noise

During the construction phase works, the appointed Contactor shall comply with:

- The mitigation measures in this Environmental Impact Assessment Report and as previously permitted application under planning reference F16A/0412.
- Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 5 Noise and Vibration.

Refer to Chapter 12 (Noise and Vibration) for further mitigation measures.

8.5.1.3 Migrating Dust & Dirt Pollution

The appointed Contractor will ensure that all construction vehicles that exit the Site onto the public roads will not transport dust and dirt to pollute the external roadways. This will be achieved through a combination of the following measures:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential Site traffic.

- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and / or windy conditions.
- Vehicles exiting the Site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using Site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any unsurfaced Site road, this will be 20 kph, and on hard surfaced roads as Site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Public roads outside the Site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and Site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-Site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

The use of appropriate water-based dust suppression systems will greatly reduce the amount of dust and windborne particulates as a result of the construction process. The main Contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan (refer to Appendix 11.3 in Volume 3). Refer to Chapter 11 (Air Quality and Climate) for further mitigation measures.

8.5.1.4 Sediment and Water Pollution Control

All works carried out as part of these infrastructure works will comply with all relevant legislation including the Local Government (Water Pollution) Acts, 1977 and 1990 and the contractor will co-operate in full with the Environmental Section of Fingal County Council.

Additional measures to be carried out to prevent impacts on habitats, plants and birds:

- Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will need be followed (i.e.

do not remove trees or shrubs during the nesting season (1 March to 31 August, inclusive)).

- Boundary vegetation and hedgerows may serve as commuting corridors for bats (and other wildlife) and will remain unlit during the construction phase.
- Mitigation measures outlined in Section 11.5 and in the Dust Management Plan (Appendix 11.3) shall be implemented.

8.5.2 Operational Phase

The proposed Project will have to comply with SUDS, legislative requirements in relation to pollution control and the provision of additional mitigation measures such as petrochemical interceptors and silt interception to comply with Water Pollution Acts. An existing attenuation pond has been developed.

8.6 Residual Impacts

The successful implementation of the preliminary CEMP and additional measures outlined in this chapter of the EIAR would be seen as important elements to the successful mitigation of the loss of biodiversity on-Site in addition to ensuring that works do not impact on the downstream aquatic ecology and designated sites.

The proposed Project has satisfactorily addressed the current ecology on-Site in its design. The application of the mitigation measures outlined in this EIAR and in the CEMP will help reduce the impact on biodiversity ecology such significant impacts do not arise. It is considered that, where possible, biodiversity enhancement measures have been incorporated into the design for the benefit of the overall biodiversity value of the Site.

The overall residual impact of the proposed Project on biodiversity will be ***long-term, slight, and neutral***. This is primarily as a result of the loss of terrestrial habitats on-Site (of poor biodiversity importance), supported by the creation of additional terrestrial biodiversity features, mitigation measures and landscaping strategy.

8.7 Monitoring

An Ecologist will be appointed to monitor the Site during pre-construction surveys, construction phase and landscaping phase, This would include obtaining derogation licences, if necessary, from the NPWS.

8.8 Reinstatement

The reinstatement of the Site will be monitored by the appointed Ecologist.

8.9 Interactions

The biodiversity elements of this EIAR have involved consultation with a wide section of the Project Team, particularly in relation to the construction management, design, drainage and landscape elements of the proposed Project.

As addressed comprehensively above, there are interactions between biodiversity and (i) air quality and climate (Chapter 11) and (ii) noise and vibration (Chapter 12). Effects in relation to air quality and noise have the potential to result in impacts on biodiversity in the study area, in the absence of mitigation. Appropriate mitigation measures have been set out in this EIAR (refer to Chapters 11 and 12 and Section 8.5, above) such that significant negative impacts are unlikely to arise.

For further information on interactions between environmental topics / media, please refer to Chapter 20 (Interactions).

8.10 Cumulative Impacts

The proposed Project is part of wider development lands (which are the subject of the Baldoyle-Stapolin LAP) that had previously undergone site clearance. In addition, part of the Site currently consists of roads and a construction compound. Therefore, it is likely that the surrounding lands will be developed further in due course. Construction on this Site will create localised light and noise disturbance. Surface water discharge from Site will be developed in accordance with the requirements of the Drainage Division as set out in the Greater Dublin Strategic Drainage Study's *'Technical Document on New Development'* using existing pond on-Site for the road.

The operational phase of the proposed Project will result in an increase in the number of people proximate to existing conservation sites. This may result in an increase of human disturbance in the vicinity of the proposed Project and within the Baldoyle area.

The proposed Project Site is located within a suburban and developed environment. Construction activities on this site will create localised light, dust and noise disturbance with potential for downstream impacts.

The following is a list of projects and plans listed have been considered in line with the EIAR Chapter 21.

Table 8.4 Cumulative Effects Evaluated

Ref. No.	Address	Proposal
F21A/0046	Lands at Baldoyle (Formerly known as the Coast, Dublin 13)	The site is bounded to north by undeveloped lands, to the south by the residential development of Myrtle, to the east by residential development of Red Arches, and to the west by undeveloped lands and the Dublin - Belfast railway line. The development consists of minor alterations to permitted residential development, as permitted under F16A/0412, ABP Ref: PL06F.248970 as amended under F20A/0258. The proposed alterations relate to Blocks B3, B4, C3, C4 and C5 only and relate to either: Proposed alterations to some of the permitted Unit Types in respect of their external design which relates primarily to roof and porch design as well as external finishes, minor internal reconfiguration and removal or alteration of permitted solar panels. The introduction of new Unit Types in place of permitted units. This is set out in respect of each block as follows: Block B3 - To the east of the Block, the replacement of the permitted 1 no Unit Type G, 7 no. Unit Type D and 1 no. Unit Type E with 9 no. Unit Type P. Block B4- to the east side of the Block, replacement of the permitted 1 no. Unit Type G, 7 No. Unit Type D and 1 no. Unit Type E, 1 no. Unit Type A and 1 no. Unit Type B with 9 no. Unit Type P. Block C3 to the west and centre of the block replacement and alteration of the permitted 2 no. Unit Type M, 8 no. Unit Type A and 6 no. Unit Type D with 18 no. revised unit Type B. To the east of the block the replacement of 2 no. Unit Type E with 2 no. revised unit Type D and the alteration of the 5 no. Unit Type E to revised unit Type E Block C4- To the west of the block the alteration of the permitted 2 no. Unit Type N and 4 no. Unit Type K to 2 no. revised unit Type N and 4 no. Revised Unit Type K. Block C5- to the west of the block the alteration of the permitted 2 no. Unit Type N and 4 no. revised Unit Type K. In total 38 permitted units are being altered with external changes and 33 no. units are replacing Type 38 no. permitted units. This proposed replacement and alteration of permitted unit types results in a reduction in permitted units by 5. Permission is also sought for the resultant increase in car-parking from 98 permitted spaces to 122 spaces relating to the subject units and for the alterations to permitted landscaping as a result of the proposed development.
F20A/0258	Lands at Baldoyle (Formerly known as the Coast, Dublin 13)	Minor alterations to permitted residential development, as permitted under F16A/0412, ABP Re. Ref; PL06F.248970. The proposed alterations rlate to Blocks C4, C5 and D1 only and primarily relate to the alteration of external finishes and material of permitted housing units including the: Omission of permitted

Ref. No.	Address	Proposal
		fireplaces and chimneys; Alterations to permitted fenestration including vertical frame sections, transoms and mullions, of windows and doors to front and rear of houses; Alteration of permitted rear flat roof to pitched roof on Building Types A & D; removal of permitted decorative balustrades; Alterations of the permitted brickwork finish to the rear and side elevations of the houses with a render finish; Alteration of permitted bin stores to include brick finishes; Removal of permitted solar panels from Building Types A,B,D,E,F G and alterations of permitted solar panels on Building Types K & N.

Ref. No.	Address	Proposal
F19A/0461	Myrtle Grange Road Baldoyle	**Primary School:** Three storey 16 classroom Primary School building in Baldoyle (Roll Number 20519G), including a two classroom SEN base. The design also includes a general-purpose hall, support teaching spaces and ancillary accommodation, external junior play areas, secure SEN hard and soft play area and a sensory garden. The proposed project also incorporates associated car parking, access road, pedestrian access, bicycle lane, construction of 2 no. external ball courts, landscaping, connection to public services and all associated site works
F16A/0412	The Coast, Baldoyle, Dublin 13.	550 no. residential units (379 no. apartments and 171 no. houses) and a village centre comprising C.1,585sq. m. of commercial floor space laid out in 13 no. blocks (Blocks A1, A2, A3, B1, B2, B3, B4, C1, C2, C3, C4, C5 and D1) ranging in height from two storeys to six storeys as follows: Blocks A1, A2 and A3 will consist of 3 no. six storey buildings (c. 30.05m OD to roof level with an overall height of c. 33.90 OD to include lift overrun) comprising 195 no. residential units (5 no. 1-bed apartment, 162 no. 2-bed apartments, and 28 no. 3-bed apartments) at first to fifth floor level, c.1,585 sq.m. of commercial floor area at ground floor level comprising a convenience outlet (c. 493sq.m.), cafe (c. 200sq.m.), 4 no. retail units (c. 88sq.m., 99sq.m., 99 sq.m. and 90sq.m.), a crèche (c. 516sq.m.) with outdoor play area (c. 183sq.m.) and shared car park also at ground floor level with two associated communal courtyard areas at first floor level above a podium. Block B1 will consist of a four storey building over basement car park (c. 21.6m OD to roof level with an overall height of c. 25m OD to include lift overrun) comprising 82 no. residential units (3 no. 1-bed apartments, 75 no. 2-bed apartments, and 4 no. 3-bed apartments); Blocks B1 and B2 include a shared central communal courtyard area over a shared basement car park and a community room (c. 78sq.m.) in the entrance pavilion to the basement.

Ref. No.	Address	Proposal
		Block B2 will consist of 3 no. three storey terraces over basement car park comprising 24 no. residential units (12 no. own door 2-bed apartments and 12 no. own door 2-bed duplex apartments). Block B3 will consist of 1 no. two storey terrace and 3 no. three storey terraces comprising 32 no. residential units (11 no. 3-bed terraced houses and 21 no. 4-bed terraced houses). Block B4 will consist of 2 no. two storey terraces and 1 no. three storey terrace comprising 25 no. residential units (16 no. 3-bed terraced houses and 9 no. 4-bed terraced houses). Block C1 will consist of 3 no. three storey terraces comprising 32 no. residential units (16 no. 2-bed own door apartments and 16 no. 2-bed own door duplex apartments). Block C2 will consist of 1 no. two storey terrace and 2 no. three storey terraces comprising 35 no. residential units (9 no. 2-bed own door apartments, 9 no. 2-bed own door duplex apartments, 10 no. 3-bed terraced houses and 7 no. 4-bed terraced houses. Block C3 will consist of 1 no. two storey terrace and 2 no. three storey terraces comprising 29 no. residential units (11 no. 3-bed houses and 18 no. 4-bed houses). Block C4 will consist of 2 no. two storey terraces and 2 no. three storey terraces comprising 47 no. residential units (5 no. 1-bed own door apartments, 2 no. 2-bed own door apartments, 5 no. 2-bed own door duplex apartments, 2 no. 3-bed own door duplex apartments, 24 no. 3-bed terraced houses and 9 no. 4-bed terraced houses). Block C5 will consist of 2 no. two storey terraces and 2 no. three storey terraces comprising 37 no. residential units (5 no. 1-bed own door apartments, 2 no. 2-bed own door apartments, 5 no. 2-bed own

Ref. No.	Address	Proposal
		door duplex apartments, 2 no. 3-bed own door duplex apartments, 14 no. 3-bed terraced houses, and 9 no. 4-bed terraced houses). Block D1 will consist of 12 no. two storey 3-bed semi-detached houses. All apartments and duplex apartments have private terraces or balconies and private communal amenity areas. The proposed development will also include 896 no. residential (including visitor) car parking spaces, 62 no. commercial car parking spaces, 551 no. residential bicycle spaces and 13 no. commercial bicycle spaces; pedestrian, vehicular and bicycle access will be via the existing Longfield Road and Red Arches Road and the proposed internal road network comprising Stapolin Avenue, Ireland's Eye Avenue and smaller access roads; construction access will be via existing haul road from the Coast Road; landscaping works including Stapolin Square (c. 0.4ha) which will provide access to Clongriffin Train Station via a series of terraces, steps and slopes, a range of public open spaces including pocket parks and amenity spaces, the largest of which will be Stapolin Haggard (c. 1.57ha); public lighting; a wetland area (c. 0.4ha.) for water quality treatment associated with the proposed development; all associated ancillary facilities including 8 no. ESB substations, switch rooms, refuse storage, water storage tanks and plant; and all associated site development works including the removal of existing roads and infrastructure where required and demolition of existing temporary lift and stair enclosure and associated infrastructure to Clongriffin Train Station. The subject site of C 15.89ha comprised Growth Area 1 of the Baldoyle-Stapolin Local Area Plan 2013-2019. This application is accompanied by an Environmental Impact Statement (E.I.S.)
F11A/0290 (/E1), PL06F.239732		Regents Park Development Ltd. were granted permission on appeal on 11th April 2013 and given a further extension of duration of permission in 2018 (FCC Reg. Ref. F11A/0290/E1) on lands at Growth Area 2 (GA2), as per Baldoyle-Stapolin Local Area Plan. FCC initially refused the application however An Bord Pleanála subsequently granted permission following appeal. The development entailed 400 no. dwelling units, 3 no. retail units, a crèche, surface and basement level car parking, landscaping and all associated works.

Ref. No.	Address	Proposal
Baldoyle – Stapolin Local Area Plan 2013 (extended)		The GA3 site forms part of a wider RA zoning as set out in the Baldoyle – Stapolin Local Area Plan 2013. Build-out of the remainder of the LAP – including the GA1 project – as well as further potential future residential and landscape / amenity works as indicated in the LAP. As outlined in the LAP '*The Vision for Baldoyle-Stapolin is to create a place to live that is appealing, distinctive and sustainable, with minimal impact on the surrounding environment and the coast. It is envisaged that Baldoyle-Stapolin will develop as a sustainable community comprised of new homes, community, leisure and educational facilities based around an identifiable and accessible new village centre which will form the heart of the area. With a range of different sizes and types of homes, as well as integrated amenities and excellent public transport, this will be a fledgling neighbourhood with a varied social mix and will embody the principles of sustainability, sustainable communities and inclusiveness.*' Baldoyle-Stapolin and the surrounding areas have a natural environment which incorporates both nationally and internationally important sites in terms of wildlife and habitats. The challenges in Baldoyle-Stapolin are how to balance the development of a compact urban area with approaches which work effectively with nature. This will be achieved by adopting an overarching Green Infrastructure Strategy centred around - Protecting, Creating, Enhancing and Connecting the natural environment within and surrounding the LAP lands. The Green Infrastructure Strategy will seek to maintain habitats and species within the Baldoyle Bay SPA and SAC at favourable conservation condition and ensure the ecological integrity of Baldoyle Bay. It will seek to develop Racecourse Park within the Baldoyle-Stapolin LAP lands and the open space areas within the Portmarnock LAP lands to the north, as Ecological Buffer Zones, which will help protect the ecological integrity of the neighbouring nationally and internationally designated sites by providing suitable habitat for key species such as birds while minimising the impacts of adjacent residential land uses. In addition to the conservation of existing designated sites and habitats the LAP will seek to create ecological networks within the LAP lands consisting of green spaces / stepping stones, corridors and links that will provide opportunities to improve linkages, for both the residents of the area and local wildlife, between the Baldoyle-Stapolin LAP lands, the neighbouring LAP lands at Portmarnock South and Clongriffin and the surrounding green belt areas. As part of the Green Infrastructure Strategy it

Ref. No.	Address	Proposal
		is envisaged that Sustainable urban Drainage System (SuDS) measures will be incorporated throughout the LAP lands in both the public and private realms to reduce the risk of flooding on site and to help to improve the quality of the water being discharged to the Mayne River, and ultimately to Baldoyle Bay, thus helping to ensuring compliance with the Water Framework Directive (WFD).

An Appropriate Assessment Report was prepared on behalf of the development proposed under planning reference number F19A/0633. The assessment was compiled by OPENFIELD Ecological Services for McGarrell Reilly Homes, in December 2019. The conclusion of the assessment states the following:

> *"This project has been screened for AA under the appropriate methodology. It has found that significant effects are not likely to arise, either alone or in combination with other plans or projects, to the Natura 2000 network. No mitigation measures are relied upon to arrive at this conclusion."*

8.10.1 Growth Area 1 (GA1)

The Shoreline Partnership (the Applicant) has applied for planning permission for a separate residential development at neighbouring GA1. The proposed development will consist of alterations to the previously permitted development at GA1, under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The existing permission provides for 544 no. residential units (385 no. apartments and 159 no. houses), residential tenant amenities, village centre and crèche laid out in 13 no. blocks (identified as A1, A2, A3, B1, B2, B3, B4, C1, C2, C3, C4, C5, D1) ranging in height from two-storeys to six-storeys, with associated pedestrian, vehicular and bicycle access, car and bicycle parking, landscape works and open spaces, including Stapolin Square and Stapolin Haggard, pocket parks, communal courtyards; surface water attenuation wetland; and associated ancillary services and works on an overall site of 15.89 hectares (ha). A number of elements of the existing permitted development have been constructed / will be constructed in accordance with the current grant of permission (as previously amended), including:

- Surface water attenuation wetlands and associated upstream surface water network;
- Ninety-nine units in permitted Blocks C4, C5 and D1 (identified as Block C6 under amendments F20A/0258 and F21A/0046);
- The open space referred to as the Haggard Park ('Stapolin Haggard');
- Demolition of existing temporary lift and stair enclosure and associated infrastructure to Clongriffin Train Station;
- Road infrastructure (except where within the application boundary and requiring to be locally altered for proposed Project); and

- Utilities infrastructure (except where within the application boundary and requiring to be locally altered for proposed Project).

Given that they are already constructed or are under construction, the area of the surface water wetlands and associated upstream surface water network, and the area of Blocks C4, C5, C6 (latter formerly D1) are excluded from the subject planning application. The Haggard Open Space will be provided in accordance with the current grant of permission and as such is also exclusion from the planning area.

The proposed amended GA1 development will provide for 882 no. new residential dwellings (747 no. apartments, 135 no. houses), residential tenant amenities, village centre, and crèche, laid out in 15 no. blocks (identified as: A1, A2, A3, B1, B2, B3, B4, C1, C1A, C2, C2A, C3, D1, D2, D3) ranging in height from two-storeys to 15-storeys, with associated pedestrian, vehicular and bicycle access, car and bicycle parking, public realm and open space, including an enlarged Stapolin Square, landscape and associated ancillary services and works over a total Site area of c. 9.1ha, of which the development area is c. 8.89ha.

As well as excluding some previously permitted areas (as above), the red line boundary for this application extends beyond the red line of the previously permitted development to provide for the full extent of Stapolin Square, new access to Clongriffin Station through the Square, new apartment blocks D1, D2, D3 to the north of Stapolin Square, and a bus ramp to Clongriffin Station. The red line boundary of this application also extends north to provide for a 300 mm watermain connection to the existing watermain in the parklands to the north.

A Natura Impact Statement has been prepared by Altemar Ltd. to accompany the planning application for the amendments to the previously permitted GA1 development. Following the implementation of mitigation measures, this report concluded the following:

> *"On the basis of the content of this report, the competent authority is enabled to conduct an assessment for Appropriate Assessment and consider whether, in view of best scientific knowledge and in view of the conservation objectives of the relevant European sites, the Proposed Development [at GA1], individually or in combination with other plans or projects is likely to have a significant effect on any European site.*

No significant effects are likely on Natura 2000 sites, their features of interest or conservation objectives. The proposed project will not will adversely affect the integrity of European sites."

Table 8.5 Key Plans Considered for Cumulative Effects

Plan / Project	Description
Baldoyle-Stapolin LAP 2013	The Site forms part of a wider 'RA' zoning as set out in the Baldoyle-Stapolin Local Area Plan (LAP) 2013 (as extended). Development of the remainder of the LAP development lands, including the GA1 project to the south of the Site, as well as further potential future residential and landscape / amenity works as indicated in the LAP, to be considered. For further information, refer to Section 3.5.2 and / or the LAP document itself.
Baldoyle-Stapolin LAP Growth Area 1 (GA1) (ABP Ref. TA06F.310418; FCC Ref. 16A/0412; ABP Ref. ABP-248970; SHD Ref. 307288-20)	An application was lodged on the 4th of June 2021 (ABP case ref. TA06F.310418) for alterations of a previously permitted development (previously permitted under FCC Reg. Ref. F16A/0412 (ABP Ref. PL06F.248970) as amended by F20A/0258 and F221A0046) for the development of 544 no. residential units (747 no. apartments and 135 no. houses) retail and a crèche. The proposed altered development would consist of 882 no. new residential dwellings (747 apartments, 135 houses), residential tenant amenity, retail, crèche, and public realm, over a site area of approx. 9.1 ha of which the development area is 8.89 ha.
Baldoyle-Stapolin LAP Growth Area 2 (GA2) (FCC Ref. F11A/0290 (/E1); ABP Ref. PL06F.239732)	Regents Park Development Ltd. were granted permission on appeal on 11th April 2013 and given a further extension of duration of permission in 2018 (FCC Reg. Ref. F11A/0290/E1) on lands at GA2, as designated in the LAP. FCC initially refused the application; however, ABP subsequently granted permission on appeal. The development entails 400 no. dwelling units, 3 no. retail units, a crèche, surface and basement level car parking, landscaping and all associated works.
Clongriffin-Belmayne LAP (2012 – 2018)	Lands immediately to the west of the Dublin-Belfast / DART railway line are within the administrative area of DCC, and subject to the Clongriffin-Belmayne Local Area Plan (2012 – 2018). On these development lands, Gerard Gannon Properties were granted permission for three major developments, as follows: ▪ **Clongriffin SHD 1** (ABP ref.: 305316) Decision date 13 December 2019. Plots 6, 8, 11, 17, 25, 26, 27, 28 and 29 Clongriffin. Application was for 1,030 no. apartments - 916 no. permitted. ▪ **Clongriffin SHD 2** (ABP ref.: 305319) Decision date 13 December 2019. Plots 4, 5 and 14 Clongriffin. Application was for 500 no. apartments. ▪ **Clongriffin S34 Permission** (DCC Ref.: 3894/19) Decision date 20 March 2020. Plots 3, 13 and 15 Clongriffin. Application was for 420

Plan / Project	Description
	no. apartments, 14 retail units, cinema, offices, etc. – 407 no. permitted. Development has yet to commence on the above permissions. Construction of c. 585 units is ongoing from previous permissions (DCC Refs.: 2903/16, 3776/15, 2478/17, 4266/16, 2610/16, 3117/16, 4101/16 and 2569/17).

Given this, it is considered that cumulative effects with other existing and proposed developments in proximity to the Site would be unlikely, neutral, not significant and localised. It is concluded that no significant effects on biodiversity will be seen as a result of the proposed Project alone or combination with other projects.

Cumulative Impact: ***Minor adverse, slight, temporary, localised, not significant*.**

8.11 'Do-Nothing' Impact

As discussed in Chapter 4 (Consideration of Alternatives), the Do-Nothing scenario, in this case, would most likely entail one of the two following outcomes:

a) A continuation of the existing status of the lands, i.e. privately owned greenfield site with some limited infrastructure in place, closed to the public; or

b) Development (likely residential) under the scope of a separate application / proposal, at some point in the future.

It would be expected that, should the Site remain undeveloped, the natural succession to scrub would continue. The biodiversity value of the Site would increase. However, it would be expected that both the butterfly bush (*Buddleja davidii*) and Gorse (*Ulex* sp) would ultimately dominate the flora on-Site.

In the case of the latter scenario, the impacts of any development on biodiversity would be broadly similar to those of proposed Project, but cannot be accurately assessed.

8.12 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered in the preparation of the Biodiversity Chapter of this EIAR. Several fieldwork dates were within in the initial stages of the Covid-19 pandemic. The Site surveys were carried out on-Site by a single outdoor fieldworker with no contact with any other person.

8.13 Worst Case Scenario

Following construction of the proposed Project, fire would be seen as the main potential risk to biodiversity in a worst case scenario, with potential downstream impacts. Petrochemical interceptors will be in place.

Worst case scenario impacts: ***Unlikely, negative, slight, localised, temporary***. No specific mitigation measures required beyond standard controls, which will be put in place.

8.14 References

- Cutts, N., Hemingway, K. and Spencer, J. (2013). *Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects.* Institute of Estuarine & Coastal Studies (IECS) University of Hull
- Department of Environment, Heritage and Local Government (DEHLG) (2010). *Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities March 2010.*
- Department of the Environment, Heritage and Local Government (DEHLG) (2009). *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. Available at: http://www.npws.ie/publications/archive/NPWS_2009_AA_Guidance.pdf
- European Commission (EC) (2000). *Managing NATURA 2000 Sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC.*
- European Commission (EC) (2001). *Assessment of Plans and Projects Significantly Affecting NATURA 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*.
- European Commission (EC) (2007). *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission*.
- European Commission (EC) (2011). *Guidance document on the implementation of the birds and habitats directive in estuaries and coastal zones with particular attention to port development and dredging*.

- National Parks and Wildlife Services (NPWS) (2007). *The Status of EU Protected Habitats and Species in Ireland.*
- NPWS (2012) Conservation Objectives: Baldoyle Bay SAC 000199. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Malahide Estuary SAC 000205. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2016) Conservation Objectives: Howth Head SAC 000202. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- NPWS (2017) Conservation Objectives: Ireland's Eye SAC 002193. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
- NPWS (2013) Conservation Objectives: Rockabill to Dalkey Island SAC 003000. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Rogerstown Estuary SAC 000208. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Lambay Island SAC 000204. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Baldoyle Bay SPA 004016. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Malahide Estuary SPA 004025. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2021) Conservation objectives for Ireland's Eye SPA [004117]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

- NPWS (2021) Conservation objectives for Howth Head Coast SPA [004113]. Generic Version 8.0. Department of Housing, Local Government and Heritage.
- NPWS (2015) Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: Rogerstown Estuary SPA 004015. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2021) Conservation objectives for Lambay Island SPA [004069]. Generic Version 8.0. Department of Housing, Local Government and Heritage.
- NPWS (2021) Conservation objectives for Dalkey Islands SPA [004172]. Generic Version 8.0. Department of Housing, Local Government and Heritage.

9 Land, Soils, Geology & Hydrogeology

9.1 Introduction

This chapter of the EIAR has been prepared by AWN Consulting Ltd. and presents an assessment of the existing environment (baseline) and the likely impacts on land, soil, geological and hydrogeological aspects, associated with the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13.

In assessing likely potential and predicted impacts, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts. Where an impact is identified, planned mitigation measures are identified and assessed.

This chapter was prepared by Paul Conaghan, an Environmental Consultant with AWN Consulting Ltd. Paul has over 9 years of experience in environmental consulting and engineering. He is a specialist in geo-environmental, hydrogeological assessment and contaminated land investigation Paul is a member of the International Association of Hydrogeologists (Irish Chapter).

Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

9.2 Methodology

The assessment has been carried out generally in accordance with the following guidelines:

- Construction Industry Research and Information Association (CIRIA) *Control of Water Pollution from Construction Sites* (2001)
- CIRIA Environmental Handbook for Building and Civil Engineering Projects (2000).
- EPA (2017). Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2015). Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.
- Institute of Geologists of Ireland (IGI) (2013). Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements

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

In the EIA assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that attribute. Appendix 9.1 in Volume 3 of this EIAR presents the impact assessment criteria provided in the Institute of Geologists of Ireland (IGI) publication.

The principal attributes (and impacts) to be assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the Site of the proposed Project;
- Landfills, industrial sites in the vicinity of the Site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the Site;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on-site as well or requirement to remove it off-site as waste for disposal or recovery;
- High-yielding water supply springs / wells in the vicinity of the Site to within a 2 km radius and the potential for increased risk presented by the proposed Project;
- Classification (regionally important, locally important, etc.) and extent of aquifers underlying the Site perimeter area and increased risks presented to them by the proposed Project, e.g. removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality;
- Natural hydrogeological / karst features in the area and potential for increased risk presented by the activities at the Site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporarily.

9.2.1 Sources of Information

Desk-based geological information on the substrata (both quaternary deposits and bedrock geology) underlying the extent of the Site was obtained through accessing national databases and site archives. The collection of baseline regional data was undertaken by reviewing the following sources:

- Geological Survey of Ireland (GSI) – online mapping, geohazard database, Geological Heritage Sites & Sites of Special Scientific Interest, bedrock memoirs and 1:100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland (OSi) – aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information; and
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

Site specific data was derived from the following sources:

- Ground Investigations Ireland (GII) (2020). *Baldoyle GA3 Block E1 & E4 Ground Investigation Report.* March 2020.
- CS Consulting Group (2020) Engineering Services Report Strategic Housing Development Stapolin Growth Area, Baldoyle Co. Dublin. November 2020

Figure 9.1, below, presents the location of the Site of the proposed Project.

Figure 9.1: Site Location[13]

9.3 Baseline Environment

9.3.1 Site Description

A detailed description of the proposed Project is provided in Chapter 5 (Description of the Proposed Project). The surrounding environment can be described as a mix of remnant agricultural, parkland and residential (to the south beyond GA1). Site investigation works[14] noted a network of access roads traversing the land and a large construction compound area located to the south east of the Site.

9.3.2 Topography & Setting

The Site is mostly flat at 6 m above Ordnance Datum (mAOD). The regional gradient falls from west to east towards the coast. The vast majority of the Site primarily consists of an area of bare ground. Historic satellite imagery shows that the Site was originally an agricultural field; however, site clearance commenced after 2005 and by 2009, the vast majority of the Site of the proposed Project had been cleared with areas of construction activity, roads and bare

[13] CS Consulting (2019).
[14] Ground Investigation Ireland (GII) (2020).

ground. Between 2010 and 2018 many areas reverted to recolonization, however, at present c. 50% of the site comprises recolonised ground and c. 50% is a site compound and haul roads facilitating the construction of housing development to the south of the Site. This area also includes access roads from Moyne Road further north.

There are some industrial and commercial units 900 m to the south, at Baldoyle Industrial Estate.The Site is bound by the Dublin-Belfast / DART train line and Clongriffin Station to the south west. The Site is also bound by proposed GA1 to the south.

The undeveloped lands of Baldoyle-Stapolin GA2 lie directly to the east of the subject lands. Baldoyle Racecourse Park bounds the site to the north and the Baldoyle Estuary is further east beyond the R106 Coast Road.

The proposed Project gradient varies between 10 m above Ordnance Datum (mAOD) in the south and 8 mAOD in the north.

9.3.3 Areas of Geological Interest & Historical Land Use

The GSI (2021) on-line mapping was reviewed to identify sites of geological heritage for the Site and surrounding area. There are no recorded sites on / at the Site of the proposed Project, or which could be considered suitable for protection under this programme or recorded in the *Fingal Development Plan (2017 – 2023)*.

The nearest Geological Heritage Site is the North Bull Island, which is located c. 2.0 km to the south of the Site. Due to the distance and the compact nature of the calp limestone beneath the proposed Site, there is a negligible risk to this heritage site.

Details of the Site history and previous land use are included in Chapter 14 (Cultural Heritage, Archaeology & Architectural Heritage). The assessment of Site history[15] confirms that until recently, the Site has been in agricultural use since the earliest mapping available (1837 – 1842).

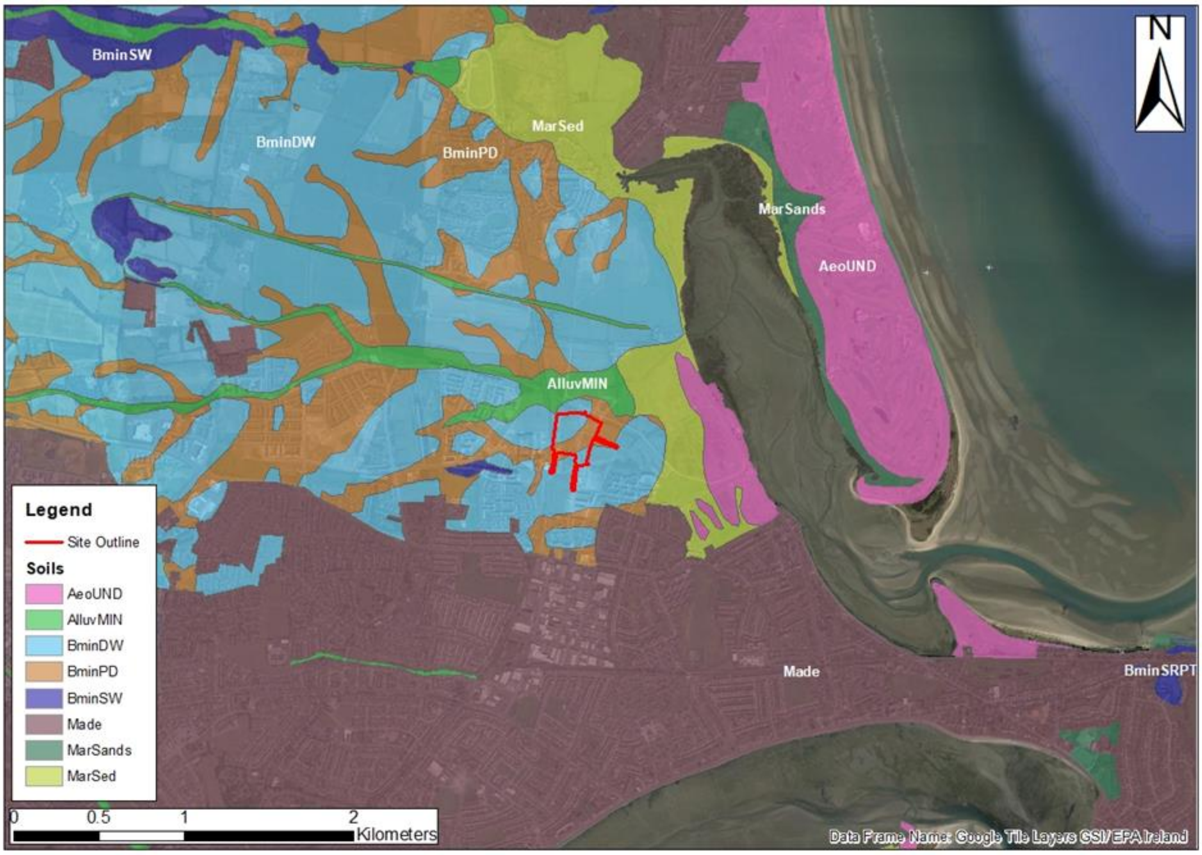
According to the EPA (2021), there are no licensed IPPC or IED facilities in the vicinity of the Site. There is no record of any landfills or licenced waste facilities in the vicinity of the Site.

[15] OSI (2021).

9.3.4 Soils

The Teagasc soil mapping indicates that the soils are comprised primarily of deep well drained mineral soil derived from limestones (BminDW) with areas of Poorly drained mineral soils derived from mainly basic parent materials (BminPD). The EPA have historically classed this area as agricultural land used for pastural farming and as a non-irrigated arable land. However, soils have been previously stripped and a parts of the area to the south is in use as a construction. The soil mapping for the site is presented below as Figure 9.2.

Figure 9.2: Regional Teagasc Soils Map[16]



9.3.5 Subsoils (Quaternary)

The Quaternary geological period extends from about 1.5 million years ago to the present day and can be sub-divided into the Pleistocene Epoch, which covers the Ice Age period, and which extended up to 10,000 years ago and the Holocene Epoch, which extends from that time to the present day.

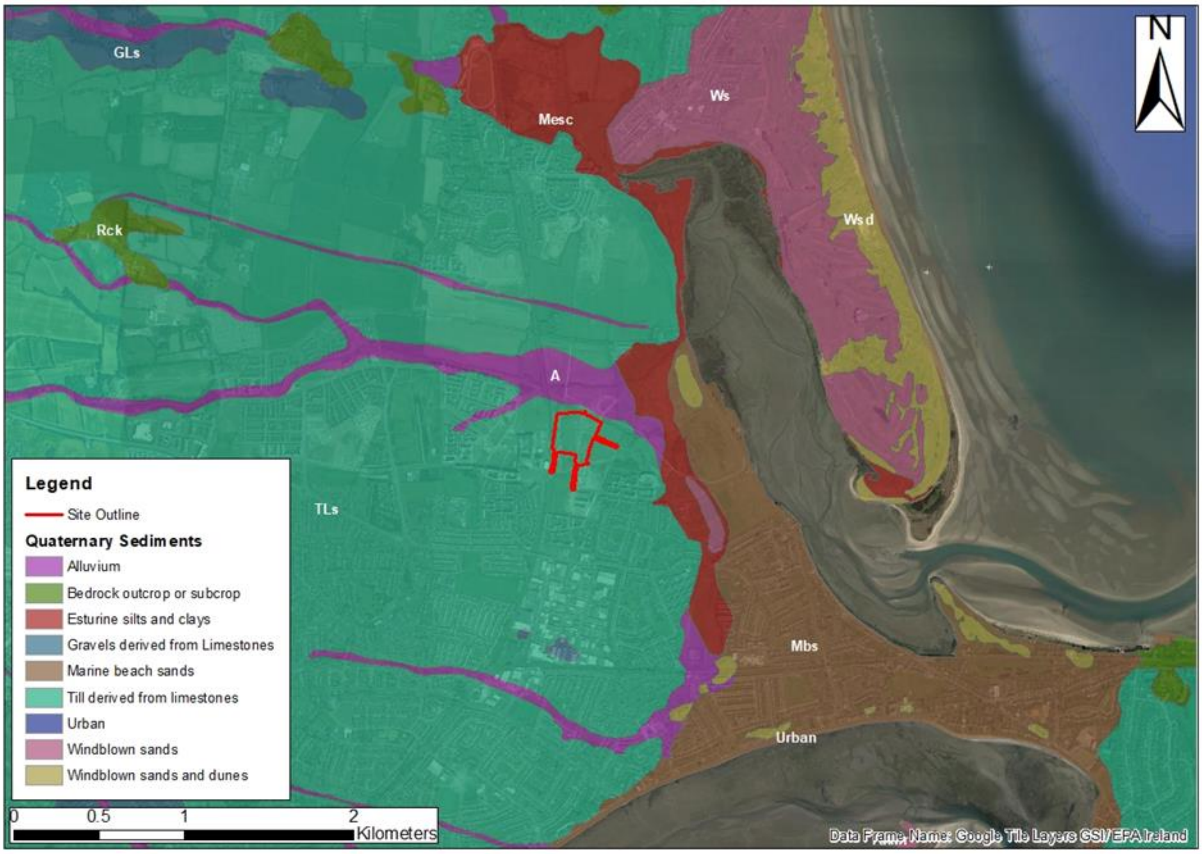
[16] Teagasc / GSI (2021).

The GSI / Teagasc mapping database of the subsoils in the area of the Site indicates one principal soil type, as shown in Figure 9.3, below. The subsoil type present across the Site is:

- *Limestone till Carboniferous (TLs).* The Site is composed of limestone till. This till is made up of glacial clays which are less permeable than alluvium subsoils.

Alluvium deposits associated with the River Mayne are noted towards the northern boundary.

Figure 9.3: Regional Subsoil (Quaternary) Map[17]



Ground Investigations Ireland (GII) carried out an environmental site investigation at the Site of the Proposed Project between October 2019 and February 2020. The scope of works included trial pitting, borehole drilling, subsoil sampling, interpretation of chemical data and reporting. The sequence of subsoils deposits recorded during the Site investigations are shown in Table 9.1. Site investigation locations are shown in Figure 9.4, with trial pit and borehole logs for these locations included as Appendix 9.2 in Volume 3. Site investigation works entailed the following:

[17] GSI (2021).

- 12 No. Trial Pits to a maximum depth of 3.30m mbgl
- 2 No. Soakaways to determine a soil infiltration value to BRE digest 365
- 12 No. Dynamic Probes to determine soil strength/density characteristics
- 2 No. Cable Percussion boreholes to a maximum depth of 7.00m mbgl
- Installation of 2 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing (12 No in total for environmental testing)

Table 9.1: Strata Noted From On-site Investigation

Name	Depths/ Notes
Topsoil	0 - 0.2m below ground level (mbgl)
Made Ground	Made Ground deposits were encountered from surface or beneath the Topsoil and were present to a variable depth of between 0.50 m and 1.00 mbgl. These deposits were described generally as brown slightly sandy gravelly CLAY with occasional redbrick fragments. Hardcore containing pyrite was encountered underlying the existing roadways on the Site.
Cohesive Deposits	Cohesive deposits were encountered beneath the Made Ground or Topsoil and were described typically as grey-brown slightly sandy gravelly CLAY with occasional cobbles and boulders overlying a grey slightly sandy gravelly CLAY with occasional cobbles and boulders.
Granular Deposits	The granular deposits were encountered within the cohesive deposits and were typically described as Grey brown or grey clayey gravelly fine to coarse SAND with occasional cobbles and rare boulders. The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs.

Bedrock was not proven during the on-site investigation with the deepest borehole (BH41) at the centre of the Site extending to 8.00 mbgl without reaching the underlying limestone bedrock, indicating the GSI vulnerability categorisation 'Low' is correct (refer to Section 9.3.7).

9.3.5.1 Soil Quality

During the 2019 and 2020 site investigations, samples were recovered from the on-site trial pit and borehole locations and sent for analysis. In order to assess materials, which may be excavated and removed from Site, in terms of waste classification, a selection of samples collected were analysed for a suite of parameters which allows for the assessment of the soils in terms of total pollutant content for classification of materials as hazardous or non-hazardous referred to as the 'RILTA Suite'. The parameter list for the RILTA suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen. The total pollutant content analysis also provides analytical data which can be used to assess the quality of the subsoils underlying the Site and allow an assessment of their suitability for a range of proposed uses against generic assessment criteria.

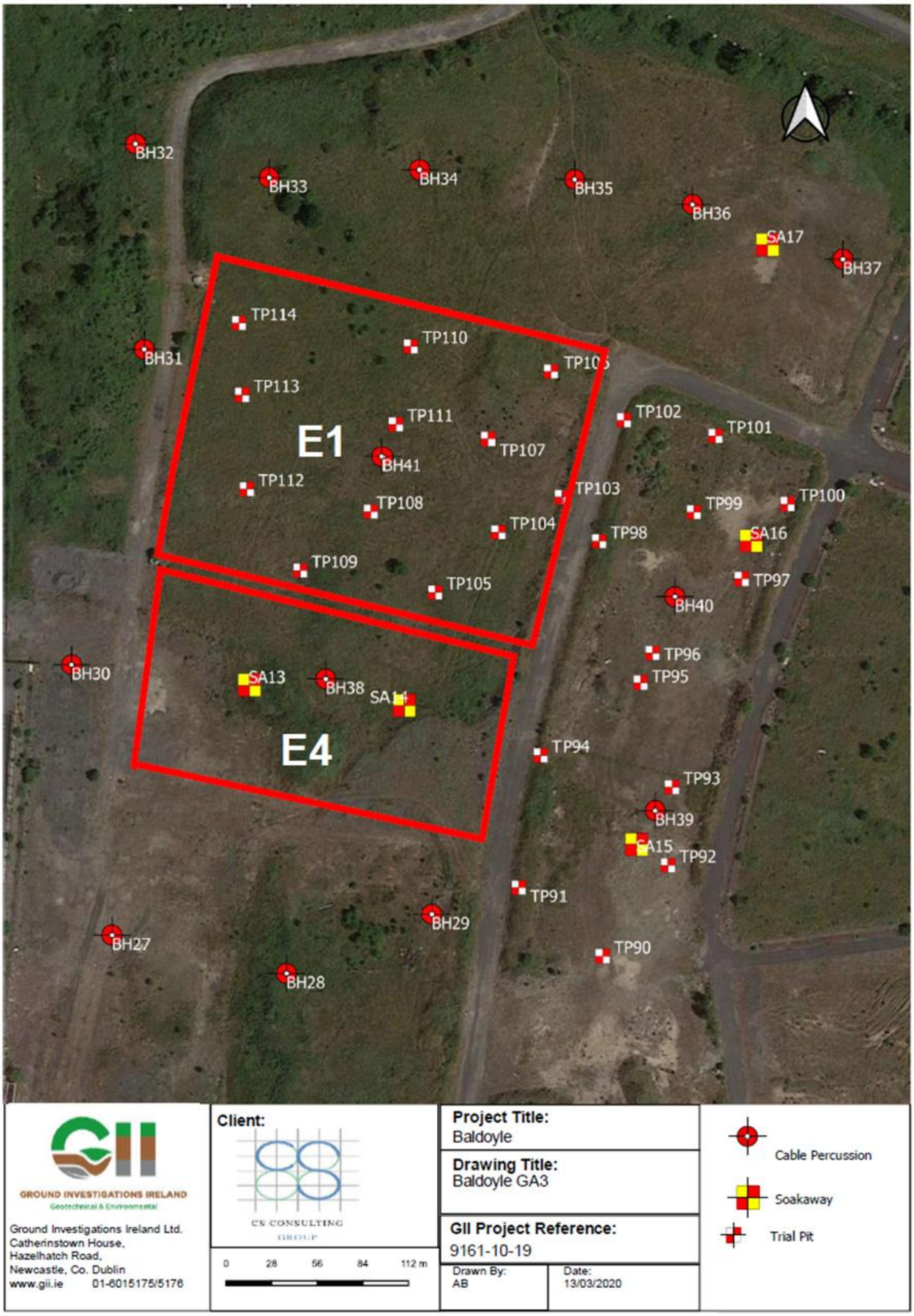
The RILTA Suite also includes those parameters specified in the EU Council Decision Establishing Criteria for the Acceptance of Waste at Landfills (Council Decision 2003/33/EC), referred to as Waste Acceptance Criteria (WAC), which for the solid samples are pH; total organic carbon (TOC); speciated aliphatic and aromatic petroleum hydrocarbons; benzene, toluene, ethylbenzene and xylene (BTEX); phenol; polychlorinated biphenyls (PCB); and polycyclic aromatic hydrocarbons (PAH).

In line with the requirement of Council Decision 2003/33/EC, leachate was generated from the solid samples, which was in turn analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS). The suite was selected due to the unknown origin of the material underlying the Site and no evidence of specific contaminants of concern highlighted in the Site history. The laboratory testing was competed by Element Materials Technology (EMT) in the UK; EMT is a UKAS accredited laboratory. The full laboratory reports are included in Appendix 9.3 in Volume 3. The Site investigation locations are shown in Figures 9.4.

The laboratory analysis did not identify any asbestos containing materials (ACMs) in any of the samples tested.

All of the samples collected at the Site (Figure 9.4 below) can be categorised as inert (as per Council Decision annex 2003/33/EC). Soil comparison WAC category tables can be viewed in Appendix A9.3. There was no evidence of waste deposited on-site during Site investigation works. It has been identified in GII Site Investigation report that some fill material around location TP-65 (refer to Figure 9.4 below) exceeds the S4ULs for future residential use. Please see Chapter 18 (Material Assets – Waste) for further discussion on waste categorisation and removal.

Figure 9.4: Site Investigation Map – Bocks E1 and E4 outline included for refrence[18]



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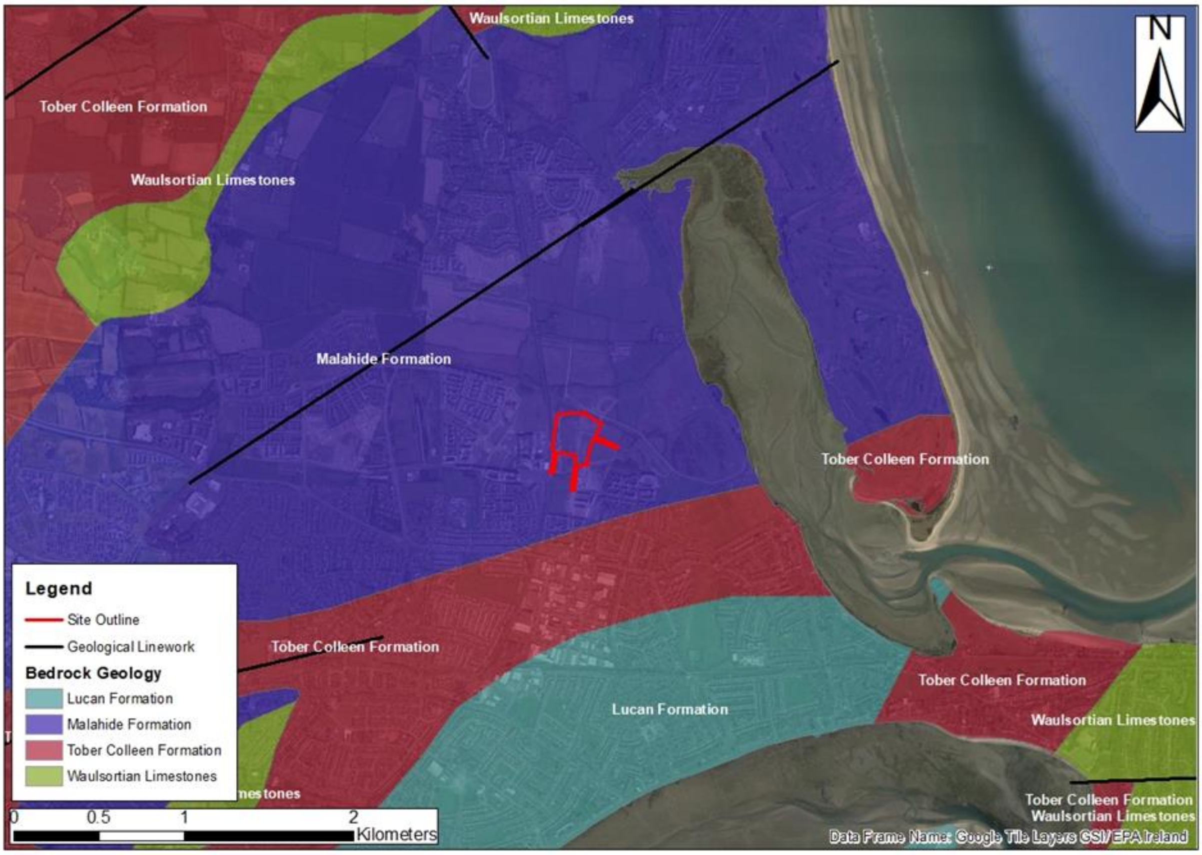
[18] GII (2021).

9.3.6 Geology

Reference to the GSI Bedrock Geology Map indicates that the Site is underlain by Lower Carboniferous (Courceyan Stage) Limestones which is referred to as Malahide Formation (Rock Unit code: CDMALH). This geological formation comprises argillaceous bioclastic limestone and shale. The Bedrock Geology Map is shown in Figure 9.5, below.

Figure 9.5: Regional Bedrock Geology Map[19]



9.3.7 Hydrogeology

The GSI classifies the principal aquifer types as:

Bedrock Aquifer

- Lk - Locally Important Aquifer - Karstified.
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive. Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones.

[19] GSI (2021).

- Pu - Poor Aquifer - Bedrock which is Generally Unproductive.
- Rkd - Regionally Important Aquifer (karstified diffuse).

Gravel Aquifer

- Lg - Locally Important Aquifer - Sand & Gravel.
- Rg - Regionally Important Aquifer - Sand & Gravel.

Reference to the *GSI National Draft Bedrock Aquifer Map* for the Site (refer to Figure 9.6, below) indicates that the Site is underlain by a Locally Important Bedrock Aquifer (LI), which is described by the GSI as bedrock as being *"moderately productive only in local zones".*

Figure 9.6: Regional Aquifer Map[20]

9.3.7.1 Aquifer Vulnerability

'Aquifer 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. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures / fractures, the main feature that

[20] GSI (2021).

protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of or of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI[21] presently classifies the aquifer vulnerability in the region of the Site as 'Low' (L) which indicates that an overburden depth of c. 10 m of low permeability soil is present. This was confirmed in 2019 and 2020 investigations undertaken by GII.

Figure 9.7: Aquifer Vulnerability Map[22]

9.3.7.2 Description of the Groundwater Body

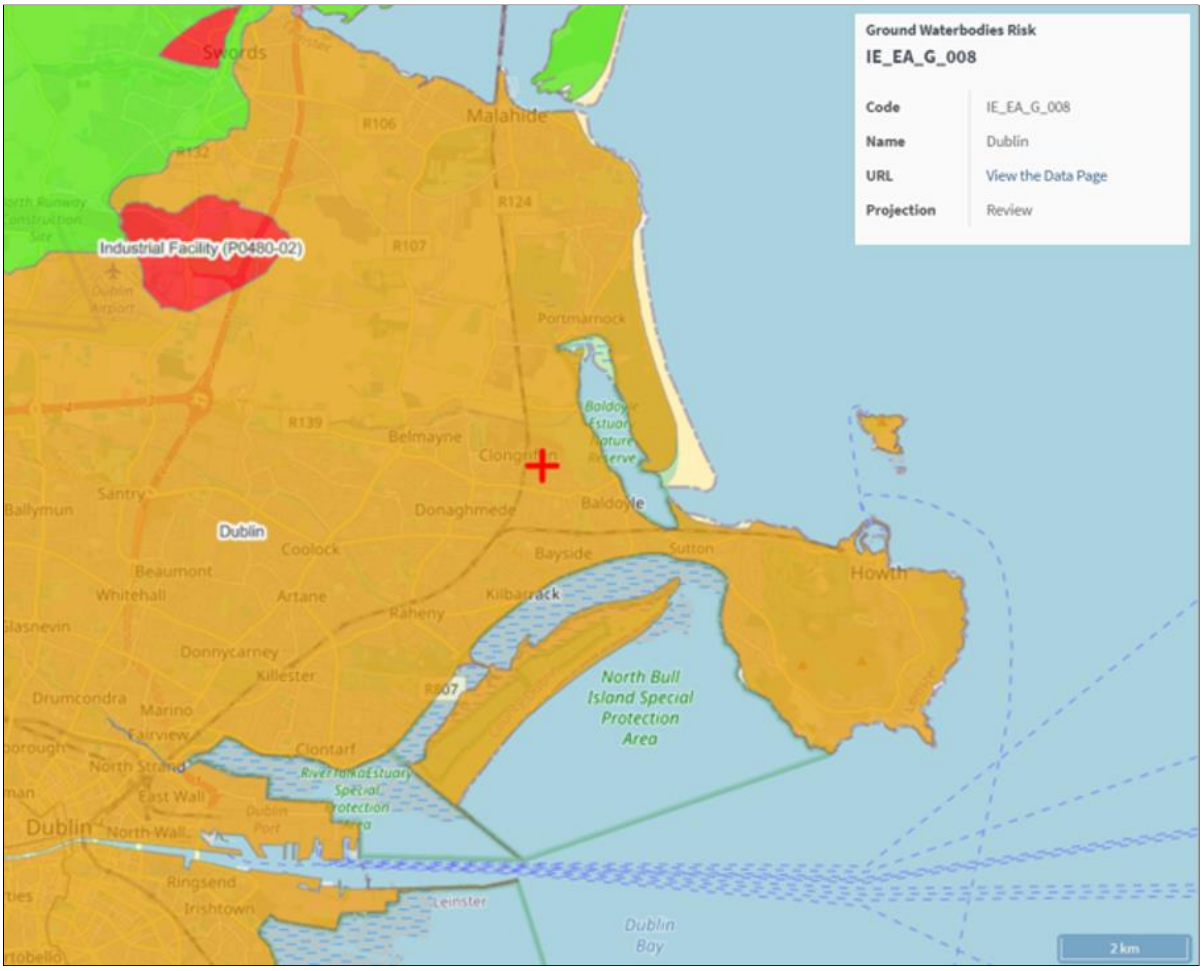
The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in waterbodies that are of lesser status at present, and retaining 'Good Status' or better where such status exists at present. 'Good Status' was to be achieved in all waters by 2015, as well as maintaining 'high status' where the status already exists. The EPA co-ordinates the

[21] GSI (2021).
[22] GSI (2021).

activities of the Eastern River Basin Districts (ERBDs), local authorities and State agencies in implementing the WFD, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland (ROI).

Presently, the groundwater body in the region of the site (Dublin GWB) is classified under review as per the WFD Risk Score system[23]. The Dublin GWB achieved 'Good Status' in the period 2013 – 2018.

Figure 9.8: Groundwater Body Map[24]



9.3.7.3 Groundwater Wells and Flow Direction

There is no licencing system for wells in Ireland at present and, as such, no complete data set. The GSI[25] Well Card Index is a record of wells drilled in Ireland, kept by the GSI. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in ROI. This

[23] EPA (2021).
[24] EPA (2021).
[25] Geological Survey of Ireland

current index, however, indicates there are no groundwater wells, boreholes or dug wells within the Site boundary. In the immediate vicinity of the Site, specifically in the south-west side, there is one borehole recorded in the GSI Well Card within 2 km of the Site, drilled in 1988. It had a good yield (196 m^3/d) and a depth of 57 mbgl.

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 discontinuous gravel lenses, 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). Bedrock was not proven during the Site investigation, so no accurate groundwater gradient can be derived. However, based on the Site's proximity to the coast, regional groundwater flow will be east towards the Malahide Estuary. Slow seepage of perched groundwater was recorded in some of the excavated soak away and trial pits, namely SA13 (0.7 mbgl) and TP111 (1.9 mbgl). Standing water levels (SWLs) were recorded in five overburden borehole locations (BH37, BH38, BH39, BH40 and BH41) indicating a non-continuous perched water table throughout the Site (bedrock was not proven during the site investigations).

The nearest drinking water protection area is located 22 km west of the Site in Co. Meath at the Dunboyne public water supply.

Figure 9.9: Regional Groundwater Wells[26]

9.3.7.4 Hydrogeological Features

There is no evidence of karstification at the vicinity of the Site according to the GSI Karst and well database. There is one spring (Saint Doolagh's) located 2.8 km north-west of the Site. The lithology of the spring is Limestone, clean (>=90% CaCO3) and unbedded.

9.3.7.5 Areas of Conservation

The closest Natura 2000 site is Baldoyle Bay Special Area of Conservation (SAC), which is 400 m from the proposed Project. The nearest Special Protection Area (SPA) to the Site of the proposed Project is the Baldoyle Bay SPA which is located 700 m from the Site. There are no designated Natural Heritage Areas (NHA) within a 15 km radius, however the nearest proposed NHA (Baldoyle Bay) is 400 m from the Site.

According to the NPWS (2021) online database, the following area of conservations are located closest to the Site:

[26] GSI (2021).

- Baldoyle Bay SAC (Site Code 000199) – c. 400 m east of the Site. (Both the bay itself and saltwater marshland which extends over part of the lands of the former Baldoyle Racecourse).
- Baldoyle Bay SPA (Site Code 004016) – c. 700 m east of the Site.
- Baldoyle Bay pNHA – c. 400 m east of the Site.

9.3.7.6 Conceptual Site Model

A local cross section of the Site is presented below in Figure 9.10 (A-A' south-west to south-east) and a regional cross section is presented in Figure 9.11 (B-B' west to east). These cross sections and the description below present the Conceptual Site Model (CSM). The CSM was developed in order to identify any likely Source-Pathway-Receptor linkages relating to the site and the proposed development.

- The Site is mostly flat at 6 m AOD. The regional gradient falls from west to east towards the coast.
- No bedrock was encountered during the on-site investigations undertaken by GII in 2020. Bedrock is > 8.0 mbgl and comprises strong, medium to thinly bedded, grey, fine-grained limestone as per the GSI mapping. The limestone is classified by the GSI as a Locally Important Bedrock Aquifer (LI), which is described as 'moderately productive only in local zones'.
- The bedrock aquifer is well protected by low permeability clay and characterised by the GSI as a low vulnerability area.
- Groundwater flow within the bedrock unit is eastward in line with the regional gradient. There is no continuous perched groundwater table on-site.
- The groundwater body in the region of the site (Dublin GWB) is classified under the WFD Risk Score system[27] as currently 'Under Review'. Previously (2013-2018) the Dublin GWB was given 'Good Status'.
- The Site drainage comprises internal drainage ditches which discharge to the Mayne River located north of the Site, which then discharges into Baldoyle Bay SAC, c. 400 m from the Site via the drainage pathway.

[27] EPA (2021).

- All of the samples collected at the Site (Figure 9.4) can be categorised as inert (as per Council Decision annex 2003/33/EC). Soil comparison WAC category tables can be viewed in Appendix 9.3. There was no evidence of waste deposited on-site during Site investigation works.
- The proposed Project is outside of any delineated drinking water protection area. There are a number of domestic / agricultural wells in the surrounding lands.
- There are no groundwater dependent terrestrial ecosystems which have potential to be impacted by the proposed Project. The Baldoyle SAC does include an area of saltwater marsh to the east of the Site (c. 400 m). This is addressed in Chapter 10 (Hydrology) and Chapter 8 (Biodiversity).

Figure 9.10: Local Cross Section A-A

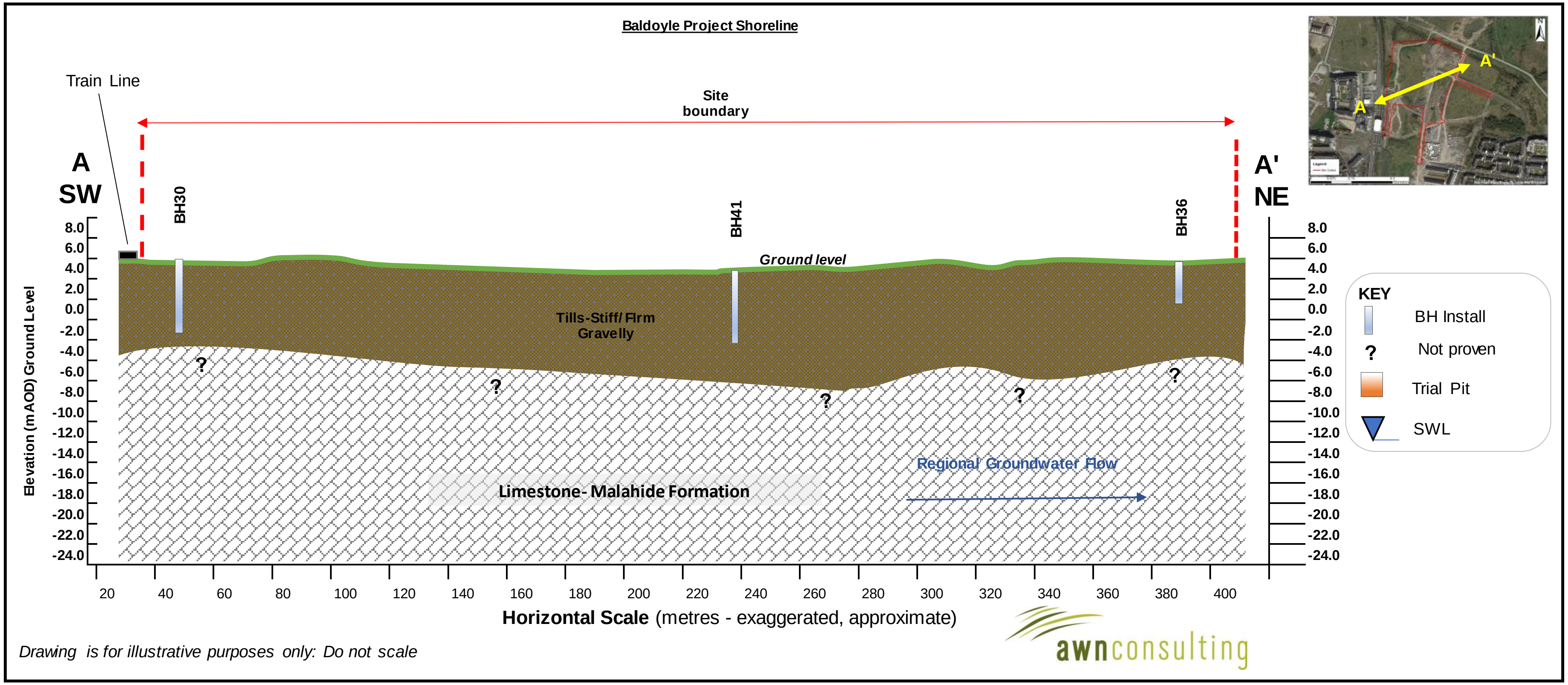
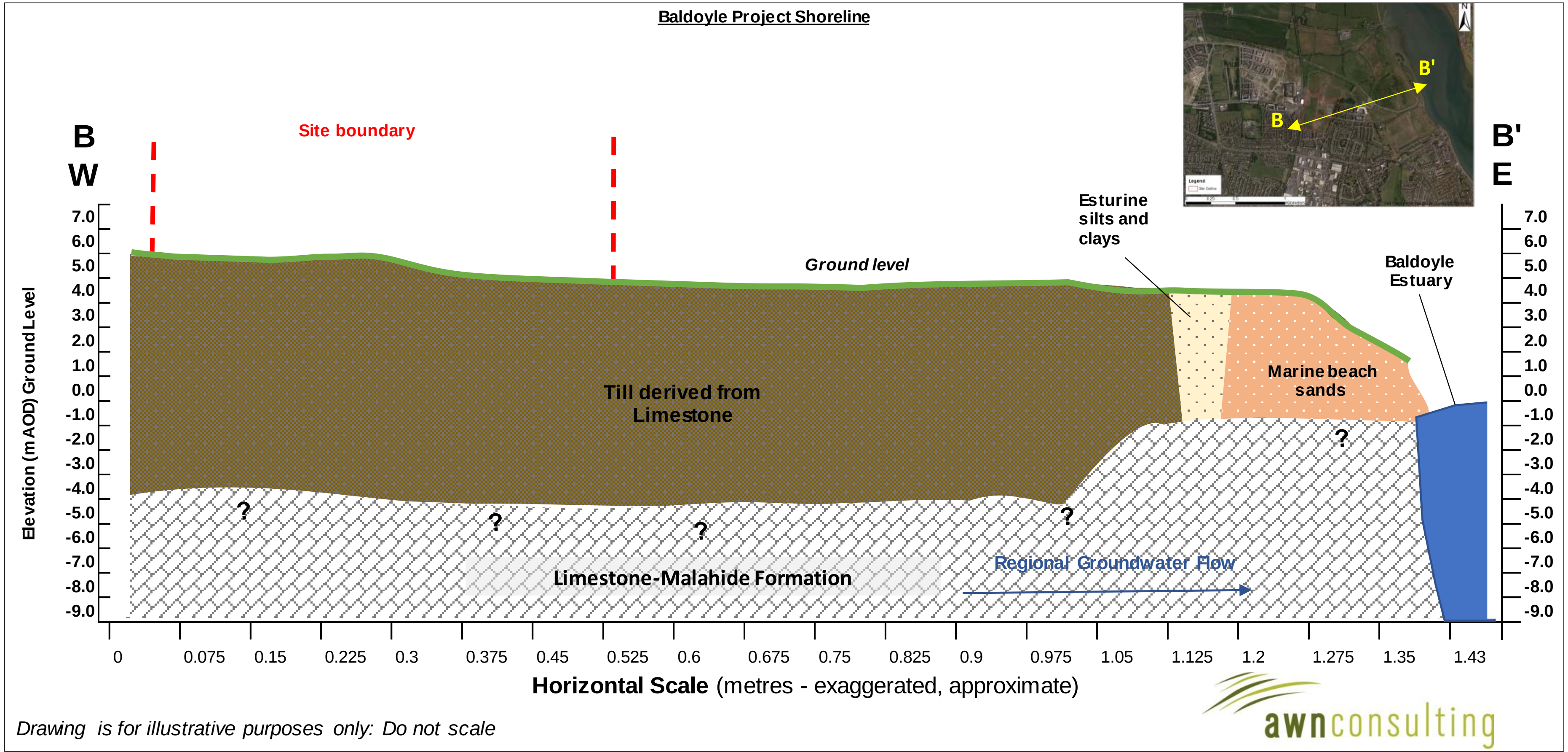


Figure 9.11: Regional Cross Section A-A



9.3.7.7 Rating of Site Importance of the Geological and Hydrogeological Features

Based on the NRA criteria[28] for rating site importance of geological features (refer to Appendix 9.4), the importance of the bedrock and soil features at this Site may be rated as 'Medium' importance with medium significance or value at the local scale, due to the presence of moderately drained and or / moderate fertility soils.

Based on the NRA / IGI criteria for rating the importance of hydrogeological features (refer to Appendix 9.4), the importance of the hydrogeological features at this Site may be rated as 'Medium'. This is based on the assessment that the low vulnerability aquifer beneath the Site is a Locally Important (Ll) bedrock aquifer which is moderately productive.

9.3.8 Economic Geology

The EPA Extractive Industry Register and the GSI mineral database were consulted to determine whether there were / are any mineral sites close to the Site. The Huntstown Quarry is 11.5 km to the west of the Site of the proposed Project. One mineral site was identified in Portmarnock, c. 2.6 km to the north. The site is described as an old brick works that supplied good class red bricks to Dublin.

9.3.9 Radon

According to the EPA (now incorporating the Radiological Protection Institute of Ireland), the Site location is an area (10 km grid) where between 1 – 5% of the homes are estimated to be above reference level. This would be considered a 'Low' Radon area as per the EPA online mapping tool.

9.3.10 Geohazards

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating the slope failure. Instability is often significantly increased by human activities, e.g. construction, agricultural activities, etc. Mass movements / mass wasting (such as landslides, mud flows, bog bursts and debris flows) are a result. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock; and where the sea constantly erodes the material at the base of a cliff, landslides and falls lead to recession of the cliffs. Landslides have also

[28] NRA (2009).

occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The GSI landslide database was consulted and there are no recorded landslides in the vicinity of the proposed Project. Due to the local topography and the underlying strata, there is a negligible risk of a landslide event occurring at the Site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. However, currently there are five permanent broadband seismic recording stations in Ireland, operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the Site of the proposed Project was in the Irish Sea (1.0 – 2.0 Ml magnitude) and ~55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity at the Site.

There are no active volcanoes in Ireland so there is no risk from volcanic activity.

9.3.11 Summary & Type of Geological / Hydrological Environment

Based on the regional and site-specific information available the type of geological / hydrogeological environment at the Site, as per the IGI Guidelines, is:

Type B - Naturally Dynamic Hydrogeological Environment

- Historically the Site of the proposed Project is greenfield in nature, although it has been stripped and recolonised in places in recent years. There is no evidence of any historical waste disposal or source of contamination. However, there is a presence of pyrite within the hardcore underlying the existing roadways.
- The Site is underlain by a locally important aquifer.
- The Site is underlain by the Malahide Formation argillaceous bioclastic limestone and shales.

9.4 Potential Impacts of the Proposed Project

The activities associated with the proposed Project which are relevant to the land, soils, geology and hydrogeological environment are detailed in Table 9.2.

Table 9.2: Site Activities Summary

	Activity	Description
Construction	Earthworks: Excavation of Superficial Deposits	Cut and fill will be required to facilitate construction of the proposed Project facility and associated ancillary services. It will also be necessary at this stage to remove pyrite-containing fill material from below existing roads. It is envisaged that the excavated material containing pyrite will be re-used during the works for haul road maintenance, temporary construction roads and site operative walkways, with this material being removed off-Site for appropriate disposal towards the end of the construction phase. Excess material which cannot be re-used on-Site will be disposed off-Site at a suitably licensed facility in accordance with the Construction and Demolition Waste Management Plan (C&D WMP) (Appendix 18.1). The maximum depth of excavation required is c. 3.5 m below ground level. There will be no excavation of bedrock required; therefore, no dewatering required. Subsoil stripping and localised stockpiling of soil will be required during construction. It is estimated that approximately 31,966.6 m^3 of soils will be excavated to facilitate construction of the proposed Project. It is anticipated that all of this excavated material will be suitable for reuse on-site, with the exception of the unclassified pyrite-containing fill material discussed above. Material to be reused on-site will be used for site levelling, roads, car parking areas, berms and other landscaping purposes.
	Storage of hazardous Material	Bunded fuel storage and wet concrete during construction phase. Good housekeeping and proper handling, storage and disposal of any potentially polluting substances will prevent soil and / or water contamination. Designated and bunded storage areas will be maintained.
	Import / Export of Materials	Suitable excavated material will be reused for site levelling, roads, car parking areas, berms and other landscaping purposes. Material removed from site may be re-used off-site for beneficial use on other sites with appropriate planning / waste permissions / derogations (e.g. in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011) as amended, or will be reused, recovered and / or disposed off-site at appropriately authorised waste facilities.

	Activity	Description
		It is estimated that a total volume of 64,117.6 m^3 of clean fill material will be imported to site to facilitate the build. As detailed above, the majority of the excavated unclassified pyrite-containing fill material will ultimately be exported off-Site for appropriate disposal. With the exception of this material, it is envisaged that the remainder of the soil excavated on-Site will be reused on-Site for site levelling, roads, car parking areas, berms and other landscaping purposes. The removal of waste from the Site will be carried out in accordance with *Waste Regulations, Regional Waste Plan (Eastern Midland Region) and Waste Hierarchy/Circular Economy Principals.* Refer to Chapter 18 (Material Assets - Waste) for further detail. It has been identified in GII Site Investigation report that some fill material around location TP-65 (refer to Figure 9.4 above) exceeds the S4ULs for future residential use. This shall be removed during Site preparation. All other suitable material excavated as part of the proposed Project works will be reused onsite.
Operation	Increase in hard standing area	Altering of local recharge (percolation to ground) due to increase in hard standing area of c. 53,526 m^2
	Storage of hazardous Material	Oil and fuel leaks from parked cars, service vehicles, HGV deliveries, etc.

As outlined in Table 9.2, the activities required for the construction phase of the proposed Project represents the greatest risk of potential impact on the geological environment. These activities primarily pertain to the Site preparation, excavation, levelling and infilling activities required to facilitate construction of proposed Project and ancillary services.

The potential geological and hydrogeological impacts during the construction and operational phases are presented below. Remediation and mitigation measures included in the design of the proposed Project to address these potential impacts are presented in Section 9.5.

9.4.1 Construction Phase

In the absence of mitigation, the following potential effects to land, soil and groundwater (hydrogeology) have been considered:

- Excavated and stripped soil can be disturbed and eroded by Site vehicles during the construction phase. Rainfall and wind can also impact on non-vegetated / uncovered areas within the excavation or where soil is stockpiled. This can lead to run-off with high suspended solid content, which can impact on waterbodies. The potential risk from this indirect impact to waterbodies and / or habitats from contaminated water would depend on the magnitude and duration of any water quality impact.
- Following the findings of the on-site investigations, the risk of a large number of contaminated soils being present on-site is low. Nonetheless, material that is exported from Site, if not correctly managed or handled, could impact negatively on human beings (on-Site and off-Site), as well as water and soil environments.
- As with all construction projects, there is potential for water (rainfall and / or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer (receptor) via the unsaturated zone (subsurface pathway). The potential main contaminants (sources) include:
    - Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
    - Cement / concrete (increase turbidity and pH) – arising from construction materials;
    - Hydrocarbons (ecotoxic) – accidental spillages from construction plant or on-Site storage; and
    - Wastewater (nutrient and microbial rich) – arising from poor on-Site toilets and washrooms.

There will be emissions to ground following attenuation from the sustainable drainage systems (SUDs) / attenuation pond to the north. All water from the proposed Project will discharge to this wetland before discharging to the Mayne River floodplain over a spillway / weir. The wetland / SUDs pond will serve as the final water quality treatment for the proposed Project of GA3, plus GA1 and GA2. Assuming implementation of the mitigation measures highlighted below (Section 9.5) and considering the low vulnerability of the underlying bedrock aquifer, there will be ***no impact*** to the Locally Important bedrock aquifer.

9.4.1.1 Loss of Agricultural Land

The Site of the proposed Project is zoned for residential development and is not being used for agricultural purposes. There will be no local loss of agricultural soil, and no impact to mineral resources in the area as a result of the proposed Project.

9.4.2 Operational Phase

In the absence of mitigation, the following risks have been considered in relation to the operational phase of the proposed Project:

- There is a potential for leaks and spillages from vehicles along roads and in parking areas (source). Any accidental emissions of oil, petrol or diesel could cause soil / groundwater contamination (receptor) if the emissions are unmitigated.

Groundwater abstraction does not form part of the proposed Project. There will be ***no impact*** on local or regional groundwater resources (abstraction) as a result of the proposed Project.

9.5 Mitigation Measures

This section describes a range of mitigation measures designed to avoid or reduce any potential adverse geological and hydrogeological impacts identified.

9.5.1 Construction Phase

In order to reduce impacts on the soils and geology environment, a number of mitigation measures will be adopted as part of the construction works on-Site. The measures will address the main activities of potential impact, which include:

- Control of soil excavation and export from Site;
- Sources of fill and aggregates for the proposed Project;
- Fuel and chemical handling, transport and storage; and
- Control of water during the construction phase.

9.5.1.1 Construction Management Plan (CMP)

An Outline Construction Management Plan (CMP) has been prepared[29] for the proposed Project and is included (under separate cover) with this planning application. It is proposed that the CMP will be finalised and maintained by the appointed Contractors during the construction phase of the proposed Project to minimise the impact of all aspects of the construction works on the local environment. The final CMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction.

9.5.1.2 Control of Soil Excavation

Subsoil will be excavated to facilitate the construction of foundations, access roads, car parking areas, expansion of drainage connections and other ancillary works. The proposed Project will incorporate the 'reduce, reuse and recycle' approach in terms of soil excavations on-Site. The construction will be carefully planned to ensure only material required to be excavated will be, with as much material left in situ as possible. Excavation arisings will be reused on-site where possible.

It is unlikely that any contaminated material will be encountered during the construction phase of the proposed Project except for the hardcore containing pyrite which is present under the existing roadways, and which will be removed from the Site towards the end of the construction phase. Nonetheless, any excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean / inert soil. In the unlikely event that any potentially contaminated soils are encountered, they should be tested and classified as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous publication, HazWasteOnline* tool or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with EC Decision 2003/33/EC. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of an

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[29] CS Consulting Engineers (2021).

appropriate earthworks handling protocol during the construction phase. It is anticipated that any stockpiles will be formed within the boundary of the Site and there will be no direct link or pathway from this area to any surface waterbody.

Dust suppression measures (e.g., damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads. Refer to the Dust Management Plan in Appendix 11.3, which shall be implemented in full during the proposed works.

9.5.1.3 Export of Material from Site

Suitable excavated material will be reused on-site, where possible, for site levelling, roads, car parking areas and other landscaping purposes. There will be waste materials generated from the excavation of soil and stones to facilitate site clearance, construction of new building foundations and installation of services. The volume of material to be excavated has been estimated by the project engineers at c. 31,966.6 m^3. It is envisaged that 21,870.0 m^3 of the excavated material will be required to be removed from site. It will also be necessary at this stage to remove pyrite-containing fill material from below existing roads. It is envisaged that the excavated material containing pyrite will be re-used during the works for haul road maintenance, temporary construction roads and site operative walkways, with this material being removed off-Site for appropriate disposal towards the end of the construction phase. It has been identified in GII Site Investigation report that some fill material around location TP-65 (refer to Figure 9.4) exceeds the S4ULs for future residential use. This shall be removed during Site preparation. All other suitable material excavated as part of the proposed Project works will be reused onsite. When material is to be removed off-site it will be taken for off-site reuse, recovery and / or disposal. Where material cannot be reused off-site it will be sent for recovery or disposal at an appropriately authorised facility. Refer to Chapter 18 (Material Assets – Waste) for further detail.

If any waste soil requires removal from the Site, it should be classified by an experienced and qualified environmental professional to ensure that the waste soil is correctly classified for transportation and recovery / disposal off-site. Refer to Chapter 18 (Material Assets - Waste) for further detail.

9.5.1.4 Sources of Fill and Aggregates

All fill and aggregate for the proposed Project will be sourced from reputable suppliers. All suppliers will be vetted for:

- Aggregate compliance certificates / declarations of conformity for the classes of material specified for the proposed Project;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

It is anticipated that approximately 64,117.6 m^3 of engineered fill will be required to facilitate construction. There will be no impact to mineral resources in the area as a result of the proposed Project.

9.5.1.5 Fuel and Chemical Handling

The following mitigation measures will take place at the Construction Phase in order to prevent any spillages to ground of fuels and prevent any resulting soil and / or groundwater quality impacts:

- Designation of bunded refuelling areas on the Site;
- Provision of spill kit facilities across the Site;
- Where mobile fuel bowsers are used, the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers to carry a spill kit;
  - Operatives must have spill response training; and
  - Drip trays shall be used on any required mobile fuel units.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;

- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they will be secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

The aforementioned list of measures is non-exhaustive and will be included in the final CMP.

9.5.1.6 Control of Water during Construction

Run-off from excavations / earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management will ensure that there will be minimal inflow of shallow / perched groundwater into any excavation. Due to the very low permeability of the overburden and the relative shallow nature for foundation excavations, infiltration to the underlying aquifer is not anticipated.

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site, which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses / drainage ditches.

Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on-Site will include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks / ponds) and hydrocarbon interceptors. Active treatment systems such as siltbusters or similar may be required, depending on turbidity levels and discharge limits.

9.5.2 Operational Phase

During the operational phase of the proposed Project, there is limited potential for Site activities to impact on the geological and hydrogeological environment of the area. There will be no impact on local or regional groundwater resources (abstraction) as a result of the proposed Project.

9.5.2.1 Increase in Hard Standing

A proportion of the development area will be covered in hardstanding (c. 53,526 m²). This will provide protection to the underlying aquifer but will also reduce local recharge in this area of the aquifer. As the area of aquifer is large, this reduction in local recharge will have ***no significant impact*** on the natural hydrogeological regime.

9.6 Residual Impacts

This section describes the residual impact of the proposed Project following the implementation of the mitigation measures contained in this EIAR.

9.6.1 Construction Phase

The implementation of mitigation measures outlined in Section 9.5.1 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be ***short-term, imperceptible***, and ***neutral***. Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

9.6.2 Operational Phase

During the operational phase of the proposed Project, there is limited potential for site activities to impact on the geological and hydrogeological environment of the area. There will be ***no impact*** on local or regional groundwater resources (abstraction) as a result of the proposed Project.

The residual impact during the operational phase will be ***long-term, imperceptible*** and ***neutral***. Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

9.7 Monitoring

Regular inspection of surface water run-off and any sediment control measures (e.g. silt traps) will be carried out during the construction phase. Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc.

No future soil or groundwater monitoring is proposed as part of the proposed Project. Petrol interceptors will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

9.8 Reinstatement

Any reinstatement from the construction activities on-site (excavations associated with ancillary / preparation works) will adhere to the design and architectural specifications presented in this application. All fill material to be used will be graded to Project Engineers' specifications.

9.9 Interactions

Please refer to Chapter 20 (Interactions) for a summary of the interactions between environmental topics that have been addressed in this EIAR.

9.9.1 Hydrology

As previously stated, there is an inter-relationship between hydrology and soils, geology and hydrogeology. The underlying aquifer is a locally important source in the surrounding catchment areas. There will be no potential cumulative impacts on the bedrock as the aquifer vulnerability is 'Low' and the aquifer is locally important with little importance regionally.

Surface water run-off may have the limited potential to enter soil and groundwater. Implementation of appropriate mitigation measures as outlined in Chapter 10 (Hydrology) will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

9.9.2 Material Assets – Waste

It has been identified in GII Site Investigation report that some fill material around location TP-65 (refer to Figure 9.4) exceeds the S4ULs for future residential use. This shall be removed during Site preparation. All other suitable material excavated as part of the proposed Project works will be reused onsite.

9.10 Cumulative Impacts

The anticipated cumulative effects of the proposed Project in combination with existing, permitted and proposed plans and projects, as listed in Chapter 21 (Cumulative Impacts) are addressed below.

In relation to the potential cumulative impact on the geological or hydrogeological environment during the construction phases, those key engineering works which would have additional impacts above are as follows:

- There will be an increase in hardstanding as the Site. Capping of significant areas of the sites by hardstand / buildings following construction and installation of drainage will minimise the potential for contamination of groundwater as current;
- Run-off containing large amounts of silt could cause damage to surface water systems and receiving watercourses. Run-off for the proposed Project will therefore need to be managed using the methods described for in Chapter 10 (Hydrology); and
- Contamination of soils and groundwater underlying the Site from accidental spillage and leakage from construction traffic and construction materials may occur unless project-specific Construction Management Plans (CMPs) are put in place and complied with. The project-specific CMP will be put in place for the proposed Project.

In relation to the potential cumulative impacts from the operational phase, the following would apply:

- Overall increase in hardstanding: Cumulatively this development and others in the area will result in localised reduced recharge to ground and increase in surface run-off. The aquifer underlying the Site is a locally important aquifer (Li). Based on site specific and regional geological investigations there is c. >10 m of overburden overlying the bedrock aquifer, classifying it as 'Low' vulnerability (GSI classification). As such, the cumulative impact is considered to be ***imperceptible***. The reduction in recharge rate to ground will be mitigated somewhat by the release of water (following treatment) from the SUDs / attenuation pond.
- Accidental releases from fuel storage / unloading could contaminate groundwater or soil environments unless mitigated adequately, i.e. bunded tanks and delivery areas. Localised accidental discharge of hydrocarbons could occur in car parking areas and

along roads unless diverted to surface water drainage system with petrol interceptors. However, all developments are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislation (primarily the Water Framework Directive 2000/60/EC) such that they would be required to manage run-off and fuel leakages.

- There will be a small loss of greenfield area locally as part of the proposed Project.

The residual cumulative effect on land, soils, geology and hydrogeology for the construction and operational phases are anticipated to be ***long-term, neutral*** in terms of quality and of ***imperceptible*** significance, once the appropriate mitigation measures are put in place for each development.

9.11 'Do-Nothing' Impact

The Do-Nothing scenario refers to the environment as it would be in the future should the proposed Project not be carried out. Should the proposed Project not proceed the lands are zoned for residential development so would likely have some form of development at some stage in the future, the impacts of which cannot be assessed. There is also the possibility that no development would be progressed at the Site in this scenario, in which case there would be no impacts on the geological and / or hydrogeological environment at the Site.

9.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in compiling this chapter of the EIAR.

9.13 References

- Chartered Institute of Environmental Health (CIEH) (2015). *The LQM/CIEH S4UIs for Human Health Risk Assessment*.
- Construction Industry Research and Information Association (CIRIA) (2011). *Environmental Good Practice on site; Construction Industry Research and Information Association Publication C692 (3rd Edition - an update of C650 (2005)* (I. Audus, P. Charles and S. Evans).
- Construction Industry Research and Information Association (CIRIA) (2012). *Environmental Good Practic*e on site – pocket book; Construction Industry Research and Information Association publication C715 (P. Charles, and G. Wadams).

- CS Consulting Group (2020) Engineering Services Report Strategic Housing Development Stapolin Growth Area, Baldoyle Co. Dublin. November 2020
- Environmental Protection Agency (EPA) (2003). *EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.*
- Environmental Protection Agency (EPA) (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*
- Environmental Protection Agency (EPA) (2002). *EPA Guidelines on the information to be contained in Environmental Impact Statements.*
- Environmental Protection Agency (EPA) (2007). *Code of Practice – Environmental Risk Assessment for Unregulated Waste Disposal Sites*.
- Environmental Protection Agency (EPA) (2021). EPA Online Mapping tool Available on-line at: https://gis.epa.ie/EPAMaps/ [accessed on 30 September 2020].
- Ground Investigations Ireland (GII) (2020). *Baldoyle GA3 Block E1 & E4 Ground Investigation Report.* March 2020.
- Geological Survey of Ireland (GSI) (2021). online shapefile content, Available on-line at: https://data.gov.ie/organization/geological-survey-of-ireland [accessed 30 September 2020].
- Institute of Geologists of Ireland (IGI) (2002). *Geology in Environmental Impact Statements, a Guide.*
- Institute of Geologists of Ireland (IGI) (2013). *Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements.*
- National Roads Authority (NRA) (2009). *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.

10 Hydrology

10.1 Introduction

This chapter of the EIAR has been prepared by AWN Consulting Ltd. and assesses and evaluates the potential impacts on the surrounding hydrological environment associated with the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13.

In assessing likely potential and predicted impacts, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

This chapter was prepared by Paul Conaghan, an Environmental Consultant with AWN Consulting Ltd. Paul has over 9 years' experience in environmental consulting and engineering. He is a specialist in geo-environmental, hydrogeological assessment and contaminated land investigation. Paul is a member of the International Association of Hydrogeologists (Irish Chapter).

A full description of the proposed Project can be found in Chapter 5 (Description of the Proposed Project). The characteristics of the proposed Project that are relevant in terms of hydrology are summarised below.

10.2 Methodology

The methodology used in this assessment follows current European and Irish guidance as outlined in:

- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*
- EPA (2015). *Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.*
- National Roads Authority (NRA) (2009). *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.*

The rating of potential environmental impacts on the hydrological environment is based on the quality, significance, duration and type of impact characteristic identified. Consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute. The Draft EIAR Guidelines (2017) tables are presented in Appendix 10.1 and in Section 1.6 of Chapter 1 (Introduction). The NRA criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment and are presented in Appendix 10.1.

10.2.1 Sources of Information

This assessment was considered in the context of the available baseline information, potential impacts, consultations with statutory bodies and other parties, and other available relevant information. In collating this information, the following sources of information and references were consulted:

- Latest EPA Maps & Envision water quality monitoring data for watercourses in the area (these data can be accessed at https://gis.epa.ie/EPAMaps/ and www.catchments.ie
- *National River Basin Management Plan 2018 – 2021.*
- Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) (2009). *The Planning System and Flood Risk Management, Guidelines for Planning Authorities.*
- Office of Public Works (OPW). *Flood mapping data*, accessed at www.floodmaps.ie
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports.
- Eastern Regional Fisheries Board. *Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites*.
- Dublin City Council (2005). *Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies.*
- *Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0* (Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire- Rathdown County Council & Dublin City Council).
- Construction Industry Research and Information Association (CIRIA) (2001). *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532).*

Other relevant documentation consulted as part of this assessment included the following:

- JBA Consulting (2021). *Flood Risk Assessment Final Report*. February 2021.
- Cronin & Sutton Consulting Engineers (CS) (2021). *Engineering Services Report.*

10.3 Baseline Environment

The proposed Project is located within the previously defined Eastern River Basin District (ERBD), now the Ireland River Basin District, in Hydrometric Area No. 09 of the Irish River Network. It is within the River Liffey catchment and mayne Sub-catchment (Mayne_SC_010). The River Liffey catchment encompasses an area of approximately 1,369 km^2. The River Liffey extends from the mountains of Kippure and Tonduff in County Wicklow to the sea at Dublin Bay. The main channel covers a distance of c. 120 km west to east. The Snugborough Stream lies 650 m to the east and the Mayne River lies 550 m to the north (EPA designations). The Snugborough rises to the south and is culverted between Seagrange Park and the Red Arches Road.

According to the NPWS (2021) online database, the following area of conservations are located closest to the Site:

- Baldoyle Bay Special Area of Conservation (SAC) (Site Code 000199) – c. 400m east of the Site. (Both the bay itself and saltwater marshland which is part of the old Baldoyle Racecourse).
- Baldoyle Bay Special Protection Area (SPA) (Site Code 004016) – c. 700m east of the Site.
- Baldoyle Bay proposed Natural Heritage Area (pNHA) – c. 400m east of the Site.

Refer to Chapter 8 (Biodiversity) for further information on Designated Sites.

Figure 10.1: Regional Hydrological Environment

10.3.1 Surface Water Quality

The European Communities Directive 2000/60/EC establishing a framework for community action in the field of water policy, commonly known as the Water Framework Directive (WFD), requires 'Good Water Status' for all European waters 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 second cycle River Basin Management Plan was published in April 2018, and replaced the first cycle plan (2009 – 2015). The impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify waterbodies at risk of failing to meet the objectives of the WFD and include a programme of measures to address and alleviate these pressures.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (**Water Policy**) Regulations, 2003 (S.I. No. 722 of 2003).
- European Communities (**Drinking Water**) Regulations 2014 (S.I. 122 of 2014).

- European Communities Environmental Objectives (**Surface Waters**); Regulations, 2009 (S.I. No. 272 of 2009 as amended by S.I. No. 77 of 2019).
- European Communities Environmental Objectives (**Groundwater**) Regulations, 2010 (S.I. No. 9 of 2010 as amended by S.I. No. 366 of 2016).
- European Communities (**Good Agricultural Practice for Protection of Waters**) Regulations, 2010 (S.I. No. 610 of 2010).
- European Communities (**Technical Specifications for the Chemical Analysis and Monitoring of Water Status)** Regulations, 2011 (S.I. No. 489 of 2011).

Figure 10.2, below, presents the EPA surface water quality monitoring points in the context of the Site and regional drainage setting, as well as the waterbodies' WFD risk category. Surface water quality is monitored periodically by the EPA at various regional locations along principal and other smaller watercourses. With reference to the Site of the proposed Project, the nearest EPA monitoring station is situated upstream at the Hole-In-Wall Bridge to the west of the Site on the Mayne River.

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method (Q-Value), which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 – Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

The surface water quality data for the nearest monitoring station (Hole in the Wall Bridge) to the Site of the proposed Project (upstream) for the Mayne River (including the Snugborough Stream) shows a Q rating of Q2-3 denoting a poor (moderately polluted) status as shown in Figure 10.2.

In accordance with the WFD, each river catchment within the former Eastern River Basin District (ERBD) was assessed by the EPA and a Water Management Plan detailing the programme of measures was put in place for each. Currently, the EPA classifies the WFD River Waterbody risk score of 1a, 'At risk of not achieving good status'. The WFD Status for the Mayne River waterbody was previously denoted as 'Poor' (2nd Cycle Status 2013-2018). The transitional waterbodies of the Mayne Estuary and North Bull Island WFD status is currently 'under review'[30] and these were not assigned a status in the previous cycle (2013 – 2015). The Irish Sea Dublin (HA 09) and the Dublin Bay Coastal Waterbodies to the east and south-east of the Site have a 'Good Status' and are listed as 'Not at Risk' by the EPA.

10.3.2 Local Drainage

Currently, storm water run-off discharges through an existing 1350 mm stormwater culvert traversing the Site along the line of Longfield Road, flowing south to north. This culvert is a diversion of a culvert which previously ran along the western boundary of the proposed Project lands. In addition, there is an existing 1050 mm stormwater culvert running from south to north along the line of Stapolin Avenue, which discharges into the Mayne River. It is noted that there is an existing stormwater drainage network located within the Site; however, due to its poor condition it is not intended to make use of the existing network and therefore it will be removed and a new network constructed in its place[31]. Although these culverts currently traverse the Site, they are not connected to any storm / surface water drainage (i.e. gullies, swales) on-site to the Mayne River or Snugbourough Stream, so currently there is no direct hydraulic connection to these surface water features (pre-construction of permitted sustainable drainage systems (SUDs) constructed wetland (discussed below)). However, there is an indirect hydraulic connection via the stormwater system which is discharged to the Mayne River. The Mayne River ultimately discharges to the Baldoyle Estuary.

10.3.3 Surface Water Flooding / Flood Risk Assessment

The proposed Project was subject to Site Specific Flood Risk Assessment (SSFRA)[32] in accordance with OPW *Flood Risk Management Guidelines*, and is included with this planning application. Review of the historic flood information does not provide any evidence of flooding at the site. The nearest flood event is situated along Coast Road, 600 m east of the site Review of the FEM FRAM (Fingal East Meath Flood Risk Assessment and Management Study) predictive flood maps confirms that the majority of the site is not at risk of flooding. A small section of the site along the northern boundary is situated in Flood Zone B. It is not proposed to place residential properties in this area, however some infilling will be undertaken as part of the landscape work elsewhere[33]. In summary, the SSFRA states that all residential properties are

[30] requires more info to assign a status
[31] CS Consulting Engineers (2021b).
[32] JBA Consulting.
[33] JBA Consulting (2021).

located in Flood Zone C and are protected from inundation up to the 0.1% AEP HEFS tidal event. The proposed infilling does not have a negative impact on flood levels downstream without mitigation. The Flood Risk Assessment was undertaken in accordance with OPW's *'The Planning System and Flood Risk Management'* guidelines. The FRA is in agreement with the core principles contained within the Planning Guidelines.

10.3.4 Areas of Conservation

The closest Natura 2000 site is Baldoyle Bay SAC, which is 400 m from the proposed Project. The nearest SPA is the Baldoyle Bay SPA, which is located 700 m from the Site. There are no designated Natural Heritage Areas (NHA) within a 15 km radius; however, the Baldoyle Bay pNHA is located c. 400 m from the Site.

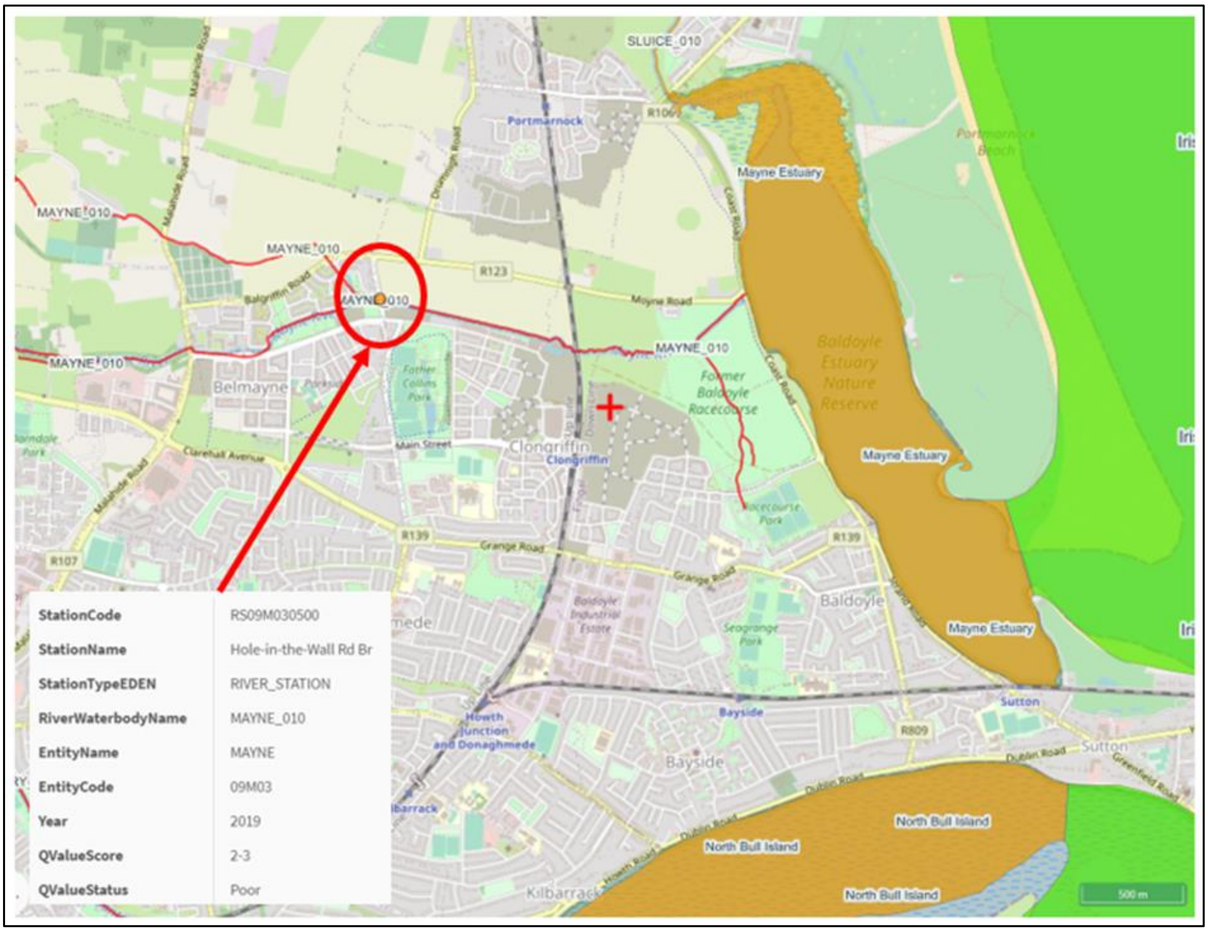
The North Dublin Bay SAC is c. 1.8km south of the Site. Currently, stormwater is discharged to the Mayne River from the Site via services installed under permission 16A/0412[34] which discharges into the Baldoyle Estuary.

10.3.5 Rating of Site Importance of Hydrological Features

There are no open water features within the Site of the proposed Project. The nearest rivers and open water are 550 m from the Site (refer to Figure 10.1). However, currently stormwater is discharged to the Mayne River from the proposed Site, which discharges into the Malahide Estuary. Based on the NRA criteria for rating the importance of hydrological features (refer to Appendix 10.1), the features at this Site may be rated as being of high importance.

[34] Refer to CS Consulting Engineers *Engineering Services Report* (2021b).

Figure 10.2: Local Hydrological Environment and current WFD Ring including location of Hole in the Wall River Station. (Site location shown with red cross)



10.4 Potential Impact of the Proposed Project

An analysis of the potential impacts of the proposed Project on the hydrological environment during the construction and operational phases is outlined below. Due to the inter-relationship between surface water (hydrology) and soils, geology and hydrogeology, the following impacts discussed will be considered applicable to both Chapters 9 (Lands, Soils, Geology and Hydrogeology) and this Chapter of this EIAR. The potential for significant impacts to arise as a result of the interaction between these topics / environmental media has been comprehensively addressed herein.

10.4.1 Construction Phase

10.4.1.1 Increased Run-off & Sediment Loading

In the absence of mitigation, surface water run-off during the construction phase may contain increased silt levels or otherwise become polluted from construction activities. As there is no open watercourse within or close to the Site, there is no potential for a direct water quality impact. There is currently no direct connection from the Site to the Mayne River. However, there is a potential impact to the current on-site storm water drainage on roads to the south of the Site (Myrtle Avenue), which discharges to the Mayne River. Furthermore, there is a potential for blocking of stormwater drainage if run-off is not managed adequately.

During the construction phase, there is the potential for a slight run-off due to the introduction of impermeable surfaces and the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading, which could potentially impact local drainage.

10.4.1.2 Contaminated Surface Water Drainage

During the construction phase, in the absence of mitigation, there is a risk of accidental pollution incidences from the following sources:

- Spillage or leakage of oils and fuels stored on-site or refuelling on-site;
- Spillage of oil or fuel from refuelling machinery on-site;
- Spillage or leakage of oils and fuels from construction machinery or Site vehicles; and
- The use of wet concrete and cement.

Machinery on-site during the construction phase may result in contamination of surface water, primarily the existing surface water drainage system, which creates an indirect hydraulic connection to the Mayne River. Potential impacts could derive from accidental spillage of fuels, oils, paints, solvents, etc., which could impact surface water and groundwater quality if allowed to infiltrate / run-off to surface water systems and / or receiving watercourses.

Concrete operations carried out near surface water drains during construction activities could lead to a discharge of alkaline wastewaters to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora.

It is the requirement of the Baldoyle-Stapolin Local Area Plan (LAP) (2013) that a constructed wetland be installed within the flood plain, just beyond the line of the existing North Fringe foul sewer to provide the required water quality treatment for this proposed Project and other developments on the LAP lands. This constructed wetland and its corresponding upstream surface water network were granted under planning reference F16A/0412 and are currently under construction, so will be in place prior to the construction phase of the proposed Project.

It is proposed to discharge to this constructed wetland during construction, following the mitigation measures listed in Section 10.5.1. The wetland was designed to attenuate storm waters of a 1 in 100-year event plus 20% extra for climate change with overland flow to the Mayne River flood plain (following construction). However, should a 1 in 1000-year event occur during the construction phase, when there is a large amount of open excavation and prior to the installation of SUDs measures included in Section 10.5 and Cronin Sutton's Engineering Services Report[35] (ESR) (submitted under separate cover), there is a risk of a ***temporary significant*** impact on the flood plain and the Mayne River itself.

10.4.2 Operational Phase

During the operational phase of the proposed Project the potential impacts in relation to hydrology (in the absence of mitigation) are assessed in the following sections.

10.4.2.1 Surface Water

In accordance with Section 4.3 of Appendix 1 of the Baldoyle-Stapolin Local Area Plan (LAP), since the Site is located adjacent to the tidal estuary at Baldoyle and as there is no downstream development before outfalling to the Irish Sea, the proposed Project is not required to provide full attenuation for the 100-year return storm as per the requirements in Section 6.6, Volume 2 of the Greater Dublin Strategic Drainage Study (GDSDS). In addition, the lands discharge into salt wetlands which are the flood estuary of the Mayne River and extend over c. 40 ha (100-year flood plain). Therefore, the principal issue is the quality of water discharging from the LAP lands and not the quantity of water being discharged to the estuary.

Rainwater run-off from the impermeable areas of the Site, roofs and roads / car park will be discharged to this wetland before discharging to the Mayne River floodplain over a spillway / weir. The wetland will serve as the final water quality treatment for the proposed Project of (plus neighbouring GA2 and GA1 (as permitted and proposed)) and has been sized accordingly. It has been sized to cater for a treatment volume based on 15 mm rainfall over 100% of the impermeable site areas, and this will be retained in a permanent pool area of the wetland at all times. The wetland will incorporate a sediment fore bay to serve as a 'first flush' collector

[35] CS Consulting Engineers (2021b).

of the majority of silt not removed by SUDs features upstream. This will ensure that the remainder of the wetland is not disturbed during maintenance when silt build-up is removed from the fore bay.

The shape and orientation of the permitted wetland has been designed to maximise the quantity of treatment provided, with a length to width ratio in excess of 3:1, allowing sediments to settle along its length. A varying width has been chosen to encourage diversity of plants and wildlife, while ensuring there are no stagnant areas and that the total volume is available to provide water quality treatment. Details of the planting / landscaping of the wetland are as outlined in the landscape documents from the grant of permission F16A/0412.

The treatment volume was calculated as 1,860 m^3 and is based on treatment 15 mm of rainfall depth from the run-off from impermeable areas. This will be provided by the constructed wetland.

As previously mentioned, it is not proposed to connect any surface water generated by the proposed Project to the existing culverts referred to earlier as they pass under the existing North Fringe Sewer. It is proposed to connect the proposed Project to the new surface water network (constructed wetland, etc.) granted under F16A/0412 that shall cross above the North Fringe Sewer to ensure all surface water generated by the proposed Project will pass through the wetland and overspill a weir / spillway into the Mayne River Floodplain. Refer to Cronin Sutton drawing nos. BD-CSC-ZZ-G3-DR-C-0103 and BD-CSC-ZZ-G3-DR-C-0104[36] and ESR[37] (submitted under separate cover) for details of the proposed drainage network.

10.4.2.2 Wastewater

There is an existing 375 mm diameter foul sewer that runs in a northern direction along the eastern boundary of the site (Stapolin Avenue). This infrastructure was installed by previous developers to serve the entire LAP lands and extends upstream in a southerly direction serving the Myrtle development. Downstream, this existing 375 mm foul sewer discharges to an existing foul pump station located on the north side of Stapolin Haggard. The foul pumping station discharges via a 300 mm rising main to the North Fringe Foul Sewer that runs around

[36] Drawing Nos. BD-CSC-ZZ-G3-DR-C-0103 and BDCSC-ZZ-G3-DR-C-0104
[37] CS Consulting Engineers (2021b).

the north / north eastern boundary of the Site, approximately 150 m away from the pump station. The pump station currently serves the existing Myrtle and Red Arches developments.

A Pre-Connection Enquiry was submitted to Irish Water (IW) based on the foul flows for the proposed Project and a favourable response was received on 25 November 2020[38]. This is subject to a connection agreement with IW.

10.4.2.3 Water Supply

As stated above, Irish Water have confirmed connection to its water network can be facilitated subject to a connection agreement.

There is a potential for leaks and spillages from vehicles along access roads and in parking areas. Any accidental emissions of oil, petrol or diesel could cause contamination if the emissions enter the water environment unmitigated.

10.5 Mitigation Measures

The design of the proposed Project has taken account of the potential impacts of the proposed Project and the risks to the water environment specific to the areas where construction is taking place. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

10.5.1 Construction Phase

10.5.1.1 Construction Management Plan (CMP)

An outline Construction Management Plan[39] (CMP) accompanies this planning application. A final CMP will be prepared and maintained by the appointed Contractors during the construction phase of the proposed Project. The CMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the Site will be trained in the implementation of the CMP. At a minimum, the CMP will be formulated in consideration of the standard best international practice including but not limited to:

- CIRIA (2001). *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532).*

[38] See Appendix D of CS Consulting's *Engineering Services Report*. (2021b).
[39] CS Consulting Engineers (2021a).

- CIRIA (2002). *Control of water pollution from construction sites: guidance for consultants and contractors (SPI56).*
- CIRIA (2005). *Environmental Good Practice on Site (C650).*
- *BPGCS005, Oil Storage Guidelines.*
- CIRIA (2007). *The SUDS Manual (697).*
- UK Environment Agency (2004). *UK Pollution Prevention Guidelines (PPG).*

10.5.1.2 Surface Water Run-Off

As there are no watercourses present on the Site, there will be no direct run-off to surface watercourses during the construction phase. It should also be noted that there are no surface water gulleys or drains currently on-site which would act as pathway to the nearby surface water features.

Run-off water containing silt will be contained on-site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks / ponds).

Should any discharge of construction water be required during the construction phase, the discharge will be treated using a sediment trap or 'siltbuster' as required.

The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce run-off and graded to aid in run-off collection, and materials will be stored away from any surface water drains. This will prevent any potential negative impact on the storm water drainage.

Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to avoid any potential impact.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the Site and the suitable distance of topsoil piles from surface water drains will be maintained. A Sediment and Water Pollution Control Plan has been drafted (Section 8 of the Outline CMP, submitted under separate cover). It states the following:

> *"… surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water run-off by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle run-off and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. All inlets to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet"*[40].

10.5.1.3 Fuel and Chemical Handling

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground of fuels and prevent any resulting to surface water systems:

- Designation of bunded refuelling areas on the Site;
- Provision of spill kit facilities across the Site;
- Where mobile fuel bowsers are used, the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers to carry a spill kit and operatives must have spill response training;
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;

[40] CS Consulting Engineers (2021b).

- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

The aforementioned list of measures is non-exhaustive and will be included in the final CMP. All appointed Contractors will be required to implement the CMP.

All ready-mixed concrete will be brought to the Site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out, which will include measures to prevent discharge of alkaline waste waters or contaminated storm water to the underlying subsoil. Wash-down and washout of concrete transporting vehicles will take place at an appropriate facility off-site.

10.5.1.4 Accidental Releases

Emergency response procedures will be outlined in the finalised CMP. All personnel working on the Site will be suitably trained in the implementation of the procedures.

10.5.1.5 Soil Removal and Compaction

Suitable excavated material will be reused on-site, where possible, for site levelling, roads, car parking areas and other landscaping purposes. There will be waste materials generated from the excavation of soil and stones to facilitate site clearance, construction of new building foundations and installation of services. The volume of material to be excavated has been estimated by the project engineers at c. 31,966.6 m^3. It is envisaged that 21,870.0 m^3 of the excavated material will be required to be removed from site. It will also be necessary at this stage to remove pyrite-containing fill material from below existing roads. It is envisaged that the excavated material containing pyrite will be re-used during the works for haul road maintenance, temporary construction roads and site operative walkways, with this material being removed off-Site for appropriate disposal towards the end of the construction phase. When material is to be removed off-site it will be taken for off-site reuse, recovery and / or disposal.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (refer to Section 10.5.1.2). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted / licensed waste disposal contractor.

10.5.2 Operational Phase

10.5.2.1 Surface Water

The proposed new storm water drainage arrangements will be designed and carried out in accordance with the:

- *Greater Dublin Strategic Drainage Study Volume 2.*
- *Greater Dublin Regional Code of Practice for Drainage Works.*
- *BS EN – 752:2008, Drains & Sewer Systems Outside Buildings.*
- Part H, Building Drainage of the Building Regulations.

There are a number of SUDs measures that will be put in place to manage storm water drainage from the Site of the proposed Project, as follows:

- Constructed Wetland (permitted under F16A/0412) – Shallow ponds and marshy areas with a high concentration of aquatic vegetation. The wetland will detain flows for an extended period allowing sediments to settle and to remove contaminants by facilitating adhesion to vegetation and aerobic decomposition. Located within existing Mayne River floodplain, prior to discharge to the floodplain.
- Swales: shallow drainage channels covered in grass which can treat, convey and attenuate run-off, at source, and can infiltrate to the ground where the subgrade is suitable. Swales also can promote biodiversity. Swales are located adjacent to the roads of Stapolin Avenue and Stapolin Road.
- Bio-retention Areas: Shallow landscaped depressions, which are under drained with engineered soils and enhanced vegetation and planting on the surface which manage and treat run-off, at source, and promote biodiversity development. Located generally at suitable low points along roads in lieu of gullies throughout Site.

- **Green Roofs**: Green roofs provide ecological, aesthetic and amenity benefits and intercept and retain rainfall, at source, reducing the volume of run-off and attenuation peak flows. Green roofs absorb most of the rainfall that they receive during ordinary events and they will only contribute to attenuation of flows for larger events. Additionally, green roofs treat surface water through removal of atmospherically deposited urban pollutants. 100 mm deep sedum green roof systems are proposed for the apartment buildings located to the west of Longfield Road in the north west of the proposed Project.

Petrol interceptors will be installed within car park areas under the apartment buildings to cater for any oil / fuel leaks from on-Site vehicles, as required[41].

10.5.2.2 Foul Water

Foul drainage for the proposed Project will be in accordance with the relevant standards for design and construction as detailed in Cronin Sutton's ESR[42] (submitted under separate cover). As stated previously, a Pre-Connection Enquiry was submitted to Irish Water (IW) based on the foul flows for the proposed Project, and a favourable response was received on 25 November 2020[43]. This is subject to a connection agreement with IW.

10.5.2.3 Water Supply

As stated above, IW have confirmed connection to its water network can be facilitated subject to a connection agreement.

10.6 Residual Impacts

The proposed Project will have ***no significant impact*** on the natural surface water regime either qualitatively or quantitatively.

10.6.1 Construction Phase

Following the implementation of mitigation measures detailed in Section 10.5, the predicted impact on the surface water environment during the construction phase is considered to be ***likely, neutral, imperceptible*** and ***short-term***.

[41] Refer to CS Consulting Engineers *Engineering Services Report* (2021b).
[42] CS Consulting Engineers (2021b).
[43] See Appendix D of CS Consulting's *Engineering Services Report*. (2021b).

10.6.2 Operational Phase

Following implementation of the mitigation measures proposed in Section 10.5, the predicted impact on the surface water environment once the proposed Project is constructed and operational is considered to be ***likely, neutral, imperceptible*** and ***long-term***. There will be ***no impact*** to the quality of local watercourses or nearby Designated Sites due to the lack of direct hydraulic connectivity and the mitigation measures cited. Overall, the attenuation proposed for the Project and installation of interceptors will improve flood management and water quality.

10.7 Monitoring

10.7.1 Construction Phase

Regular inspection of surface water run-off and any sediment control measures (e.g. silt traps) will be carried out during the construction phase. Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc.

10.7.2 Operational Phase

No future surface water monitoring is proposed for the proposed Project due to the low hazard potential at the Site. Oil interceptors will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

10.8 Reinstatement

Reinstatement of excavations during the construction phase of the proposed Project will meet the design criteria presented in the design specification of this application. All fill material used will be clean and graded to engineers' specifications.

10.9 Interactions

Refer to Chapter 20 (Interactions) for a summary of the interactions between environmental topics addressed in this EIAR.

10.9.1 Land, Soils, Geology & Hydrogeology

As previously stated, there is an inter-relationship between hydrology and land, soils, geology and hydrogeology. There will be no potential cumulative impacts on the bedrock as the aquifer vulnerability is 'Low' (no bedrock was encountered to >10 m) and the aquifer is locally important with little importance regionally.

Surface water run-off may have the potential to enter soil and groundwater. Implementation of appropriate mitigation measures as outlined in Chapters 9 (Land, Soils, Geology and Hydrogeology) and this Chapter will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

10.10 Cumulative Impacts

The anticipated cumulative effects of the proposed Project in combination with existing, permitted and proposed plans and projects listed in Chapter 21 (Cumulative Impacts) are summarised below.

In relation to the potential cumulative impact on hydrology during the construction phases, the construction works which would have potential cumulative impacts are as follows:

- Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses. There are no notable surface water features on-site. Stockpiled material will be stored on hardstand away from surface water drains, and gullies will be protected during works to ensure there is no discharge of silt-laden water into the surrounding surface water drainage system.
- Contamination of local water sources from accidental spillage and leakage from construction traffic and construction materials is possible unless project-specific CMPs are put in place for each development and complied with. As stated, there are no notable surface water features on-site and no direct hydrological pathways to off-site surface waterbodies.

Potential cumulative impacts considered in respect of the operational phase are as follows:

- Increased hard standing areas will reduce local recharge to ground and increase surface water run-off potential if not limited to the green field run-off rate from the Site.
- Increased risk of accidental releases from fuel storage / delivery unless mitigated adequately, e.g. through use of a bunded tank.

- Increased risk of accidental discharge of hydrocarbons from car parking areas and along roads is possible unless diverted to surface water system with petrol interceptor.
- Any additional foul discharges should be treated where appropriate and / or diverted to the foul sewer system and not directly to ground.

Similar mitigation measures to those described in Section 10.5 will need to be implemented to protect water quality in relation to any future proposed developments.

Increase in wastewater loading and water supply requirement is an impact of all development. Each development will require approval from the IW confirming available capacity in the water and wastewater infrastructure. The surface water and foul drainage infrastructure and water supply requirements for the proposed Project have been designed to accommodate the proposed Project. IW have confirmed connection to its water and foul network can be facilitated subject to a connection agreement.

Development will result in an increase in hard standing (52,526 m^2) which will result in localised reduced recharge to ground and increase in run-off rate. Each permitted development is required by the Local Authority and IW to comply with the Local Authority and IW requirements by providing suitable attenuation on-site to ensure greenfield run-off rates and ensure that there is no increase in off-site flooding as a result of the development in question.

There is a potential for contamination of watercourses during construction and operation. Mitigation measures are required (and have been set out in respect of the proposed Project above) to manage sediment run-off and fuel leakages during construction and operation. All developments are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislation (Water Framework Directive and associated legislation) such that they would be required to manage run-off and fuel leakages.

The residual cumulative impact on water and hydrology for the construction and operational phases is anticipated to be ***long-term and neutral*** in terms of quality and of ***imperceptible*** significance, assuming appropriate mitigation measures to manage water quality run-off, in compliance with legislative requirement, are put in place for other developments.

10.11 'Do-Nothing' Impact

The Do-Nothing scenario refers to the environment as it would be in the future should the proposed Project not be carried out. Should the project the lands are zoned for residential development so would likely have some form of development at some stage in the future, the potential impacts of which cannot be assessed. There is also the possibility that no development would be progressed at the Site in this scenario, in which case there would be no impacts on the hydrological environment at the Site.

10.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in the compilation of this chapter of the EIAR.

10.13 References

- Cronin & Sutton Consulting Engineers (CS) (2021a). Outline *Construction Management Plan.*
- Cronin & Sutton Consulting Engineers (CS) (2021b). *Engineering Services Report.*
- Environmental Protection Agency (EPA) (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*
- Environmental Protection Agency (EPA) (2015). *Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*.
- JBA Consulting (2021). *Flood Risk Assessment* Final Report. February 2021 (2020s1166).
- National Roads Authority (NRA) (2009). *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.

11 Air Quality & Climate

11.1 Introduction

AWN Consulting Ltd. has been commissioned to carry out an assessment of the likely air quality and climate impacts associated with the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13. A full description of the proposed Project is available in Chapter 5 – Description of the Proposed Project.

This chapter was completed by Niamh Nolan, an environmental consultant in the air quality section of AWN Consulting Ltd. She holds a BSocSci (Hons) in Social Policy and Geography from University College Dublin. She is an Associate Member of both the Institute of Air Quality Management (IAQM) and the Institution of Environmental Science. She specialises in air quality and climate.

11.2 Methodology

11.2.1 Criteria for Rating of Impacts

11.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or 'Air Quality Standards' are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 11.1 and Appendix 11.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC, which has set limit values for NO_2, PM_{10} and $PM_{2.5}$, which are applicable in relation to this proposed Project (see Table 11.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used, which are triggers for particular actions (see Appendix 11.1).

Table 11.1: Ambient Air Quality Standards

Pollutant	Regulation[44]	Limit Type	Value
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times / year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
		Critical level for protection of vegetation	30 µg/m^3 NO + NO_2
Particulate Matter (PM_{10})	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times / year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter ($PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3

11.2.1.2 Dust Deposition Guidelines

The concern in relation to air quality from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$), for which the EU ambient air quality standards have set limit values (Table 11.1).

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this proposed Project.

The German TA-Luft standard for (non-hazardous) dust deposition (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one-year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed Project.

11.2.1.3 Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels,

[44] EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

with efforts to limit this rise to 1.5°C. The aim is to limit global greenhouse gas (GHG) emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post-2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013 (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors, amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) was enacted (the Act). The purpose of the Act was to enable Ireland "*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*" (3(1) of No. 46 of 2015). This is referred to in the Act as the "*national transition objective*". The Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The Climate Action Plan (CAP), published in June 2019, outlines the current status across key sectors including electricity, transport, built environment, industry and agriculture; and outlines the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The CAP also details the required governance arrangements for implementation; including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas.

The CAP has set a built environment sector reduction target of 40 – 45% relative to 2030 pre-NDP projections.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019 followed by the publication of the Climate Action and Low Carbon Development (Amendment) Bill 2021 (hereafter referred to as the 2021 Climate Bill) in March 2021 (Government of Ireland, 2021). The 2021 Climate Bill was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Bill, if enacted, is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*'. The 2021 Climate Bill will also '*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy'*. The 2021 Climate Bill defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period'.*

The 2021 Climate Bill removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

The Fingal County Council Climate Change Action Plan 2019 – 2024 sets out specific objectives in relation to climate:

- A 40% reduction in the Council's GHG emissions by 2030;
- To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events; and
- To actively engage and inform citizens on climate change.

The actions in the plan are a starting point and will be regularly monitored and updated by a dedicated Climate Action Team, working with an Interdepartmental Steering Group representative of all five Dublin Council Departments. This plan includes that all new developments in Ireland have to be energy-efficient, and must comply with nearly Zero Energy

Building (nZEB) standards. These are also commitments to more detailed flood risk assessments for developments that are in high risk areas along the coast and rivers. Fingal is also reviewing with the OPW where physical flood defences are required, and a priority list for their development.

11.2.2 Worst-Case Scenario

Conservative background concentrations are used in order to ensure a robust, worst-case impact assessment.

11.2.3 Construction Phase

The current assessment has focussed on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the proposed Project through an assessment of EPA monitoring data. The impact of the construction phase on air quality was then determined through a qualitative assessment of the nature and scale of dust generating activities associated with the proposed works.

Construction phase traffic also has the potential to impact air quality and climate. The UK Design Manual for Roads and Bridges (DMRB) guidance (UK Highways Agency, 2019a), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band; and
- A change in carriageway alignment by 5m or greater.

Transport Infrastructure Ireland (TII) recommend the use of the UK DMRB guidance (UK Highways Agency, 2007) in its document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). This approach is considered best practice in the absence of specific Irish guidance.

The construction stage traffic does not meet the above scoping criteria and, therefore, has been scoped out from any further assessment, as there is no potential for significant impacts to air quality.

11.2.4 Operational Phase

11.2.4.1 Air Quality Assessment

The air quality assessment has been carried out following procedures described in the publications by the EPA (2015; 2017) and using the methodology outlined in the guidance documents published by the UK Highways Agency (2019a) and UK Department of Environment Food and Rural Affairs (DEFRA) (2016; 2018). TII reference the use of the UK Highways Agency and DEFRA guidance and methodology in their document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). This approach is considered best practice in the absence of Irish guidance and can be applied to any development that causes a change in traffic.

In 2019 the UK Highways Agency DMRB air quality guidance was revised, with *LA 105 Air Quality* replacing a number of key pieces of guidance (HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). This revised document outlines a number of changes for air quality assessments in relation to road schemes but can be applied to any development that causes a change in traffic. Previously, the DMRB air quality spreadsheet was used for the majority of assessments in Ireland with detailed modelling only required if the screening tool indicated compliance issues with the EU air quality standards. Guidance from TII (2011) recommends the use of the UK Highways Agency DMRB spreadsheet tool for assessing the air quality impacts from road schemes. However, the DMRB spreadsheet tool was last revised in 2007 and accounts for modelled years up to 2025. Vehicle emission standards up to Euro V are included, but since 2017, Euro 6d standards are applicable for the new fleet. In addition, the model does not account for electric or hybrid vehicle use. Therefore, this a somewhat outdated assessment tool. The LA 105 guidance document states that the DMRB spreadsheet tool may still be used for simple air quality assessments where there is unlikely to be a breach of the air quality standards. Due to its use of a 'dirtier' fleet, vehicle emissions would be considered to be higher than more modern models and, therefore, any results will be conservative in nature and will provide a worst-case assessment.

The 2019 UK Highways Agency DMRB air quality revised guidance, *LA 105 Air Quality,* states that modelling should be conducted for NO_2 for the base, opening and design years for both the do-minimum (do-nothing) and do-something scenarios. Modelling of PM_{10} is only required for the base year to demonstrate that the air quality limit values in relation to PM_{10} are not breached. Where the air quality modelling indicates exceedances of the PM_{10} air quality limits in the base year, then PM_{10} should be included in the air quality model in the do-minimum and do-something scenarios. Modelling of $PM_{2.5}$ is not required as there are currently no issues with compliance with regard to this pollutant. The modelling of PM_{10} can be used to show that the project does not impact on the $PM_{2.5}$ limit value, as if compliance with the PM_{10} limit is achieved, then compliance with the $PM_{2.5}$ limit will also be achieved. Historically, modelling of carbon monoxide (CO) and benzene (Bz) was required. However, this is no longer needed, as concentrations of these pollutants have been monitored to be significantly below their air quality limit values in recent years, even in urban centres (EPA, 2020a).

The key pollutant reviewed in this assessment is NO_2. Modelling of operational NO_2 concentrations has been conducted for the do-nothing and do-something scenarios for the base year (2020) opening year (2023), and design year (2038).The TII guidance (2011) states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50 m of a complex road layout (e.g. grade separated junctions, hills, etc).

The UK Highways Agency guidance *LA 150* (2019) scoping criteria, outlined in Section 11.2.2, was used to determine the road links required for inclusion in the modelling assessment. Sensitive receptors within 200 m of impacted road links are included within the modelling assessment. Pollutant concentrations are calculated at these sensitive receptor locations to determine the impact of the proposed Project in terms of air quality. The guidance states that a proportionate number of representative receptors, which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed Project, are to be included in the modelling (UK Highways Agency, 2019a). The TII guidance (2011) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas; i.e. locations where members of the public are likely to be regularly present. A total of three (3 no.) sensitive receptors within 200 m of impacted road links were included in the modelling assessment (see Figure 11.1), all of which are high sensitivity residential properties.

The following model inputs are required to complete the assessment using the DMRB spreadsheet tool:

- Road layouts;
- Receptor locations;
- Annual average daily traffic movements (AADT);
- Percentage heavy goods vehicles (%HGV);
- Annual average traffic speeds; and
- Background concentrations.

Using this input data, the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB, Volume 11, Section 3, Part 1 – HA 207/07, Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed Project with these ambient air quality standards.

The TII document, *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011), details a methodology for determining air quality impact significance criteria for road schemes that can be applied to any project that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed Project. The TII significance criteria have been adopted for the proposed Project and are detailed in Appendix 11.2, Tables 11.2.1 and 11.2.2. The significance criteria are based on NO_2 and PM_{10}, as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3).

Conversion of NO_x to NO_2

NO_X – NO (nitric oxide) and NO_2 (nitrogen dioxide) – are emitted by vehicles exhausts. The majority of emissions are in the form of NO; however, with greater diesel vehicles and some regenerative particle traps on HGVs, the proportion of NO_X emitted as NO_2, rather than NO, is increasing. With the correct conditions (presence of sunlight and O_3), emissions of NO have the potential to be converted to NO_2.

TII states the recommended method for the conversion of NO_x to NO_2 in *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). The TII guidelines recommend the use of DEFRAs NO_x to NO_2 calculator (2020), which accounts for the predicted availability of O_3 and proportion of NO_x emitted as NO for each local authority across the UK. O_3 is a regional pollutant and, therefore, concentrations do not vary in the same way as concentrations of NO_2 or PM_{10}.

The calculator includes Local Authorities in Northern Ireland, and the TII guidance recommends the use of 'Armagh, Banbridge and Craigavon' as the choice for local authority when using the calculator in Ireland. The choice of Craigavon provides the most suitable relationship between NO_2 and NO_x for Ireland. The 'All Non-Urban UK Traffic' traffic mix option was used.

Update to NO_2 Projections using DMRB

In 2011, the UK DEFRA published research (Highways England, 2013) on the long-term trends in NO_2 and NO_X for roadside monitoring sites in the UK. This study found a decrease in NO_2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO_2 concentrations, which UK DEFRA previously published, and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO_2 concentrations for predicted future years. Subsequently, the UK Highways Agency published an interim advice note (IAN 170/12) in order to correct the DMRB results for future years. This methodology has been used in the current assessment to predict future concentrations of NO_2 as a result of the proposed Project.

Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from CS Consulting for the purposes of this assessment. Data for the do-nothing and do-something scenarios for the base year (2020), opening year (2023) and design year (2038) were provided. The traffic data in AADT is detailed in Table 11.2 along with the %HGV. Only road links that met the DMRB scoping criteria outlined in Section 11.2.2, and that were within 200 m of receptors, were included in the modelling assessment. Background concentrations have been included as per Section 11.3.3 of this chapter, based on available EPA background monitoring data (EPA, 2020a).

Table 11.2: Traffic Data Used in Air Quality Modelling Assessment

Road Name	Base Year	Do-Nothing		Do-Something		Speed (kph)
	2020	2023	2038	2023	2038	
Link A	1,970 (0.61%)	2,844 (0.88%)	2,402 (0.83%)	6,107 (1.64%)	6,473 (1.62%)	50
Link B	1,972 (0.61%)	2,726 (1.25%)	3,093 (1.29%)	4,141 (1.16%)	4,508 (1.18%)	50
Link M	26,228 (4.63%)	27,491 (4.71%)	32,225 (5.54%)	28,600 (9.06%)	33,708 (5.38%)	50

Figure 11.1: Location of Sensitive Receptors used in Air Quality Modelling Assessment

11.2.4.2 Air Quality Impact on Ecological Sites

For routes that pass within 2 km of a designated area of conservation (either Irish or European), TII requires consultation with an ecologist (TII, 2011). However, in practice the potential for impact to an ecological site is highest within 200 m of a proposed Project, and when significant changes in AADT (>5%) occur. Only sites that are sensitive to nitrogen deposition should be included in the assessment. In addition, the UK Highways Agency (2019) states that a detailed assessment does not need to be conducted for areas that have been designated for geological features or watercourses.

TII's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) and *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impacts on ecological sites due to nitrogen deposition should be conducted:

- A designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

The Baldoyle Bay Special Area of Conservation (SAC) and Proposed Natural Heritage Area (pNHA) (site code 000199), along with the Baldoyle Bay Special Protection Area (SPA) (site code 004016) are to the east of the proposed Project, within 200 m. An assessment of the impact with regards to nitrogen deposition was conducted for these sites. Dispersion modelling and prediction was carried out at typical traffic speeds at this location. Ambient NO_x concentrations were predicted for the opening year of 2023 along a transect of up to 200 m within the pNHA, SAC and SPA, in line with the UK Highways Agency (2019a) and TII (2011) guidance. The road contribution to dry deposition along the transect was also calculated using the methodology outlined in Appendix 9 of the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011).

11.2.4.3 Climate Assessment

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to mitigate climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under Regulation (EU) 2018/842 on binding annual [GHG] emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013, which has set a target of a 30% reduction in non-ETS sector emissions by 2030 relative to 2005 levels.

As per the EU guidance document, *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013), the climate baseline is first established by reference to EPA data on annual GHG emissions (see Section 11.3.3). Thereafter, the impact of the proposed Project on climate is determined. Emissions from road traffic associated with the proposed Project will emit GHGs, including carbon dioxide (CO_2), which will in turn affect atmospheric GHG concentrations and climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments, *LA 114 Climate* (2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage:

- If any of the road links impacted by the proposed Project meets one or more of the below criteria, then further assessment is required:
- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and / or
- A change in daily average speed of more than 20 km/hr.

There are five road links that will experience an increase of 10% or more in AADT. These have been included in the detailed climate assessment (see Table 11.3).

The impact of the proposed Project at a national / international level has been determined using the procedures given by TII (2011) and the methodology provided in Annex D in the UK DMRB (UK Highways Agency, 2007). The assessment focused on determining the resulting change in emissions of carbon dioxide (CO_2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes and can be applied to any project that causes a change in traffic. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds (see Table 11.3).

EU guidance (2013) also states indirect GHG emissions as a result of a development must be considered. These include emissions associated with energy usage. The Building Lifecycle Report prepared in relation to this application (submitted under separate cover) has been reviewed and used to inform the operational phase climate assessment. This report outlines a number of measures in relation to energy usage from the proposed Project, primarily in relation to heat and electricity. A number of measures have been incorporated into the overall design of the proposed Project to reduce the impact to climate, where possible.

Table 11.3: Traffic Data Used in Climate Modelling Assessment

Road Name	Base Year	Do-Nothing		Do-Something		Speed (kph)
	2020	2023	2038	2023	2038	
Link A	1,970 (0.61%)	2,844 (0.88%)	2,402 (0.83%)	6,107 (1.64%)	6,473 (1.62%)	50
Link B	1,972 (0.61%)	2,726 (1.25%)	3,093 (1.29%)	4,141 (1.16%)	4,508 (1.18%)	50
Link C	19,627 (4.39%)	20,930 (4.42%)	24,103 (6.75%)	22,835 (4.18%)	26,645 (4.91%)	50
Link M	26,228 (4.63%)	27,491 (4.71%)	32,225 (5.54%)	28,600 (9.06%)	33,708 (5.38%)	50

11.3 Baseline Environment

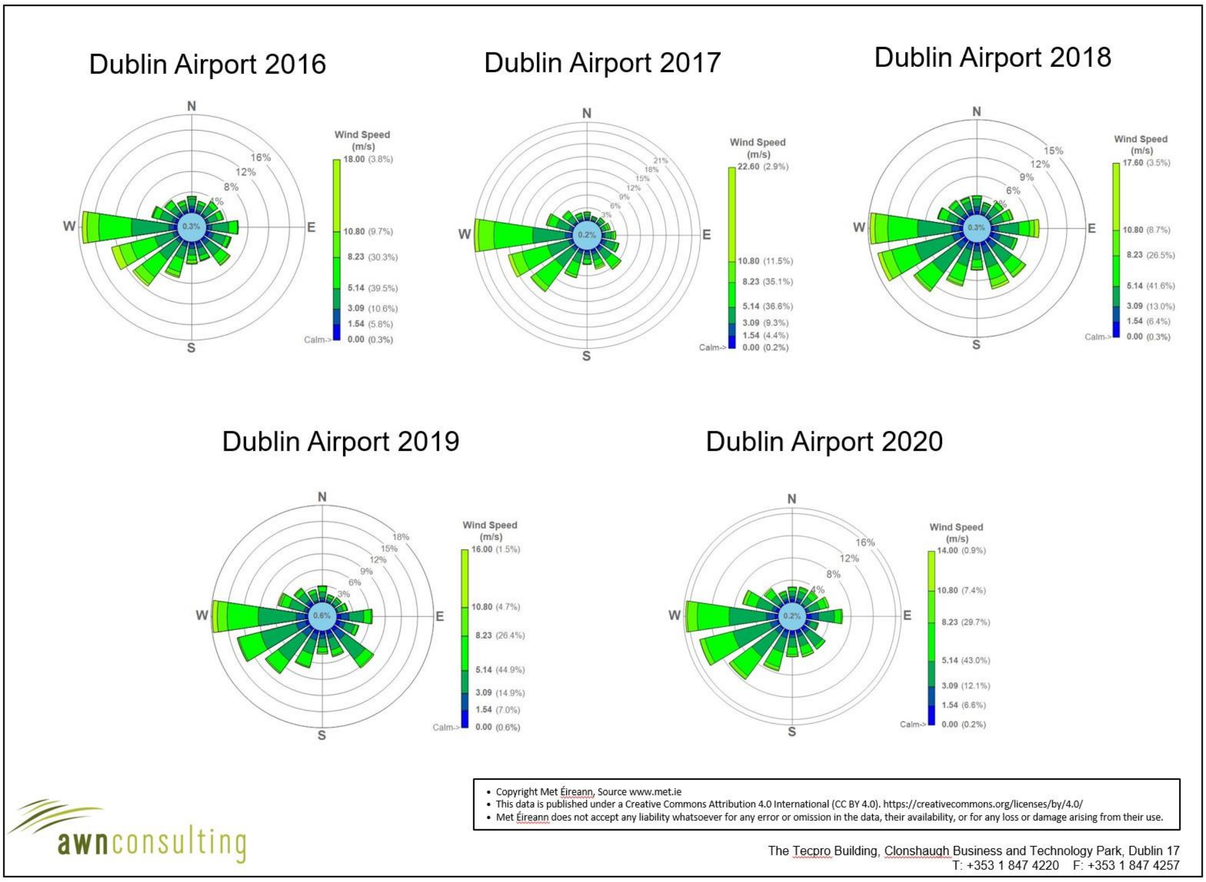
11.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength. Wind is of key importance in dispersing air pollutants, and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ – PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, which is located approximately 5 km west of the Site. Dublin Airport meteorological data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 11.2). For data collated during five representative years (2016 –

2020), the predominant wind direction is westerly to south-westerly, with generally moderate wind speeds (Met Éireann, 2021).

Figure 11.2: Dublin Airport Windroses 2016 – 2020



11.3.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is *Air Quality In Ireland 2019* (EPA, 2020a). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2021).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2020a). Dublin is defined as Zone A, and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed Project is within Zone A (EPA, 2020a). The long-term EPA monitoring data have been used to determine background concentrations for the key pollutants in the region of the proposed Project. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating, etc.).

With regard to NO_2, continuous monitoring data from the EPA (EPA, 2020a) at suburban Zone A locations in Ballyfermot, Dún Laoghaire, Swords and Rathmines show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 15 – 22 µg/m^3 in 2019 (see Table 11.4). Sufficient data is available for all stations to observe the long-term trend since 2015 (EPA, 2020a) (see Table 11.4), with results ranging from 13 – 22 µg/m^3 and few exceedances of the one-hour limit value. The station in Swords is approximately 7 km north-west of the proposed Project Site, and monitored background concentrations would be representative of the site location. Concentrations of NO_2 at the Swords site over the period 2015 – 2019 ranged from 13 – 16 µg/m^3. Based on the above information, an estimate of the background NO_2 concentration in the region of the proposed Project is 16 µg/m^3.

Table 11.4: Trends in Zone A Air Quality – Nitrogen Dioxide (NO2)

Station	Averaging Period[45,46]	Year				
		2015	2016	2017	2018	2019
Rathmines	Annual Mean NO_2 (µg/m^3)	18	20	17	20	22
	Max 1-hr NO_2 (µg/m^3)	106	102	116	138	183
Dún Laoghaire	Annual Mean NO_2 (µg/m^3)	16	19	17	19	15
	Max 1-hr NO_2 (µg/m^3)	103	142	153	135	104
Swords	Annual Mean NO_2 (µg/m^3)	13	16	14	16	15
	Max 1-hr NO_2 (µg/m^3)	170	206	107	112	108
Ballyfermot	Annual Mean NO_2 (µg/m^3)	16	17	17	17	20
	Max 1-hr NO_2 (µg/m^3)	142	127	148	217	124

[45] Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

[46] 1-hour limit value - 200 µg/m^3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Continuous PM_{10} monitoring carried out at the Zone A locations of Rathmines, Phoenix Park and Dún Laoghaire showed 2015 – 2019 annual mean concentrations ranging from 9 – 15 µg/m^3 (Table 11.5), with at most 9 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m^3 (35 exceedances are permitted per year). The most representative location is Phoenix Park, which had an average annual mean concentration of 10.8 µg/m^3 over the five year period. Based on the EPA data (Table 11.5) a conservative estimate of the current background PM_{10} concentration in the region of the proposed Project is 13 µg/m^3.

Table 11.5: Trends in Zone A Air Quality – PM10

Station	Averaging Period[45,46]	Year				
		2015	2016	2017	2018	2019
Rathmines	Annual Mean PM_{10} (µg/m^3)	15	15	13	15	15
	24-hr Mean > 50 µg/m^3 (days)	5	3	5	2	9
Phoenix Park	Annual Mean PM_{10} (µg/m^3)	12	11	9	11	11
	24-hr Mean > 50 µg/m^3 (days)	2	0	1	0	2
Dún Laoghaire	Annual Mean PM_{10} (µg/m^3)	13	13	12	13	12
	24-hr Mean > 50 µg/m^3 (days)	3	0	2	0	2

Continuous $PM_{2.5}$ monitoring carried out at the Zone A location of Rathmines showed $PM_{2.5}$ / PM_{10} ratios ranging from 0.60 – 0.68 over the period 2015 – 2019. Based on this information, a conservative ratio of 0.7 was used to generate a background $PM_{2.5}$ concentration in the region of the proposed development of 9.1 µg/m^3.

Background concentrations for opening year (2023) and design year (2038) have been calculated using current estimated background concentrations and year-on-year reduction factors provided by TII in the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) and the UK Department for Environment, Food and Rural Affairs LAQM.TG(16) (2018).

11.3.3 Climate Baseline

Anthropogenic emissions of GHGs in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA, which details provisional emissions up to 2019 (EPA, 2020b). The data published in 2020 indicate that Ireland will have exceed its 2019 annual limit set under the EU's Effort Sharing Decision (ESD) (Decision 406/2009/EC1) by an estimated 6.98 Mt. The 2019 data is considered to be most representative as a result of the restrictions imposed during the COVID-19 pandemic in 2020. For 2019, total national GHG emissions are estimated to be 59.9 Mt CO_2 equivalent (Mt CO_2eq) with 45.71 MtCO_2eq of emissions associated with the ESD sectors, for which the EU targets must be met. Agriculture was the largest CO_2 contributor in 2019, at 35.3% of the total, with the transport sector accounting for 20.3%.

GHG emissions for 2019 are estimated to be 4.5% lower than those recorded in 2018. Emission reductions had been recorded in 6 of the preceding 10 years. However, compliance with the annual EU targets had not been met for the four preceding years in a row. Emissions from 2016 – 2019 exceeded the annual EU targets by 0.29 MtCO_2eq, 2.94 MtCO_2eq, 5.57 MtCO_2eq and 6.98 MtCO_2eq, respectively. Agriculture is consistently the largest contributor to GHG emissions in Ireland, with emissions from the transport and energy sectors being the second and third largest contributors, respectively.

The EPA 2020 GHG Emissions Projections Report for 2019 – 2040 (EPA 2020c) notes that there is a long-term projected decrease in GHG emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and Climate Action Plan (CAP) published in 2019. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 – 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 13.4 Mt CO_2eq under the "With Existing Measures" scenario and 12.6 Mt CO_2eq under the "With Additional Measures" scenario (EPA, 2020c).

11.3.4 Sensitivity of the Receiving Environment

In line with the UK IAQM guidance document, *Guidance on the Assessment of Dust from Demolition and Construction* (2014), prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity, while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are approximately 35 high sensitivity residential properties within 100 m of the main works area of the proposed Project Site. Based on the IAQM criteria outlined in Table 11.6, the worst case sensitivity of the area to dust soiling is considered to be low.

Table 11.6: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed Project is 13 µg/m^3 and there are approximately 60 high sensitivity receptors located within 200 m of the proposed Project Site. Based on the IAQM criteria outlined in Table 11.7, the worst case sensitivity of the area to human health is considered to be low.

Table 11.7: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<200
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

11.4 Potential Impacts of the Proposed Project

11.4.1 Proposed Development

11.4.1.1 Construction Stage

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed Project is from construction dust emissions and the potential for nuisance dust and PM_{10} / $PM_{2.5}$ emissions. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The proposed Project can be considered moderate in scale and, therefore, there is the potential for significant dust soiling impacts within 50 m of the Site (Table 11.8). The closest high sensitivity receptors (residential properties) to the Site are approximately 60 m to the west of the Site. As per Section 11.3.4, the surrounding area is of low sensitivity to dust soiling and dust related human health impacts. In the absence of mitigation, there is the potential for ***short-term, negative, slight impacts*** to nearby sensitive receptors as a result of construction dust emissions. There is the potential for the construction stage of GA3 to overlap with the construction of additional phases of the wider Baldoyle-Stapolin lands development however significant impacts are not predicted once appropriate mitigation measures are in place (see Section 11.4.2 for cumulative assessment).

Table 11.8: Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place (TII, 2011)

Source		Potential Distance for Significant Effects (Distance From Source)		
Scale	Description	Soiling	PM_{10}	Vegetation Effects
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

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase, particularly due to the increase in HGVs accessing the Site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed Project satisfy the DMRB assessment criteria in Section 11.2.2. It can therefore be determined that the construction stage traffic will have an ***imperceptible, neutral, localised and short-term impact*** on air quality.

Climate

There is the potential for a number of GHG emissions to atmosphere during the construction phase of the proposed Project. Construction vehicles, generators, etc., may give rise to CO_2 and N_2O emissions. The IAQM document, *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014), states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, the impact on climate is considered to ***be imperceptible, neutral and short term***.

Human Health

Dust emissions from the construction phase of the proposed Project have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 11.8, significant PM_{10} emissions can occur within 15 m of the site for a development of this scale. However, the surrounding area is of low sensitivity to dust related human health impacts, as per Section 11.3.4. Therefore, in the absence of mitigation, there is the potential for ***imperceptible, negative, short-term impacts*** to human health as a result of the proposed Project.

11.4.1.2 Operational Stage

Air Quality

The impact of the proposed Project has been assessed by modelling emissions from the traffic generated as a result of the Project. The impact of NO_2 emissions for the opening and design years was predicted at the nearest sensitive receptors. This assessment allows the significance of the proposed Project, with respect to both relative and absolute impacts, to be determined. The assessment was carried out at three (3 no.) high sensitivity residential receptors (R1 – R3) (see Figure 11.1).

TII's guidelines (2011) detail a methodology for determining air quality impact significance criteria for road schemes that can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed Project. Results are compared against the do-nothing scenario, in order to determine the degree of impact.

The results of the assessment of the impact of the proposed Project on NO_2 in the opening year (2023) are shown in Table 11.9, and for design year (2038) are shown in Table 11.10. The annual average concentration is in compliance with the limit value at the worst-case receptor in both years. Concentrations of NO_2 are, at most, 50% of the annual limit value in 2023 and, at most, 49% in 2038 for the do-something scenario. There are some increases in traffic volumes between 2023 and 2038; therefore, any reductions in concentrations are due to decreased background values. In addition, the hourly limit value for NO_2 is 200 $\mu g/m^3$ and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year (Table 11.11).

The impact of the proposed Project on annual mean NO_2 concentrations can be assessed relative to do-nothing levels. Relative to baseline levels, there are predicted to be some small to imperceptible increases in NO_2 concentrations at each receptor. Concentrations will increase by, at most, 2.0% of the annual limit value in 2023, and by 3.1% in 2038, at the worst-case receptor (R1). Using the assessment criteria outlined in Appendix 11.2, Tables 11.2.1 and 11.2.2, the impact of the proposed Project in terms of NO_2 is considered negligible. Therefore, the overall predicted impact of NO_2 concentrations as a result of the proposed Project is ***long-term, negative and imperceptible***.

Concentrations of PM_{10} were modelled for the baseline year of 2020. The modelling showed that concentrations were in compliance with the annual limit value of 40 $\mu g/m^3$ at all receptors assessed. Therefore, further modelling for the opening and design years was not required as per the UK Highways Agency guidance (2019a). Concentrations reached, at most, 0.97 $\mu g/m^3$, excluding background concentrations. When a background concentration of 13 $\mu g/m^3$ is included, the overall impact is 35% of the annual limit value at the worst case receptor (R3).

Overall, the predicted impact of the proposed Project on ambient air quality in the operational stage is ***long-term, localised, negative and imperceptible***.

Table 11.9: Predicted Annual Mean NO_2 Concentrations – Opening Year 2023 ($\mu g/m^3$)[47]

Receptor	Impact Opening Year 2023				
	DN	DS	DS-DN	Magnitude	Description
R1	15.5	16.3	0.79	Small	Negligible Increase
R2	15.5	15.8	0.25	Imperceptible	Negligible Increase
R3	19.9	19.9	0.04	Imperceptible	Negligible Increase

Table 11.10: Predicted Annual Mean NO2 Concentrations – Design Year 2038 (µg/m3)47

Receptor	Impact Design Year 2038				
	DN	DS	DS-DN	Magnitude	Description
R1	14.6	15.9	1.26	Small	Negligible Increase
R2	14.9	15.2	0.30	Imperceptible	Negligible Increase
R3	19.6	19.7	0.05	Imperceptible	Negligible Increase

Table 11.11: Predicted 99.8th percentile of Daily Maximum 1-hour NO_2 Concentrations ($\mu g/m^3$)

Receptor	Opening Year 2023		Design Year 2038	
	DN	DS	DN	DS
R1	54.4	57.1	51.2	55.7
R2	54.4	55.3	52.3	53.3
R3	69.6	69.7	68.6	68.8

Air Quality Impact on Sensitive Ecosystems

The existing road network and the proposed Project both have the potential to impact a section of the Baldoyle Bay Special Area of Conservation (SAC) and Proposed Natural Heritage Area (pNHA) (site code 000199), along with the Baldoyle Bay Special Protection Area (SPA) (site code 004016) to the east of the proposed Project.

Modelling has been conducted at the worst-case location in closest proximity to the road links impacted by the proposed Project. The NO_X emissions resulting from traffic associated with

[47] Based on UK Highways Agency IAN technique for predicting future NO_2 concentrations

the current road network and proposed Project have been calculated and are detailed in Table 11.12. Ambient NO_X concentrations have been predicted for the opening year of 2023 as per the UK Highways Agency (2019a) and TII (2011) guidance. Concentrations are predicted along a transect of up to 200 m within the SAC, pNHA and SPA.

The predicted annual average NO_X concentration within the SAC, pNHA and SPA, is in exceedance of the limit value of 30 µg/m^3 for the existing do-nothing scenario and the do-something scenario. Concentrations are, at most 83% of the annual limit value, including a background concentration of 23 µg/m^3, for the protection of ecosystems for the existing scenario without the proposed Project in place. The proposed Project is predicted to increase NO_X concentrations by, at most, 0.44 µg/m^3.

Appendix 9 of the TII guidelines (2011) states that where a scheme is expected to cause an increase of more than 2 µg/m^3 and the predicted concentrations (including background) are close to, or exceed the standard, then the sensitivity of the habitat to NO_X should be assessed by the project ecologist. While NO_X concentrations are predicted to be in exceedance of the limit value either with or without the proposed Project in place, the proposed Project will only increase NO_X concentrations by a maximum of 0.44 µg/m^3 at the worst-case location. Therefore, effects are not predicted to be significant.

The contribution to the NO_2 dry deposition rate along the 200 m transect within the pNHA, SAC and SPA is also detailed in Table 11.11. The change in the maximum NO_2 dry deposition rate is 0.024 Kg(N)/ha/yr. This is well below the critical load for coastal habitats of 10 – 20 Kg(N)/ha/yr (TII, 2011).

Overall, the predicted air quality effect on designated ecological sites is considered ***negative, localised, long-term and imperceptible.***

Table 11.12: Assessment of NO_X Concentrations and NO_2 Dry Deposition Impact on the Baldoyle Bay SAC, pNHA and SPA

Distance to Road (m)	NO_X Concentration (µg/m^3)[48]			NO_2 Dry Deposition Rate Impact
	Do Nothing	Do Something	Change in NO_X Concentration	Kg N ha^{-1} yr^{-1}
10	24.35	24.78	0.44	0.024

48 Based on a background NO_X concentration of 23 µg/m^3 in 2023

Distance to Road (m)	NO_X Concentration ($\mu g/m^3$)[48]			NO_2 Dry Deposition Rate Impact
	Do Nothing	Do Something	Change in NO_X Concentration	Kg N ha^{-1} yr^{-1}
20	24.02	24.35	0.33	0.018
30	23.78	24.04	0.25	0.013
40	23.61	23.81	0.20	0.011
50	23.48	23.63	0.16	0.009
60	23.38	23.50	0.12	0.006
70	23.30	23.39	0.10	0.005
80	23.23	23.31	0.08	0.004
90	23.18	23.24	0.06	0.003
100	23.14	23.19	0.05	0.002
110	23.11	23.15	0.04	0.002
120	23.09	23.12	0.03	0.001
130	23.07	23.09	0.02	0.001
140	23.06	23.07	0.02	0.001
150	23.05	23.06	0.02	0
160	23.04	23.06	0.01	0.001
170	23.04	23.05	0.01	0.001
180	23.03	23.04	0.01	0
190	23.03	23.04	0.01	0.001
200	23.02	23.03	0.01	0

Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this, there is the potential for flooding related impacts on Site in future years. A detailed flood risk assessment has been undertaken as part of this planning application (submitted under separate cover) and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the predicted impact in this respect is ***imperceptible***.

There will be a certain degree of GHG emissions to atmosphere as a result of the operational phase of the proposed Project. The predicted concentrations of CO_2 for the opening year (2023) and design year (2038) are detailed in Table 11.13 relative to the national 2030 target set out under EU legislation. It is predicted that in 2023, the proposed Project will increase CO_2 emissions by 0.00054% of the EU 2030 target. In 2038, CO_2 emissions will increase by 0.00072% of the 2030 target. Therefore, the predicted climate impact of the proposed Project is ***negative, long-term and imperceptible***.

Table 11.13: Climate Impact Assessment

Year	Scenario	CO_2 (tonnes/annum)
2023	Do Nothing	2,526
	Do Something	2,703
2038	Do Nothing	2,965
	Do Something	3,203
Increment in 2023		176.8 Tonnes
Increment in 2038		237.7 Tonnes
Emission Ceiling (kilo Tonnes) 2030		32,860[49]
Impact in 2023 (%)		0.00054 %
Impact in 2038 (%)		0.00072 %

In addition, the proposed Project has been designed to reduce the impact to climate, where possible. The following measures have been incorporated into the design:

- The use of photovoltaics as a means of providing a renewable source of energy for the building is being considered.
- The proposed Project aims to be a Near Zero Energy Building meaning it will have a very high energy performance with a Building Energy Rating (BER) of at minimum A3.
- A BEMS (Building Energy Management System) system is to be installed to monitor the use of all major systems in the building. The BEMS system is a graphical interface that allows the facilities/building manager to monitor and control all systems throughout the building.

Further details on the measures being undertaken to reduce the proposed Project's impact on climate can be found in the Energy and Sustainability Report prepared in support of this application.

Human Health

[49] Target under Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013

Traffic related air emissions have the potential to impact air quality, which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health. The predicted impact on human health during the operational stage is ***long-term, negative and imperceptible.***

11.4.2 Potential Cumulative Impacts

11.4.2.1 Construction Stage

According to the IAQM guidance (2014), should the construction phase of the proposed Project coincide with the construction phase of any other developments within 350 m, then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. There is the potential for the construction phase of the proposed Project to coincide with the construction of additional phases of the wider Baldoyle-Stapolin lands development. However, provided the mitigation measures outlined in Section 11.5 and Appendix 11.3 are implemented throughout the construction phase of the proposed Project, ***significant cumulative dust impacts are not predicted***.

Due to the short-term duration of the construction phase and the low potential for significant CO_2 and N_2O emissions, cumulative impacts to climate are considered ***imperceptible***.

11.4.2.2 Operational Stage

The traffic data used to assess the operational stage impacts to air quality and climate included the cumulative traffic associated with the proposed Project combined with other existing and permitted developments in the local area, where such information was available. Therefore, the cumulative impact is included within the operational stage impact for the proposed Project. The impact is predicted to be ***long-term, negative and imperceptible*** with regards to air quality and climate, during the operational phase.

In short, ***no significant cumulative impacts are predicted to occur in relation to air quality or climate*** as a result of the proposed Project.

11.5 Mitigation Measures

11.5.1 Construction Phase

The following mitigation measures shall be implemented during the construction phase:

11.5.1.1 Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released.

The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan. The key aspects of controlling dust are listed below. Full details of the Dust Management Plan can be found in Appendix 11.3. These measures will be incorporated into the finalised Construction Environmental Management Plan (CEMP) prepared for the site.

In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.

Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

11.5.1.2 Climate

Construction stage traffic and embodied energy of construction materials are expected to be the dominant source of GHG emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term nature of these works, the impact on climate will not be significant.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are reduced further:

- On-site or delivery vehicles will not be permitted to leave engines idling, even over short periods, unless strictly necessary.
- An efficient materials management system will be implemented in order to minimise wastage of materials due to poor timing / over-ordering or improper storage, reducing the embodied carbon footprint of the site.

11.5.2 Operational Phase

The impact of the proposed Project on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no site specific mitigation measures are required.

11.6 Residual Impacts

11.6.1 Construction Stage

11.6.1.1 Air Quality

Once the dust minimisation measures outlined in Section 11.5 and Appendix 11.3 are implemented, the predicted residual impact of the proposed Project in terms of dust soiling will be ***short-term, negative and imperceptible*** at nearby receptors.

11.6.1.2 Climate

According to the IAQM guidance (2014), site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, the predicted residual impact is ***neutral, short-term and imperceptible.***

11.6.1.3 Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed Project, which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction phase will ensure that the impact of the proposed Project complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the predicted residual impact of construction of the proposed Project is likely to be ***negative, short-term, localised and imperceptible*** with respect to human health.

11.6.2 Operational Stage

11.6.2.1 Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed Project was carried out using the UK DMRB model. The modelling assessment determined that the change in emissions of NO_2 at nearby sensitive receptors will be imperceptible. Therefore, the predicted operational phase residual impact to air quality is ***long-term, localised, negative and imperceptible.***

11.6.2.2 Climate

Modelling of operational phase CO_2 emissions as a result of the traffic associated with the proposed Project was carried out to determine the impact to climate. It was found that emissions of CO_2 will increase by an imperceptible amount relative to the EU 2030 GHG target. The predicted residual operational phase impact to climate is ***long-term, negative and imperceptible***.

11.6.2.3 Human Health

As the air dispersion modelling has shown, emissions of air pollutants will be significantly below the ambient air quality standards, which are based on the protection of human health. Predicted residual impacts to human health during the operational phase are ***long-term, negative and imperceptible***.

11.7 Monitoring

Beyond that which is inherent in the mitigation set out above and in Appendix 11.3, no monitoring is considered necessary.

11.8 Interactions

Refer to Chapter 20 (Interactions) for a summary of the interactions between environmental topics addressed in this EIAR.

11.8.1 Population & Human Health

The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits. The predicted impact is ***long-term and imperceptible*** with respect to human health.

11.8.2 Traffic & Transportation

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the proposed Project on air quality are assessed by reviewing the change in annual average daily traffic on the surrounding road network and the proposed scheme. In this assessment, the impact arising as a result of the interactions between traffic and air quality are considered to be ***imperceptible***.

11.8.3 Biodiversity

There is the potential for interactions between air quality and biodiversity as the Baldoyle Bay Special Area of Conservation (SAC) and Proposed Natural Heritage Area (pNHA) (site code 000199), along with the Baldoyle Bay Special Protection Area (SPA) (site code 004016) are to the east of the proposed Project. Dust emissions from construction works have the potential to impact vegetation in the SAC, pNHA and SPA. Once the mitigation measures outlined within Section 11.5 and Appendix 11.3 are implemented, dust related impacts are predicted to be ***short-term and imperceptible***.

Traffic emissions also have the potential to impact vegetation as a result of NO_x emissions. Air dispersion modelling of traffic emissions was conducted, and it was found that the traffic associated with the proposed Project will lead to an imperceptible increase in NO_x concentrations within the pNHA, SAC and SPA. Therefore the predicted impact is ***long-term, negative and imperceptible.***

11.8.4 Land, Soil, Geology & Hydrogeology

Construction phase activities such as land clearing, excavations, stockpiling of materials, etc., have the potential for interactions between air quality and land and soils in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions (as set out above and in Appendix 11.3), it is predicted that there will be ***no significant impacts*** arising as a result of interactions between air quality and land and soils.

11.9 Cumulative Impacts

Refer to Section 11.4.2 for an assessment of cumulative impacts in relation to air quality and climate. The cumulative impact assessment has had reference to the list of plans and projects set out in Chapter 21 (Cumulative Impacts).

11.10 'Do-Nothing' Impact

In the do-nothing scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc.).

Considering the zoning of the lands in question and the context in terms of policy and housing demand, it is also possible that, in the absence of the proposed Project, a similar type of development (likely predominantly residential) would be progressed at the site, under the scope of a different application. As the details of a hypothetical future development at the site are unknown, it is not possible to accurately predict its impacts in terms of air quality and climate.

11.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered when conducting this assessment.

11.12 References

- DEHLG (2004). *Quarries and Ancillary Activities, Guidelines for Planning Authorities*
- DEHLG (2010). *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*
- Environmental Protection Agency (EPA) (2019). *GHG Emissions Projections Report – Ireland's Greenhouse Gas Emissions Projections 2018 – 2040*
- EPA (2015). *Advice Notes for Preparing Environmental Impact Statements – Draft*

- EPA (2017). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft*
- EPA (2020a). *Air Quality Monitoring Report 2019* (and previous annual reports)
- EPA (2020b). *Ireland's Provisional Greenhouse Gas Emissions 1990 – 2019*
- EPA (2021). *EPA website*: http://www.epa.ie/whatwedo/monitoring/air/
- European Commission (2013). *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*
- Fingal County Council & Codema (2019). *Fingal County Council Climate Change Action Plan 2019 – 2024*
- German VDI (2002). *Technical Guidelines on Air Quality Control – TA Luft*
- Government of Ireland (2015). *Climate Action and Low Carbon Development Act*
- Government of Ireland (2019). *Climate Action Plan 2019*
- Government of Ireland (2020a). *Draft General Scheme of the Climate Action (Amendment) Bill 2019*
- Government of Ireland (2020b). *Climate Action and Low Carbon Development (Amendment) Bill 2020*
- IAQM (2014). *Guidance on the Assessment of Dust from Demolition and Construction Version 1.1*
- Met Éireann (2021). *Met Eireann website*: https://www.met.ie/
- TII (2009). *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (Rev. 2)
- TII (2011). *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*
- UK DEFRA (2016). *Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG(16)*
- UK DEFRA (2018). *Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG(16)*
- UK Highways Agency (2007). *Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document & Calculation Spreadsheet)*

- UK Highways Agency (2019a). *UK Design Manual for Roads and Bridges (DMRB), Volume 11, Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air quality*
- UK Highways Agency (2019b). *UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate*
- World Health Organisation (2006). *Air Quality Guidelines – Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)*

12 Noise & Vibration

12.1 Introduction

This Chapter of the EIAR has been prepared by AWN to assess the noise and vibration impact of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, in the context of current relevant standards and guidance. This assessment has been prepared by Leo Williams BAI MAI PgDip MIOA, Acoustic Consultant at AWN Consulting, who has over 6 years' experience as an environmental consultant specialising in Acoustic Impact Assessments.

This Chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impacts associated with the proposed Project during both the short-term construction phase and the long-term operational phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed Project is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment. Inward noise impacts, in particular of aircraft movements at Dublin Airport, have also been considered.

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration, which are set out within the relevant sections of this Chapter and included in the references section. In addition to specific noise guidance documents, the following guidelines were considered and consulted for the purposes of this Chapter:

- EPA (2002). *Guidelines on the Information to be contained in Environmental Impact Statements*;
- EPA (2003). *EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*;
- EPA (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*;
- EPA (2017). *Draft EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports*;

- FCC (2017). *Fingal Development Plan 2017 – 2023 – Policy on Aircraft Noise*;
- FCC (2018). *Noise Action Plan for Dublin Airport 2019 – 2023*;
- Dublin City Council, Dún Laoghaire-Rathdown County Council, FCC & South Dublin County Council (2018). *Dublin Agglomeration Noise Action Plan 2019 – 2023*; and
- Association of Noise Consultants, the Institute of Acoustics & the Chartered Institute of Environmental Health (2017). *Professional Guidance on Planning & Noise*.

12.2 Methodology

This assessment has been undertaken using the following methodology:

- Detailed baseline noise monitoring has been undertaken in the vicinity of the nearest noise sensitive locations to determine the range of noise levels in the existing environment;
- 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 Project; and
- Where necessary, a schedule of mitigation measures has been proposed to control the noise and vibration emissions associated with the construction and / or operational phases of the proposed development, as appropriate.

12.2.1 Construction Phase – Noise Criteria

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities typically control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In order to set appropriate construction noise limits for the development site, reference has been made to BS 5228 2009+A1 2014 Code of practice for noise and vibration control on construction and open sites. Part 1 of this document, 'Noise', provides guidance on selecting appropriate noise criteria relating construction works.

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise.

This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 12.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Table 12.1: Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value (dB)		
	Category A[50]	Category B[50]	Category C[50]
Daytime (08:00 – 19:00) and Saturdays (08:00 – 14:00)	65	70	75
Evenings and weekends[51]	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

For the appropriate assessment period (i.e. daytime in this instance), the ambient noise level is determined and rounded to the nearest 5 dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur.

12.2.2 Construction Phase – Vibration Criteria

Vibration standards address two aspects: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. For the purpose of this scheme, the range of relevant criteria used for surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

---

[50] A. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

B. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

C. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

[51] 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

12.2.2.1 Building Damage

Guidance relevant to acceptable vibration in order to avoid damage to buildings is contained within BS 7385-2 (1993). The guidance values contained within BS 7385 are reproduced also in British Standard BS 5228-2 (2009).

These standards differentiate between transient and continuous vibration. Surface construction activities are considered to be transient in nature as they occur for a limited period of time at a given location. The standards note that the risk of cosmetic damage to residential buildings starts at a Peak Particle Velocity (PPV) of 15 mm/s at 4 Hz. The standard also notes that below 12.5 mm/s PPV, the risk of damage tends to zero. Both standards note that important buildings that are difficult to repair might require special consideration on a case-by-case basis but a building of historical importance should not (unless it is structurally unsound) be assumed to be more sensitive. If a building is in a very unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground borne disturbance.

Table 12.2 summarises the proposed vibration criteria below which there is no risk of damage to buildings. These limits apply to vibration frequencies below 15 Hz, where the most conservative limits are required. If there are any protected buildings near the works there is a greater potential for these to be more vulnerable than other adjacent modern structures. Therefore, on a precautionary basis, the guidance values for structurally sound buildings are reduced by 50% in line with the guidance documents referred to above.

Table 12.2: Recommended Vibration Limits

Structure Type	Vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:		
	4 to 15 Hz	15 to 40 Hz	40 Hz +
Structurally sound and non-protected buildings	15 mm/s	20 mm/s	50 mm/s

12.2.2.2 Human Perception

It is acknowledged that humans are sensitive to vibration stimuli and that perception of vibration at high magnitudes may lead to concern. Vibration typically becomes perceptible at around 0.15 – 0.3 mm/s and may become disturbing or annoying at higher magnitudes.

However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known. For example, piling can typically be tolerated at vibration levels up to 6 mm/s if adequate public relations are in place. The above values refer to the day and evening time periods only.

During certain construction works (piling, demolition, etc.), the vibration limits set out in Table 12.2 will be perceptible to building occupants and have the potential to cause subjective impacts. The level of impact is, however, greatly reduced when the origin and time frame of the works are known and limit values relating to structural integrity are adequately communicated. In this regard, the use of clear communication and information circulars relating to planned works and their duration can significantly reduce vibration impacts to the neighbouring properties.

Expected vibration levels from the construction works will be discussed further in Section 12.5.2.

With regards to inward vibration associated with the rail line, 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 $m \cdot s^{-1.75}$. 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 12.3, which has been adapted from the standard, details the values of VDV where various comments from occupiers are possible. The standard notes that the values are applicable to both vertical and horizontal vibration with the appropriate weighting applied. The values in Table 12.3 have been adopted for this assessment.

Table 12.3: VDV ($m \cdot s^{-1.75}$) above Which Various Degrees of Adverse Comment may be Expected in Residential Buildings

Building Type	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential Building Day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6

12.2.3 Operational Phase – Noise Criteria

12.2.3.1 Mechanical Plant

In relation to day-to-day operational noise impacts on off-site residential locations, Local Authorities would typically apply the following condition to a grant decision for a development of this nature:

> *Noise levels from the proposed development shall not be so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give reasonable cause for annoyance to a person in any premises in the neighbourhood or to a person lawfully using any public place. In particular, the rated noise levels from the proposed development shall not constitute reasonable grounds for complaint as provided for in B.S. 4142. Method for rating industrial noise affecting mixed residential and industrial areas.*
>
> *Reason: In order to ensure a satisfactory standard of development, in the interests of residential amenity.*

This wording is most relevant to the noise emissions from mechanical plant serving the development and careful consideration will be given to this issue as part of the detailed assessment.

Guidance from Local Authorities on noise emissions from mechanical plant items typically makes reference to the British Standard BS 4142: 2014: *Methods for Rating and Assessing Industrial and Commercial Sound*. This document is the industry standard method for analysing building services plant noise emissions to residential receptors and is the document typically used by Local Authorities in their standard planning conditions and also in complaint investigations.

BS 4142 describes methods for rating and assessing sound of an industrial and / or commercial nature. The methods described in BS 4142 use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

For an appropriate BS 4142 assessment, it is necessary to compare the measured external background noise level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where noise emissions are found to be tonal, impulsive in nature or irregular enough to attract attention, BS 4142 also advises that a penalty be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal noise characteristics outlined in BS 4142 recommends the application of a 2 dB penalty for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

The following definitions are set out in BS 4142 and apply to this assessment:

Ambient noise level, $L_{Aeq,T}$	is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
Residual noise level, $L_{Aeq,T}$	is the noise level produced by all sources excluding the sources of concern, i.e. the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
Specific noise level, $L_{Aeq, T}$	is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].

Rating level, $L_{Ar,T}$	is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components).
Background noise level, $L_{A90,T}$	is the sound pressure level of the residual noise that is exceeded for 90% of the time period T.

If the rated plant noise level is +10 dB or more above the pre-existing background noise level, then this indicates that complaints are likely to occur and that there will be a significant adverse impact. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

The existing prevailing background noise level measured during the noise survey is on average 48 dB L_{A90} during the most sensitive night-time period. During the daytime, the prevailing background noise levels were of the order of 58 dB L_{A90}.

Assuming that certain items of mechanical plant serving the development will operate 24/7, the mechanical plant noise emissions must be designed to achieve the BS4142 requirements during the night-time period. Therefore, in order to limit the noise impact of mechanical plant serving the proposed Project, during the detailed design of the proposed Project, the specific plant noise levels will be designed to be equal to or lower than the prevailing background noise level at the nearest off-site noise sensitive locations.

As there is the potential for short periods of noise to cause a greater disturbance at night-time, a shorter assessment time period (T) is adopted. Appropriate periods are 1 hr for daytime (07:00 – 23:00 hrs) and 15 mins for night-time (23:00 – 07:00 hrs).

Noise criteria have been derived from measured background noise levels for various noise sensitive receivers surrounding and within the Site. This is discussed in Section 12.5.3.

12.2.3.2 Traffic Noise

Given that traffic to and from the proposed Project will make use of existing roads already carrying traffic volumes, it is appropriate to consider the increase in traffic noise levels that will arise as a result of vehicular movements associated with the proposed Project.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 12.4 offers guidance as to the likely impact associated with any particular change in traffic noise level (as per DMRB, 2020). It shows that small changes in noise levels are not normally noticeable, whereas an increase of 10 dB would be described as a doubling of loudness. In summary, the assessment looks at the impact with and without the proposed Project at the nearest noise sensitive locations.

Table 12.4: Significance in Change in Noise Level

Change in Sound Level (dB L_{A10})	Subjective Reaction	DMRB magnitude of Impact	EPA Classification Magnitude of Impact
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate

12.2.3.3 Inward Noise Impact

Fingal Development Plan Policy on Aircraft Noise

The members of Fingal County Council resolved to adopt Variation No. 1 of the *Fingal Development Plan 2017 – 2023* at a Council meeting on 9 December 2019. Variation No. 1 outlines revised Noise Zones and policy objectives in relation to aircraft noise from Dublin Airport.

Four noise zones (Zone A to D) are now indicated, representing potential site exposure to aircraft exposure. The council will actively resist residential development within Zone A, and resist in Zone B and C, pending independent acoustic advice and mitigation measures. Certain specific residential developments located in Zone D may be required to demonstrate that aircraft noise intrusion has been considered in the design. The proposed Project Site is located in Zone C as illustrated in Figure 12.1, below. Table 12.5, below, outlines the objectives to be adhered to by applicants for developments in the zones relevant in this instance.

Figure 12.1: Proposed Airport Noise Zones – Site Location

Table 12.5: Aircraft Noise Zones

Zone	Potential Noise Exposure during Airport Operations	Objective
D	≥ 50 dB and < 54 dB $L_{Aeq, 16hr}$ and ≥ 40 dB and < 48 dB L_{night}	To identify noise sensitive developments which could potentially be affected by aircraft noise and to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment. All noise sensitive development within this zone is likely to be acceptable from a noise perspective. An associated application would

Zone	Potential Noise Exposure during Airport Operations	Objective
		not normally be refused on noise grounds, however where the development is residential-led and comprises non-residential noise sensitive uses, or comprises 50 residential units or more, it may be necessary for the applicant to demonstrate that a good acoustic design[52] has been followed. Applicants are advised to seek expert advice.
C	≥ 54 dB and < 63 dB $L_{Aeq, 16hr}$ and ≥ 48 dB and < 55 dB L_{night}	To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure, where appropriate, noise insulation is incorporated within the development[53]. Noise sensitive development in this zone is less suitable from a noise perspective than in Zone D. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed. The noise assessment must demonstrate that relevant internal noise guidelines will be met. This may require noise insulation measures. An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the development's design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels. Applicants are strongly advised to seek expert advice.

[52] 'Good acoustic design' means following the principles of assessment and design as described in *ProPG: Planning & Noise – New Residential Development* (ANC, IOA & CIEH, 2017).
[53] Internal and external amenity and the design of noise insulation measures should follow the guidance provided in British Standard BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'.

Noise Action Plan for Dublin Airport 2019 – 2023

The Noise Action Plan for Dublin Airport (2019 – 2023) was published by Fingal County Council on 19 December 2019. The plan outlines the following objective in relation to aircraft noise:

> *"to avoid, prevent and reduce, where necessary, on a prioritised basis the effects due to long term exposure to aircraft noise, including health and quality of life through implementation of the International Civil Aviation Organisation's 'Balanced Approach' to the management of aircraft noise as set out under EU Regulation 598/2014"*

Whilst the plan outlines a range of measures to achieve this objective, the document is focussed primarily on the outward impact of the airport and aircraft noise and considers planning only in the context of outward impacts, such as the encroachment of airport activities on existing uses.

Discussion on the consideration of the inward noise impacts on residential amenity is considered in more detail in the Dublin Agglomeration Noise Action Plan 2019 – 2023.

Dublin Agglomeration Noise Action Plan 2019 – 2023

The Dublin Agglomeration Noise Action Plan (NAP) states the following with respect to assessing the noise impact on new residential development:

> *"In the scenario where new residential development or other noise sensitive development is proposed in an area with an existing climate of environmental noise, there is currently no clear national guidance on appropriate noise exposure levels. The EPA has suggested in the interim, that Action Planning Authorities should examine planning policy guidance notes, such as ProPG (2017). Such guidance notes have been produced with a view to providing practitioners with guidance on a recommended approach to the management of noise within the planning system."*

In addition, the following is provided:

> *"In advance of any national guidance relating to noise in the planning process, the following actions relating to planning and development will be considered for implementation:*

To integrate Noise Action Plans into the County Development Plans.

To develop guidelines relating to Noise and Planning for FCC. These guidelines should outline the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise. They should introduce the concept of a risk based approach to assessment of noise exposure, and for Good Acoustic Design to be encouraged as part of all new residential developments in FCC.

To require developers to produce a noise impact assessment and mitigation plans, where necessary, for any new development where the Planning Authority considers that any new development will impact negatively on pre-existing environmental noise levels within their Council area.

To ensure that future developments are designed and constructed in such a way as to minimise noise disturbances in accordance with Department of the Environment, Community and Local Government planning guidelines such as the Urban Design Manual. e.g. the position, direction and height of new buildings, along with their function, their distance from roads, and the position of noise barriers and buffer zones with low sensitivity to noise,

To ensure that new housing areas and in particular brown field developments will be planned from the outset in a way that ensures that at least the central area is quiet. This could mean designating the centre of new areas as pedestrian and cycling zones with future developments to provide road design layouts to achieve low speed areas where appropriate.

To incorporate street design in new developments, which recognise that residential streets have multi-function uses (e.g. movement, recreation) for pedestrians, cyclists and vehicles, in that priority order. The noise maps will be used to identify and classify the priority areas and streets. In the design of streets, cognisance should be given to the Irish Manual for Roads and Streets 2013.

To require sound proofing for all windows, in all new residential developments, where noise maps have indicated undesirable high noise levels. This may also lead to a requirement to install ducted ventilation.

To advise during pre-planning meetings regarding site specific design, the orientation of sensitive rooms and balconies away from noise, designing the layout and internal arrangement in apartments to ensure that similar rooms in individual units are located above each other or adjoin each other and that halls are used as buffer zones between sensitive rooms and staircases."

In accordance with the requirements of the NAP, an Acoustic Design Statement (ADS) has been incorporated into this Chapter in respect of the proposed Project.

ProPG: Planning & Noise

The Professional Guidance on Planning & Noise (ProPG) document was published in May 2017. 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 government document, since its adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk-based two-stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

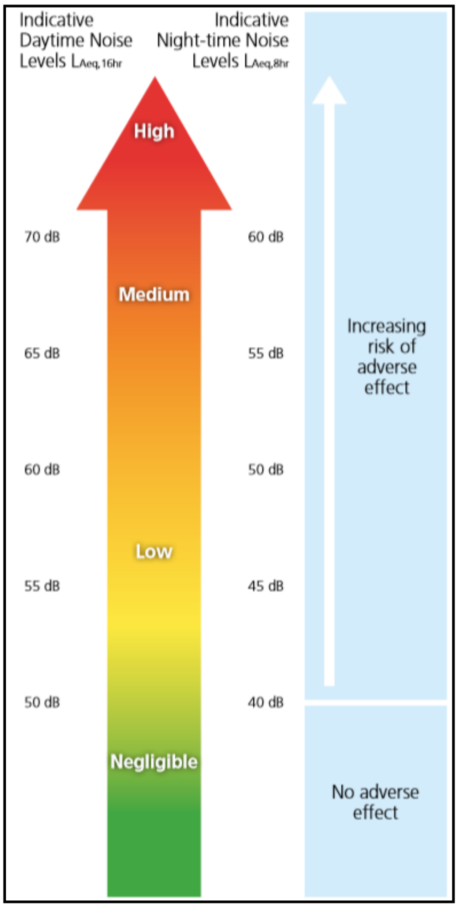
Stage 1: Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,

Stage 2: Involves a full detailed appraisal of the proposed development covering four *"key elements"* that include:

- Element 1 – Good Acoustic Design Process;
- Element 2 – Noise Level Guidelines;
- Element 3 – External Amenity Area Noise Assessment; and
- Element 4 – Other Relevant Issues.

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the Site as a 'negligible', 'low', 'medium' or 'high' risk, based on the pre-existing noise environment. Figure 12.2 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.

Figure 12.2: ProPG Stage 1 – Initial Noise Risk Assessment



It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period, and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 12.6 and are based on annual average data; that is to say they omit occasional events where higher intermittent noisy events may occur.

Table 12.6: ProPG Internal Noise Levels

Activity	Location	Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$	Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,T}$[54]

In addition to these absolute internal noise levels, ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered

[54] The document comments that the internal $L_{AFmax,T}$ noise level may be exceeded no more than 10 times per night without a significant impact occurring.

necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in a development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16\,hr}$."*

12.2.4 Operational Phase – Noise Criteria

Taking into account the expected activities associated with the operational phase of the proposed Project, it is not anticipated that there will be any impact associated with vibration.

The inward vibration impact from rail traffic has been considered. The relevant vibration criteria are set out in Section 12.2.2.

12.3 Baseline Environment

12.3.1 Environmental Noise Survey

12.3.1.1 Overview

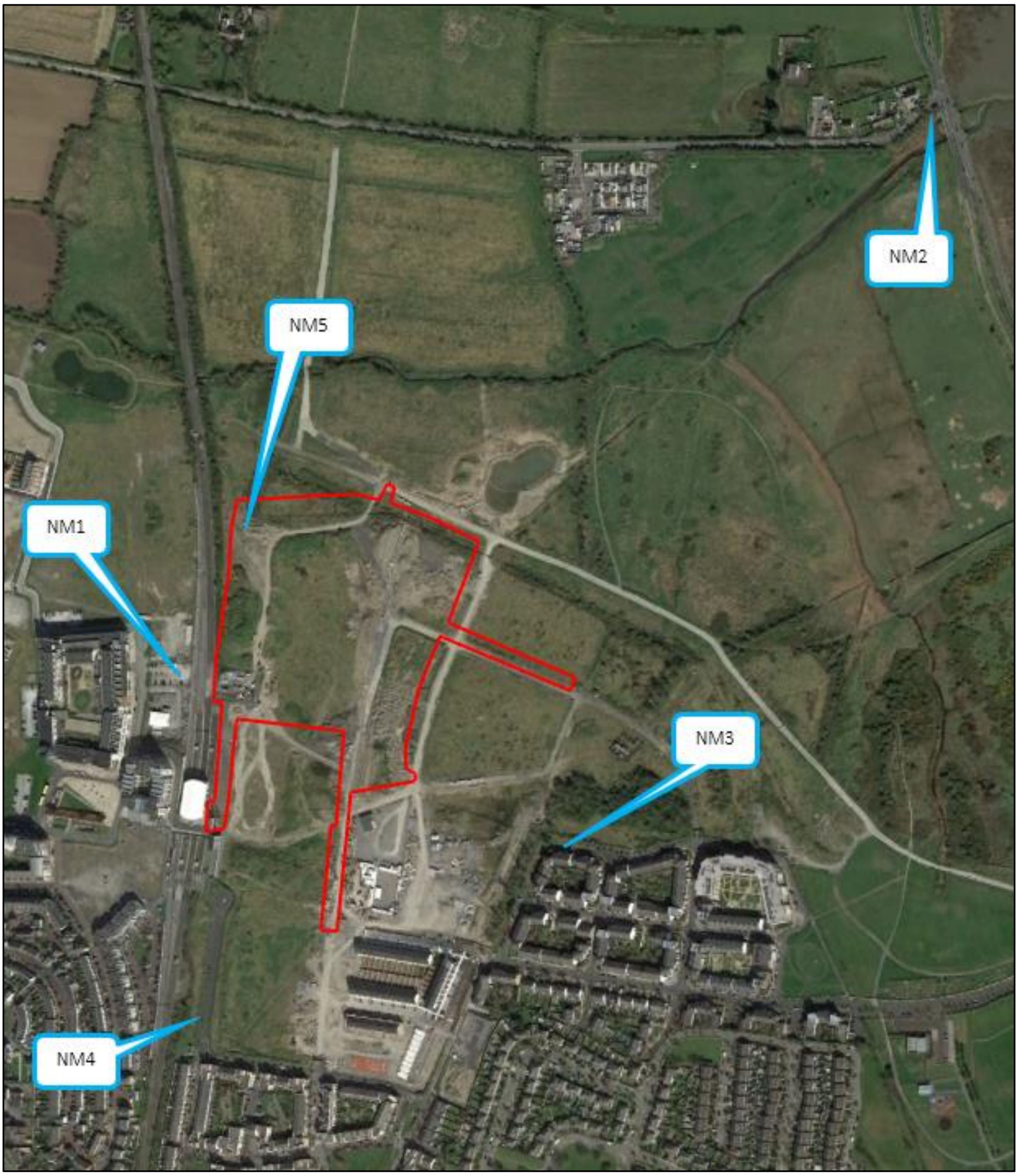
An environmental noise survey has been conducted at the Site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*. Specific details are set out below.

12.3.1.2 Measurement Locations

The measurement locations are described below and shown in Figure 12.3.

- NM1 Located in front of apartment building to the west of site.
- NM2 Located at houses to the north east of site.
- NM3 Located near houses at Red Arches Drive east of site.
- NM4 Located near houses at Myrtle Close to the south of site.
- NM5 Located adjacent to the rail line along the western site boundary.

Figure 12.3: Indicative Site Layout and Survey Locations



12.3.1.3 Survey Periods

The attended noise survey was carried out by AWN personnel over the period 11:00 to 15:30 hrs on 8 January 2020.

12.3.1.4 Instrumentation

The noise measurements were carried out using a Larson Davis 813 sound level meter. The instrument was calibrated before and after the survey with no significant drift noted.

12.3.1.5 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

SEL is 'sound exposure level' – a measure of the A-weighted sound energy used to describe noise events such as the passing of a train or aircraft; it is the A-weighted sound pressure level if occurring over a period of 1 second, would contain the same amount of A-weighted sound energy as the event.

The 'A' suffix denotes the fact that the sound levels have been 'A-weighted' in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

12.3.1.6 Results and Discussion

The results of the noise survey at the five monitoring locations are summarised below.

Location NM1

Table 12.7: Measured Noise Levels – NM1

Start Time (hrs)	Measured Noise Level (dB re. 2x10^{-5} Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
14:40	52	71	39
15:00	52	68	39

Start Time (hrs)	Measured Noise Level (dB re. $2x10^{-5}$ Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
15:30	58	80	39

The noise environment at his location was dictated by construction noise on a nearby site, which was influencing the L_{Aeq} measurements. Intermittent rail and aircraft movements were also observed. Faint traffic noise was audible during lulls in construction activity. The ambient L_{Aeq} ranged from 52 to 58 dB. The background L_{A90} was of the order of 39 dB.

Location NM2

Table 12.8: Measured Noise Levels – NM2

Start Time (hrs)	Measured Noise Level (dB re. 2x10-5 Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
14:20	66	89	54
14:37	67	85	55
15:10	66	77	54

The noise environment at this location was dictated by road traffic noise and frequent aircraft movements overhead. Other noise sources that contributed to measured noise levels included birdsong and noise from a generator. The ambient L_{Aeq} ranged from 66 to 67 dB. The background L_{A90} ranged from 54 to 55 dB.

Location NM3

Table 12.9: Measured Noise Levels – NM3

Start Time (hrs)	Measured Noise Level (dB re. 2x10-5 Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
11:30	50	73	45
12:30	52	67	43
12:45	50	69	43

The noise environment at this location was dictated by distant road traffic noise and aircraft movements overhead. Other noise sources that contributed to measured noise levels included birdsong and rail movements. The ambient L_{Aeq} ranged from 50 to 52dB. The background L_{A90} ranged from 43 to 45 dB.

Location NM4

Table 12.10: Measured Noise Levels – NM4

Start Time (hrs)	Measured Noise Level (dB re. 2x10-5 Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
11;00	55	71	46
12:00	55	73	45
12:45	53	73	46

The noise environment at this location was dictated by distant road traffic noise and frequent rail movements. Other noise sources that contributed to measured noise levels included birdsong, pedestrian activity and aircraft movements. The ambient L_{Aeq} ranged from 53 to 55 dB. The background L_{A90} ranged from 45 to 46 dB.

Location NM5

Table 12.11: Measured Noise Levels – NM5

Start Time (hrs)	Measured Noise Level (dB re. 2x10-5 Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
11:00	55	72	44
11:30	54	72	44
12:05	56	73	45

The noise environment at this location was dictated by distant road traffic noise and frequent rail movements. Other noise sources that contributed to measured noise levels included frequent aircraft movements and birdsong. The ambient L_{Aeq} ranged from 54 to 56 dB. The background L_{A90} ranged from 44 to 45 dB.

L_{max} noise levels during the daytime survey did not exceed 80 dB as a result of prevailing noise sources. It is therefore reasonable to assume that during the quieter night-time period that events of a higher level than this would not occur regularly.

Measurements of rail movements were made while on Site. The calculated (SEL) are detailed in Table 12.12, below.

Table 12.12: Noise Levels associated with Rail Movements

Activity	Location	Approximate Distance (m)	SEL (dB)
Rail Movement	Inbound track	53	75 – 82
	Outbound track	57	68 – 77

12.4 Characteristics of the Proposed Project

A full description of the proposed Project is provided in Chapter 5 – Description of the Proposed Project. Those aspects of the proposed Project which are pertinent to this Chapter are discussed in the following sections. Please refer to Figure 5.4 for the proposed Site layout.

12.4.1 Construction Phase

The construction phase will involve excavation over the development site, the formation of the basement levels, construction of the new buildings and landscaping.

12.4.2 Operational Phase

The primary sources of outward noise that are deemed long term are mechanical plant items that will serve the development and traffic travelling to and from the development. Inward noise from road and rail movements and aircraft will also be incident on the development buildings.

12.5 Potential Impacts of the Proposed Project

Taking into account the characteristics of the proposed Project, there is the potential for noise and vibration impacts during the short-term construction phase associated with construction activities and mobile plant, etc. During the long-term operational phase of the proposed Project, there is a potential impact associated with noise emissions from mechanical plant items and from an increase in traffic coming to and from the Site.

12.5.1 Construction Phase

The proposed construction hours are 07:00 to 19:00 hrs, Monday to Friday, and 08:00 to 14:00 hrs on Saturdays. Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise.

The construction programme has been established in outline form only, therefore it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS5228-1:2009+A1:2014. Table

12.13 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme at a standard reference distance of 10 m from the various plant items.

Table 12.13: Typical Construction Noise Emission Levels

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at 10m Distance (dB L_{Aeq})
Site Preparation	Wheeled Loader Lorry (D3 1)	75
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
Foundations	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Large Rotary Bored Piling Rig (C3.14)	83
	Compressor (D7 6)	77
	Poker Vibrator (C4 33)	78
General Construction	Hand tools	81
	Tower Crane (C4.48)	76
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68
	Wheeled Loader Lorry (D3 1)	75

For the purposes of the assessment it is assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this chapter.

The predicted daytime noise levels from an indicative construction period on site at the nearest off-site receptor have been calculated. Note construction noise sources for site are assumed to be running 66% of the time. The predictions have been prepared at various distances to provide an overview of how construction works will affect noise sensitive at various locations across the site. The nearest noise sensitive locations (NSLs) to the proposed Project have been identified and are illustrated in Figure 12.4.

NSL1: Apartments at Station Street, some 105 m west of site.

NSL2: Houses at Red Arches Drive some 180 m east of site.

NSL3: Halting Site on Moyne Road, some 370 m north of site.

In addition, two reference locations have been included at Baldoyle Bay Special Area of Conservation (SAC) and at Baldoyle Bay Special Protection Area (SPA). The impact on wildlife is assessed in Chapter 8 – Biodiversity.

N1: Baldoyle Bay SAC, approximately 470m north east of site at the closest point.

N2: Baldoyle Bay SPA, approximately 830m east of site at the closest point.

With reference to Table 12.1 and taking into account the measured ambient noise levels measured on site, the appropriate noise criteria for the NSLs listed above is 65 dB $L_{Aeq,1hr}$ during daytime hours.

Table 12.14 presents the predicted daytime noise levels associated with construction activity.

The predicted construction noise levels at the nearest identified noise sensitive locations are comfortably below the noise criteria for all construction works indicating a slight to moderate impact, in the absence of mitigation measures.

The scenarios described above represent works close to the site boundary, at the closest possible points to sensitive receivers off-site. As works move around the proposed project site, the distances between works and sensitive receivers increase and the noise levels associated with the works decrease.

Figure 12.4: Nearest Noise Sensitive Receivers

Table 12.14: Typical Construction Noise Emission Levels

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at Distance (dB L_{Aeq})				
		105m (NSL1)	180m (NSL2)	370m (NSL3)	230m (N1)	770m (N2)
Site Preparation	Wheeled Loader Lorry (D3 1)	48	43	37	41	31
	Track Excavator (C2 22)	45	40	34	38	28
	Dozer (C2.13)	51	46	40	44	34
	Dump Truck (C4.2)	51	46	44	44	34
Site Preparation Total		**55**	**51**	**34**	**48**	**38**
Foundations	Tracked Excavator (C3.24)	46	42	35	40	29
	Concrete Pump (C3.25)	50	46	39	44	33

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at Distance (dB L_{Aeq})				
		105m (NSL1)	180m (NSL2)	370m (NSL3)	230m (N1)	770m (N2)
	Large Rotary Bored Piling Rig (C3.14)	55	51	44	49	38
	Compressor (D7 6)	49	45	38	43	32
	Poker Vibrator (C4 33)	50	46	39	44	33
Foundations Total		**58**	**54**	**47**	**52**	**41**
General Construction	Hand tools	54	49	43	47	37
	Tower Crane (C4.48)	49	44	38	42	32
	Pneumatic Circular Saw (D7.79)	48	43	37	41	31
	Internal fit – out	43	38	32	36	26
General Construction Total		**56**	**51**	**45**	**49**	**39**
Landscaping	Dozer (C2.13)	51	46	40	44	34
	Dump Truck (C4.2)	51	46	40	44	34
	Surfacing (D8.25)	41	36	30	34	24
	Wheeled Loader Lorry (D3 1)	53	48	42	46	36
Landscaping Total		**56**	**52**	**46**	**50**	**39**

12.5.1.1 Vibration

The main potential source of vibration during the construction programme is associated with piling activities, depending on the methodologies used.

In order to assess potential vibration impacts at the closest sensitive buildings to the site works, a range of typical level of vibration during augured piling have been determined through reference to published empirical data within BS 5228 – Part 2. Vibration magnitudes associated with rotary bored piling using a 600 mm pile diameter for bored piling into soft ground over rock are summarised below:

- 0.54 mm/s at a distance of 5 m, for auguring;
- 0.22 mm/s at a distance of 5 m, for twisting in casing;
- 0.42 mm/s at a distance of 5 m, for spinning off, and;
- 0.43 mm/s at a distance of 5 m, for boring with rock auger.

Considering the low vibration levels at very close distances to augured piling rigs, vibration levels at the nearest receptors are not expected to pose any significance in terms of cosmetic or structural damage. At these distances from the works, vibration magnitudes will dissipate further, resulting in lower vibration levels to those noted above and, hence, orders of magnitude below the limit values in Table 12.2 for structurally sound buildings. In addition, the range of vibration levels is below a level which would be perceptible to occupants of the closest buildings beyond the eastern and western perimeter of the Site.

Notwithstanding the above, any construction activities undertaken on the Site will be required to operate below the recommended vibration criteria set out in Table 12.2 during all activities. Further discussion of mitigation measures during this phase is provided in Section 12.6.

12.5.2 Operational Phase

12.5.2.1 Outward Noise Impact

Mechanical Plant and Services

Once operational, building services plant items will be required to serve the commercial, amenity and residential aspect of the proposed Project. The cumulative operational noise level at the nearest noise sensitive location within the proposed Project (e.g. apartments, etc.) will be designed / attenuated to meet the relevant BS 4142 noise criteria for daytime and night-time periods.

Given the baseline noise levels measured and presented in Section 12.3, and on review of available EPA Noise Maps[55], appropriate criteria for plant noise levels at the nearest sensitive noise receptors have been derived. Based on the varying baseline noise levels across the Site, the following apply:

- Daytime (07:00 to 23:00 hrs): 50 dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00 hrs) 40 dB $L_{Aeq,15min}$

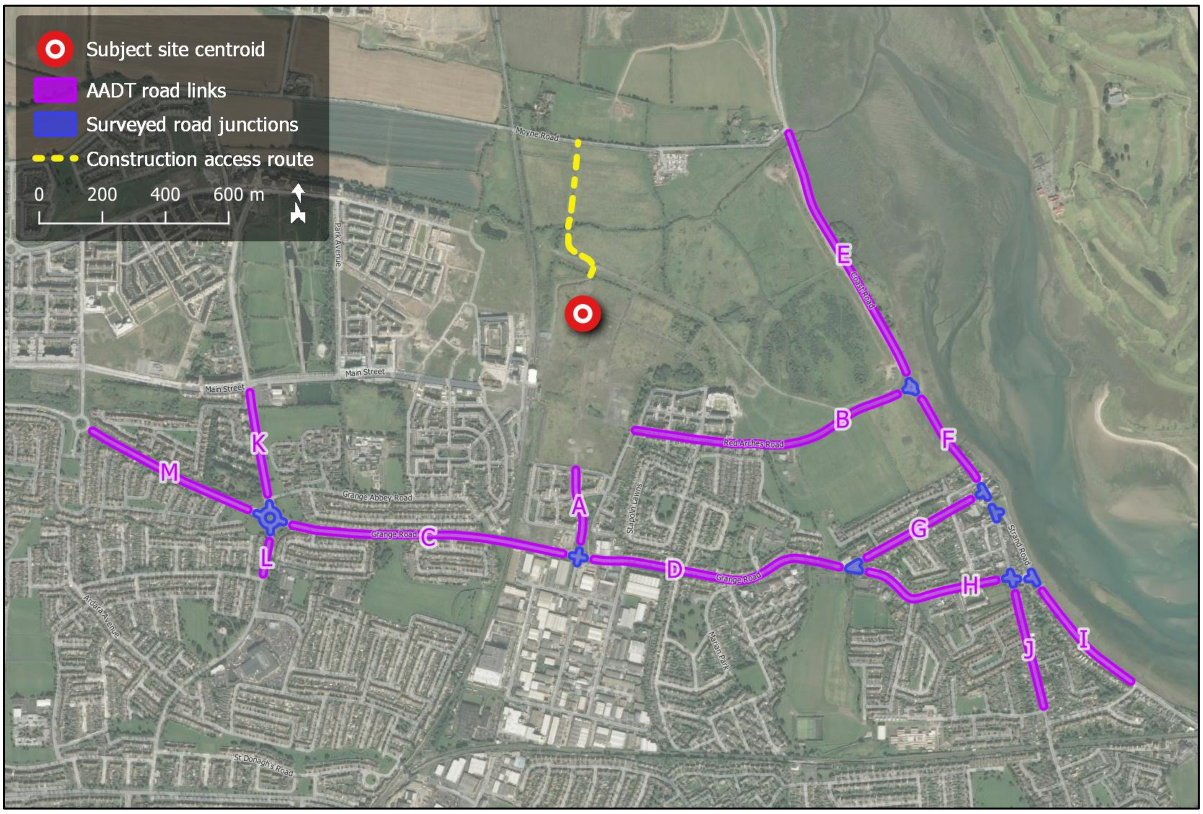
Additional Traffic on Local Roads

During the operational phase of a proposed Project, an increase in vehicles associated with the Project has the potential to increase the noise levels on the surrounding road network. Figure

[55] Source: https://gis.epa.ie/EPAMaps

12.5, below, from Cronin Sutton Consulting's Traffic and Transport Assessment (TTA) (submitted under separate cover as part of the planning application) illustrates the road links in the vicinity of the Site. The traffic flows on these road links have been provided by Cronin Sutton Consulting in the form of Annual Average Daily Traffic (AADT).

Figure 12.5: Traffic Noise Assessment – Road Links



The predicted changes in noise level have been calculated based on the change in traffic flows that have been provided for the various scenarios considered, i.e. do-nothing and do-something. These are presented in Table 12.15, below. This assessment considers the worst-case cumulative impact of the proposed Project as well as permitted nearby developments.

Table 12.15: Predicted Change in Traffic Noise Levels – Opening Year 2023

Road Link	Traffic Flows – AADT		
	Do Nothing – 2023 (Without development)	Do Something – 2023 (With Development)	Predicted Change in Noise Level (dB)
A	2876	5216	+2.6
B	2759	3571	+1.1
C	21270	22536	+0.3

Road Link	Traffic Flows – AADT		
	Do Nothing – 2023 (Without development)	Do Something – 2023 (With Development)	Predicted Change in Noise Level (dB)
D	15175	14093	-0.3
E	13418	14332	0.3
F	13848	12889	-0.3
G	5803	4397	-1.2
H	8206	8530	+0.2
I	11167	11508	+0.1
J	10676	11103	+0.2
K	15560	15720	0.0
L	25143	25508	+0.1
M	27946	28687	+0.1

Table 12.16: Predicted Change in Traffic Noise Levels – Design Year 2038

Road Link	Traffic Flows – AADT		
	Do Nothing – 2038 (Without development)	Do Something – 2038 (With Development)	Predicted Change in Noise Level (dB)
A	2414	5562	+3.6
B	3105	3916	+1.0
C	24237	26140	+0.3
D	17393	16602	-0.2
E	15655	16567	+0.2
F	16152	15193	-0.3
G	6745	5342	-1.0
H	9462	9886	+0.2
I	13066	13408	+0.1
J	12245	12883	+0.2
K	18122	18362	+0.1
L	29211	29761	+0.1
M	32405	33516	+0.1

At external road links under consideration, with the exception of Link A, the predicted changes in noise levels are in the range of -1.2 to +1.1 dB. With reference to Table 12.4, the corresponding impact is ***negligible***. The impact for the majority of road links is determined to be ***neutral, imperceptible and long term***. On Road Link A, the associated predicted impact is categorised as ***negative, imperceptible to slight, and long-term***.

12.5.2.2 Inward Noise Impact

In the context of noise impacts inwards on the proposed Project, the Site is bound to the west by the Dublin-Belfast rail line and is located within the proposed new airport noise Zone D, with part of the northern sector located in Zone C. These external noise sources are assessed here in order to ensure that internal noise levels within houses and apartments meet the appropriate criteria so that residential amenity of future occupants is not negatively impacted.

Rail Noise

Noise from rail traffic was measured during the baseline noise survey on Site and the SEL derived. Using this SEL and knowledge of the number of rail movements in a given period, it is possible to predict the expected noise levels arising at the façade of the nearest noise sensitive receptor using the following equation:

$$L_{Aeq} = L_{AX} - 10*log_{10}(r_1/r_2) + 10*log_{10}(N) - 10*log_{10}(T)$$

Where:

L_{Ax} = measured SEL

N = number of vehicle movements

T = time (seconds)

r_1 = distance from the source to the receiver

r_2 = distance from the source to the measurement

Predicted noise levels are presented in the table below.

Table 12.17: Predicted Rail Line Noise

Location	Distance	Period	Predicted Façade Noise Level ($L_{Aeq,T}$) (dB)
Block G1 (Western Façade)	50 m	Daytime	54
		Night-time	47

Location	Distance	Period	Predicted Façade Noise Level ($L_{Aeq,T}$) (dB)
Block E1 (Western Façade)	25 – 30 m	Daytime	60
		Night-time	53

At façades located further from the rail line, rail noise levels are predicted to be of a level that is similar to the prevailing background noise levels.

Aircraft Noise

A future change to the local infrastructure that is likely to alter the noise environment is the development of the North Runway at Dublin Airport. To address this, FCC have produced noise zone maps for the area surrounding the airport. These maps present noise contours as follows:

- Zone A – ≥ 63 dB $L_{Aeq,16hr}$ and/or ≥ 55 dB L_{night};
- Zone B – ≥ 54 dB $L_{Aeq,16hr}$ and < 63 dB $L_{Aeq,16hr}$ and ≥ 55 dB L_{night};
- Zone C – ≥ 54 dB $L_{Aeq,16hr}$ and < 63 dB $L_{Aeq,16hr}$ and ≥ 48dB L_{night} and < 55 dB L_{night}; and,
- Zone D – ≥ 50 dB $L_{Aeq,16hr}$ and < 54dB $L_{Aeq,16hr}$ and ≥ 40dB L_{night} and < 48dB L_{night}

As discussed, and illustrated in Figure 12.6, below, the Site is located in Zone C with a very small portion of the southern portion of the site located in Zone D. Therefore, the noise levels incident to dwellings and external amenity areas falling within these zone can be summarised as:

Zone C:

- Daytime: 63 dB $L_{Aeq,16hr}$.
- Night-time: 55 dB L_{night}.

Summary

With reference to the Noise Risk Assessment outlined in ProPG, the noise levels for relevant periods have been derived in order to classify the proposed Project Site. Table 12.18, below, summarises the predicted cumulative noise levels at various proposed building facades as per the site layout provided.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. Review of measured L_{AFmax} levels show they are below the 80 dB threshold during the daytime and, therefore, it is not deemed likely that the threshold of 20 no. events would be exceeded during the night-time period, therefore the 'High' risk classification is not triggered.

Figure 12.6: Aircraft Noise Zones

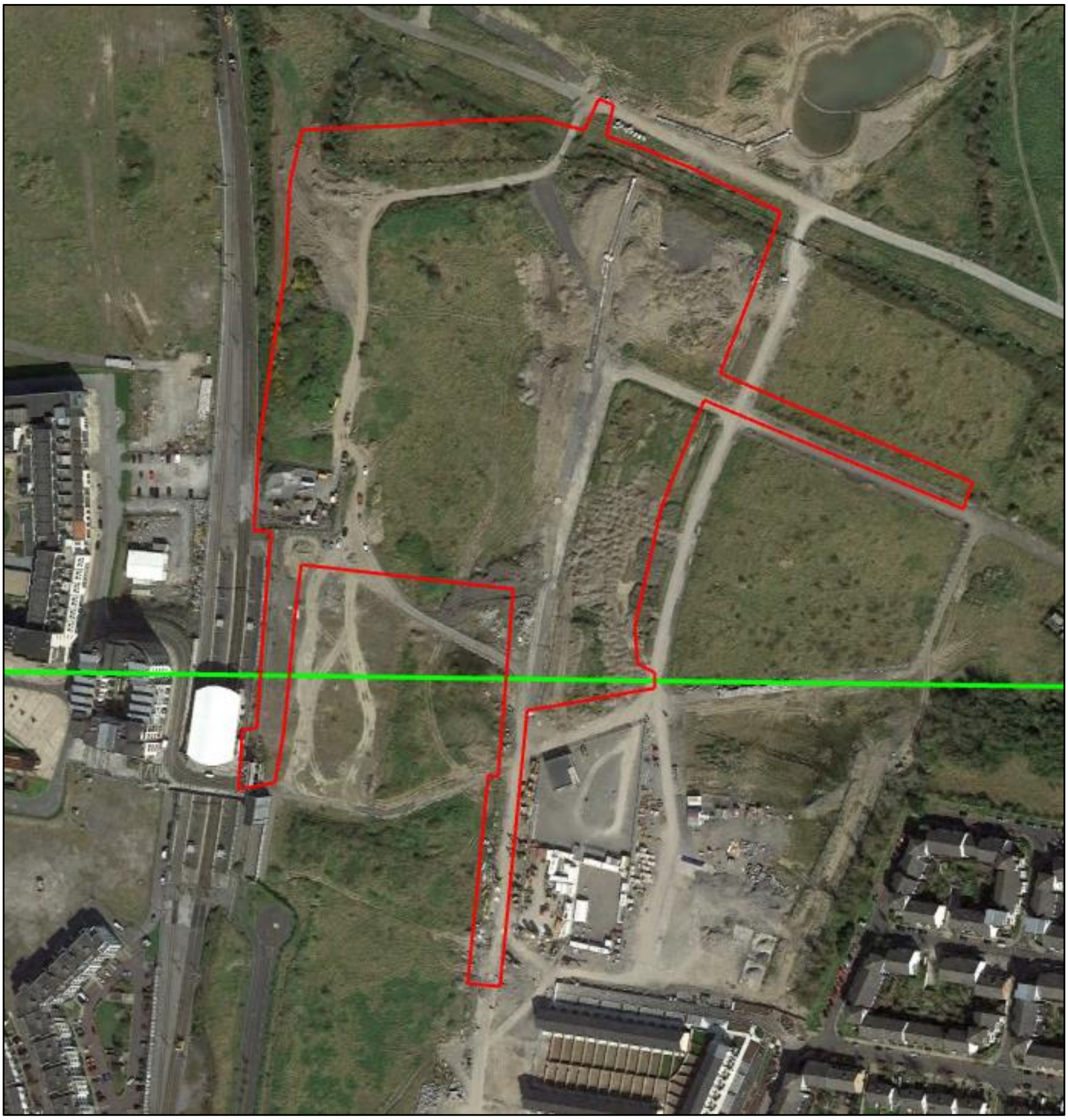


Table 12.18: Categorising Proposed Project Site

Location	Period	Predicted Noise Level (dB, $L_{Aeq,T}$)	Noise Risk Category
Block G1 (Western Façade)	Daytime	64	Medium
	Night-time	56	Medium

Location	Period	Predicted Noise Level (dB, $L_{Aeq,T}$)	Noise Risk Category
Block E1 (Western Façade)	Daytime	65	Medium
	Night-time	57	Medium
Rest of Project Site (Zone C)	Daytime	63	Medium
	Night-time	55	Medium

ProPG states the following with respect to 'Medium' risk categories:

> *"As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development."*

Given the above, it can be concluded that the proposed Project Site may be categorised as 'Medium' risk and, as such, an ADS will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impacts to such an extent that an adverse noise impact will be avoided in the final Project Site.

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used:

> *"It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."*

The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

12.5.2.3 Vibration

Review of representative vibration data has identified vibration events corresponding to rail traffic on the adjacent line. With reference to Table 12.2, above, the values are lower than typical values which would have a *"low probability of adverse comment"* for both daytime and night-time periods.

Notwithstanding the above, vibration data included within this study will be used during the detailed design stage of the building to determine if further measures are required to protect against vibration at the closest buildings to the rail line. This will involve analysis of the proposed building structure, review of ground conditions and vibration data which is beyond the scope of this study at this stage.

There is no vibration source proposed that would generate significant vibration during the operational phase of the proposed development therefore there is no vibration effects on the surrounding environment.

12.5.2.4 Acoustic Design Statement – Part 1

Noise levels have been predicted across the proposed Project Site during daytime and night-time periods.

Where façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night, it is possible to achieve reasonable internal noise levels while also ventilating the dwellings with open windows. Therefore, for those properties where the façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day, and 50 dB $L_{Aeq,8hr}$ at night, no further mitigation is required.

Where façade levels are above these levels, the sound insulation performance of the building façade becomes important and a minimum sound insulation performance specification is required for windows to ensure that, when windows are closed, the internal noise criteria are achieved. These façades are located along the western boundary. The minimum required specification of glazing and vents on these façades is discussed in Section 12.6.2. These facades include those set out in Table 12.19.

Aircraft noise is a noise source incident on the proposed Project and, therefore, roof constructions have been taken into account in the noise intrusion calculations.

Table 12.19: Predicted Façade Noise Levels

Location	Daytime Predicted Noise Level (dB, $L_{Aeq,T}$)	Night-time Predicted Noise Level (dB, $L_{Aeq,T}$)
Block G1 (Western Façade)	64	56
Block E1 (Western Façade)	65	57

External Noise Levels

External noise levels within the vast majority of communal open spaces across the proposed Project are within the recommended range of noise levels from ProPG of between 50 – 55 dB $L_{Aeq,16hr}$. The positioning of buildings allows for screening of noise from transport noise sources in areas close to the rail line. In addition, internal amenity space is also provided across the Site at ground floor level. It is considered that the objectives of achieving suitable external noise levels is achieved within the overall Site; therefore, no further mitigation is required to control external noise levels across amenity areas.

12.6 Mitigation Measures

12.6.1 Construction Phase

12.6.1.1 Noise

Predicted noise and vibration levels are within the relevant criteria and, therefore, no significant impacts are predicted. Good practice noise control measures are presented here to ensure any impacts are reduced.

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) *Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2.* Whist construction noise and vibration impacts are expected to vary during the construction phase, depending on the distance between the activities and noise sensitive buildings, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at off-site noise sensitive locations are minimised.

The best practice measures set out in BS 5228-1 and BS 5228-2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- Selection of quiet plant;
- Noise control at source;
- Piling;
- Screening; and
- Liaison with the public.

Selection of Quiet Plant

The potential for any item of plant to generate noise should be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control 'at source'. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures will be implemented:

- The lifting of bulky items, dropping and loading of materials will be restricted to normal working hours.
- Mobile plant should be switched off when not in use and not left idling.
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.

- For all materials handling, ensure that materials are not dropped from excessive heights, and line drop chutes and dump trucks with resilient materials.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Piling

Piling is the construction activity which is most likely to cause disturbance. On typical piling sites, the major sources of noise are essentially mobile and the noise received at any control points will, therefore, vary from day to day as work proceeds. The duration of piling works is typically relatively short in relation to the length of construction work as a whole, and the amount of time spent working near to noise sensitive areas can represent only a part of the piling period.

General mitigation in relation to piling shall be implemented as follows:

- Piling programmes will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.
- Prior to construction, the planner, developer, architect and engineer, as well as the local authority, shall be made aware of the proposed method of working of the piling contractor. The piling contractor shall in turn have evaluated any practicable and more acceptable alternatives that would economically achieve, in the given ground conditions, equivalent structural results.
- Noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover. Impact noise when

piling is being driven can be reduced by introducing a non-metallic dolly between the hammer and the driving helmet.

- Screening by barriers and hoardings is less effective than total enclosure but can be a useful adjunct to other noise control measures. For maximum benefit, screens should be close either to the source of noise (as with stationary plant) or to the listener. Removal of a direct line of sight between source and listener can be advantageous both physically and psychologically. In certain types of piling works, there will be ancillary mechanical plant and equipment that may be stationary, in which case, care should be taken in location, having due regard also for access routes. When appropriate, screens or enclosures should be provided for such equipment.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. It is understood a standard site hoarding will be set in place during the construction process and provide a degree of screening.

In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

Liaison with the Public

A designated Community Liaison Officer (CLO) shall be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the CLO. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours, etc., the CLO will inform residents / business owners at the nearest noise sensitive locations of the time and expected duration of the noisy works.

12.6.1.2 Liaison with Neighbouring Site

Due to the proximity of the GA1 development within the Masterplan site it is recommended that liaison between both construction sites is on-going throughout the duration of the construction phase. Contractors should schedule work in a co-operative effort to limit the duration and magnitude of potential cumulative impacts on nearby sensitive receptors.

Cumulative construction noise impacts have the potential to be negative, significant and short-term at times of high activity on both sites.

12.6.1.3 Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation / piling or when other high noise generating works are in progress concurrent with other works that may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any one time.

12.6.1.4 Monitoring

Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

Vibration monitoring stations should continually log vibration levels using the PPV parameter (mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: *Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures*.

12.6.1.5 Working Hours

The proposed construction hours are 07:00 to 19:00 hrs, Monday to Friday, and 08:00 to 14:00 hrs on Saturdays. Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise.

12.6.2 Operational Phase

12.6.2.1 Noise

As part of the detailed design of the proposed Project, plant items with appropriate noise ratings and, where necessary, appropriately selected remedial measures (e.g. enclosures, silencers, etc.) will be specified in order that the adopted plant noise criteria is achieved at the façades of noise sensitive properties, including those within the proposed Project itself.

The assessment outlined earlier in this Chapter has specified cumulative plant noise limits at the nearest noise sensitive properties that must be achieved in order to ensure the impact is acceptable. These are:

- Daytime (07:00 to 23:00 hrs): 50 dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00 hrs) 40 dB $L_{Aeq,15min}$

To achieve these noise limits, consideration will be given, at the detailed design stage, to a variety of mitigation measures and forms of noise control techniques. Some example of these measures are as follows:

- Reduced / quiet modes;
- Duct mounted attenuators on the atmosphere side of air moving plant;
- Splitter attenuators or acoustic louvres providing free ventilation to internal plant areas;
- Solid barriers screening any external plant; and
- Anti-vibration mounts on reciprocating plant.

In addition to the above, it is proposed that the following practices are adopted to minimise potential noise disturbance for neighbours.

- All mechanical plant items (e.g. motors, pumps, etc.) shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised;
- Any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document.

12.6.2.2 Acoustic Design Statement – Part 2

As is the case in most buildings, the glazed elements, ventilation paths and roof of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

In this instance, the façades highlighted red in Figure 12.7 will be provided with glazing and ventilation that achieve the minimum sound insulation performance, as set out in Tables 12.20

and 12.21. Other façades in the proposed Project have no minimum requirement for sound insulation.

Table 12.20: Sound Insulation Performance Requirements for Glazing, SRI (dB)

Façade	Octave Band Centre Frequency (Hz)						R_w
	125	250	500	1000	2000	4000	
Red	26	27	34	40	38	46	37

The overall R_w and $D_{ne,w}$ outlined in this section are provided for information purposes only. The overriding requirement is the Octave Band sound insulation performance values, which may also be achieved using alternative glazing and ventilation configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Tables 12.20 and 12.21 or greater.

The following performance requirements apply to all ventilation paths from outside the building. This can be achieved by passive acoustic wall or window vents or via mechanical ventilation systems.

Table 12.21: Sound Insulation Performance Requirements for Ventilation, $D_{n,e,w}$ (dB)

Façade	Octave Band Centre Frequency (Hz)						$D_{n,e,w}$
	125	250	500	1000	2000	4000	
Red	35	34	33	38	49	45	39

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing and ventilation systems. In the context of the acoustic performance specification, the ‘glazing system’ is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements, etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Figure 12.7: ProPg Stage 2 – Façade Sound Insulation Requirement

There is the potential for the roof structure to allow the passage of sound into the rooms. In order to control potential sound transmission via this route, the ceiling / roof construction will need to provide a sound reduction in excess of that required for the windows. In the case of the apartments, a reinforced concrete roof with thermal insulation and plasterboard ceiling below will also provide suitable sound insulation.

Any penetrations through the ceiling constructions must be as small as possible and made good by fully filling with plaster or with an acoustic sealant.

12.7 Residual Impacts

12.7.1 Construction Phase

12.7.1.1 Noise

Piling activities are predicted to exceed the noise threshold for potential significant effect when they occur at the closest proximity to the dwellings located on the boundary of the Site. However, it should be noted that the assessment can be considered worst-case and it is unlikely that all items of plant assessed will be in operational simultaneously. Additionally, the predictions only indicate a potential significant effect (based on a worst-case scenario) when working at the closest location to the dwellings, with lesser impacts predicted at all other locations across site.

Residual impacts associated with construction activities undertaken adjacent to Site boundaries are categorised as ***negative, slight to moderate, and short-term***.

12.7.1.2 Vibration

It is possible that vibration from construction activities will be perceptible at receptor locations, but not of the magnitude that would cause disturbance. The impacts are predicted to be ***neutral, imperceptible and short-term***.

12.7.2 Operational Phase

12.7.2.1 Noise

Mechanical Plant and Services Noise

Once cumulative plant noise emissions from the development are designed to achieve the appropriate noise criteria the residual noise impact is predicted to be ***neutral, imperceptible and permanent***.

Additional Traffic on Local Roads

Based on the traffic flows associated with the operation of the proposed development the impacts are predicted to be ***neutral, imperceptible and permanent*** for assessed local road Links B to M. For road Link A, the impact is predicted to be ***negative, imperceptible to slight, and permanent***.

12.8 Monitoring

Besides the construction phase monitoring set out in Section 12.6, above, no monitoring is required.

12.9 Interactions

12.9.1 Population & Human Health

The potential impacts on human beings in relation to the generation of noise and vibration during the construction phase could cause nuisance to people in nearby sensitive locations. Implementation of the mitigation measures set out above, and adherence to good practice noise reducing measures, will ensure that the residual impact on human health is ***negative, slight-moderate and short-term***.

Similarly, during the operational phase, siting and selecting mechanical plant to achieve the relevant noise criteria will result in a residual impact that is ***imperceptible*** to people in nearby noise sensitive locations, both within the proposed Project and off-site. External noise sources acting on the proposed Project have been assessed and mitigation to ensure internal noise levels achieve the relevant noise criteria will result in a residual impact that is ***not significant***.

12.9.2 Biodiversity

There is potential for impact on wildlife during the construction phase of a development such as the one assessed here. While this Chapter assesses the noise and vibration impact on humans, predicted construction noise levels have been presented for information purposes for use in the assessment of impact on biodiversity. Please refer to Chapter 8, where this potential impact is addressed.

12.10 Cumulative Impacts

In the context of construction noise, it is noted that construction works at the Growth Area 1 (GA1) site may coincide with the construction of the proposed Project. Due to where the nearest NSLs to both sites are located, there is a possibility that elevated construction noise emissions due to cumulative noise could occur at receptor locations equidistant to both sites, i.e. receptors bounding the western boundary of the site in the area of Station Road. These locations represent a limited number of receptors and cumulative impacts in this regard would be short-term in nature.

Sensitive locations to the west of site are located at Bridge Street and Station Road which represent a limited number of receptors and cumulative impacts in this regard would be short term in nature.

Nonetheless, cumulative impacts will need to be considered and managed during the construction phase. It is recommended that liaison between construction sites is on-going throughout the duration of the construction phase. Contractors should schedule work in a co-operative effort to limit the duration and magnitude of potential cumulative impacts on nearby sensitive receptors. Cumulative construction noise impacts are expected to be negative, significant and short-term at times of high activity on both sites.

During the construction phase of the proposed Project, construction noise on site will be localised and will therefore likely be the primary noise source at the nearest noise sensitive receivers. In the event that construction activities associated with other committed developments occur simultaneous to the proposed development, they are at sufficient distances such that the cumulative noise levels will remain dominated by the localised works referred to in Table 12.15.

Construction noise monitoring should be undertaken and will dictate the need for specific noise control actions.

There are also permitted schemes on lands to the west of the proposed Project site. The Clongriffin SHD schemes are as follows:

- **Clongriffin SHD 1** (ABP ref.: 305316: Decision date 13 December 2019) Plots 6, 8, 11, 17, 25, 26, 27, 28 and 29 Clongriffin. Application was for 1,030 no. apartments – 916 no. permitted.
- **Clongriffin SHD 2** (ABP ref.: 305319: Decision date 13 December 2019) Plots 4, 5 and 14 Clongriffin. Application was for 500 no. apartments.
- **Clongriffin S34 Permission** (DCC Ref.: 3894/19: Decision date 20 March 2020) Plots 3, 13 and 15 Clongriffin. Application was for 420 no. apartments, 14 retail units, cinema, offices, etc. – 407 no. permitted.

Development has yet to commence on the above permissions.

Construction of c.585 units is on-going from previous permissions (DCC Refs.: 2903/16, 3776/15, 2478/17, 4266/16, 2610/16, 3117/16, 4101/16 and 2569/17). It is likely that the most intensive of works will be completed in advance of commencement of the proposed Project.

Permitted developments are included in the traffic impact and therefore the potential for a cumulative noise impact has already been assessed in this respect.

Future large-scale developments seeking planning permission in the vicinity would need to conduct an EIA to ensure that no significant impacts resulting from noise and vibration will occur as a result of same, in isolation or in combination with other existing / proposed developments.

12.11 'Do-Nothing' Impact

In the absence of the proposed Project, there would be little or no change to the prevailing noise and vibration levels across the site. The impact would therefore be considered ***neutral***. It is possible, given the zoning of the lands and in the context of housing policy and market, that in the event that the proposed Project were not progressed at the Site, a different development (under the scope of a separate application) would be progressed at a future date.

12.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered when conducting this assessment.

12.13 References

- ANC, IoA & CIEH (2017). *Professional Guidance on Planning & Noise*
- BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings*
- BS 4142: 2014+A1 2019: *Methods for Rating and Assessing Industrial and Commercial Sound*
- BS 5228 (2009 +A1 2014): *Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration*
- BS 7385 (1993): *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*
- BS 6472-1:2008 *Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting*
- Department of Transport Welsh Office, HMSO (1988). *Calculation of Road Traffic Noise*
- Dublin City Council, Dún Laoghaire-Rathdown County Council, FCC & South Dublin County Council (2018). *Dublin Agglomeration Noise Action Plan 2019 – 2023*
- EPA (2002). *Guidelines on the Information to be contained in Environmental Impact Statements*
- EPA (2003). *EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*
- EPA (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*
- EPA (2017). *Draft EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports*
- FCC (2017). *Fingal Development Plan 2017 – 2023 – Policy on Aircraft Noise*

- FCC (2018). *Noise Action Plan for Dublin Airport 2019 – 2023*
- ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*
- ISO 9613 (1996): *Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation*; and,
- United Kingdom Highways Agency (UKHA) (2020). *Design Manual for Roads and Bridges (DMRB) – Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2*

13 Landscape & Visual

13.1 Introduction

This Chapter of the EIAR has been prepared by Chris Kennett, a Chartered Member of the Landscape Institute since 1996 and director of Kennett Consulting Limited.

It describes the likely significant effects on the landscape and visual aspects of the receiving environment of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13.

Chris Kennett has a BSc in Landscape Design and Plant Science and a Diploma in Landscape Architecture, both from Sheffield University. He qualified for full membership of the Landscape Institute (UK) in 1996. He also has a MSc in Sustainable Development from Dublin Institute of Technology (2013) and a Diploma in Urban Design from Oxford Brookes University (2017).

This assessment addresses two separate but closely related aspects: the first is visual impacts, focusing on the extent to which new developments can be seen, the potential loss of existing site features and the introduction of new site features; the second aspect is impacts on the character of the landscape, the changes the proposed Project will bring to the landscape in general, the impacts of those changes upon views from the surrounding area, and examining responses which are felt towards the combined effects of the proposed Project.

This latter topic is complex because it can encompass many other environmental topics such as ecology, archaeology and architectural history and because attempts to scientifically measure feelings and perceptions are not universally reliable.

For clarification, this Chapter does not address technical impacts on light and shadowing, which have been assessed separately in Chapter 15 (Microclimate – Daylight / Sunlight).

Growth Area 3 (GA3) lies within the development lands of the Baldoyle-Stapolin LAP, directly to the south of the planned future Racecourse Park, and to the north of Growth Area 1 (GA1). GA3 provides a transition from the more urban character of the proposed Stapolin Square in GA1 to the open parkland setting of the future Racecourse Park.

The proposed Project will consist of the development of 1,221 no. residential apartment / duplex dwellings in 11 no. blocks, ranging in height from 2 to 15 storeys and including for residential tenant amenity, restaurant / café, crèche, car and bicycle parking and public realm.

Residential tenant amenity facilities are located in Blocks E3, E4, G3, G4 and G5, and external communal amenity space is provided at ground, podium and terrace levels throughout the proposed Project. Car parking is provided in a mix of undercroft for Blocks E1 - E2, F1 and F2 and at basement level for Blocks G1 - G3 and G4 - G5. Cycle parking spaces are provided for residents, visitors and commercial uses, in secure locations and within the public realm throughout the proposed Project. A new central public space between Blocks E1 - E2 and E3 and E4, and a new linear space between Blocks G2 - G3 and G4 - G5 provides pedestrian and cycle connectivity from Longfield Road to the planned future Racecourse Park to the north. A proposed new bus, cycle, pedestrian and taxi ramp to the south of the Site and north of Stapolin Square provides access from Longfield Road to Clongriffin Train Station.

Figure 13.1: Proposed Red Line Boundary[56]

13.2 Methodology

13.2.1 Relevant Legislation and Guidance

This Chapter has been prepared between January 2020 and June 2021, with reference to the methodology and terminology outlined in the following guidelines:

[56] Google Earth (2020).

- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*
- EPA (2015 & 2003). *Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.*
- Landscape Institute / Institute of Environmental Management and Assessment (IEMA) (2013). *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition) (referred to as 'GLVIA3')

Specific guidance for the assessment of landscape and visual impacts for the purpose of EIA is given in GLVIA3. This is UK guidance but the Irish Landscape Institute identifies this as applicable to projects in Ireland, while the EPA refers to this as topic-specific guidance in the EPA Draft Guidelines[57].

GLVIA3 is helpful in outlining a methodology for determining the sensitivity of a landscape or view to the proposed Project and the significance of effects arising from the proposed Project. The sensitivity of a landscape or view is judged by balancing its value with its susceptibility to the type of development proposed. The significance of effects on that landscape or view is then judged by balancing its sensitivity with the magnitude of change it might experience as a result of the proposed Project. GLVIA3 recognises (at para 2.23) that "*professional judgement is a very important part of LVIA. While there is scope for quantitative measurement of some relatively objective matters much of the assessment must rely on qualitative judgements.*" Professional judgement has supplemented the standard evaluation methodology utilised for this assessment.

13.2.2 Desk Study

An initial desk study was undertaken to establish an understanding of the Site and surroundings, its planning context and to make an initial assessment of the likely visual envelope, i.e. areas from which the Site might be seen. Relevant maps, development plans and other published documents were used for this purpose and are referenced at the end of this report.

[57] EPA (2017).

13.2.3 Site Visit

The Site and surroundings were the subject of a visual field survey in March 2020, examining the nature of the local built environment, considering the contribution that each landscape component makes to local landscape character, and exploring the potential for views of the Site from the surrounding area. A selection of key / representative views were identified at this stage, which have supported this landscape and visual appraisal and informed production of supporting photomontages. The methodology for photomontage production is contained in the photomontage booklet by Modelworks, submitted under separate cover as part of the planning application.

The potential impact of the proposed Project on the landscape has been assessed with reference to the following landscape factors:

- *Context:* This is a factual description of the Site and its surroundings.
- *Character:* This identifies one or more distinct landscape units within the Site and / or its surroundings and outlines the defining features of each landscape.
- *Sensitivity:* This is based on two factors:
  - *Value:* Whether a landscape / view is scarce or unique (and designated for this reason); recognised for its high amenity; whether it is 'ordinary' or even 'derelict'.
  - *Susceptibility:* To what extent there is pressure for / vulnerability to the type of proposed Project and the damage likely to arise as a result.
  - *Significance:* Susceptibility is combined with the anticipated magnitude of change to determine the likely effects (impacts) of the proposed Project.

Potential changes in character, visibility and land use patterns have been considered first; including indirect, secondary and cumulative impacts. This has given direction to proposed mitigation measures, which have been discussed with the Project Design Team and incorporated into the Project proposal; the subsequent assessment of likely landscape and visual impacts takes account of the proposed mitigation measures.

13.2.4 National Planning Policy

Irish national policy of particular relevance to the assessment of landscape and visual impacts is the *Urban Development and Building Heights Guidelines for Planning Authorities* (Department of Housing, Local Government and Heritage, 2018) (hereafter 'the Guidelines').

This is rooted in the National Planning Framework (NPF) (Government of Ireland, 2018), which states that:

> *"To enable brownfield development, planning policies and standards need to be flexible, focusing on design-led and performance-based outcomes, rather than specifying absolute requirements in all cases."* (p. 67)

The NPF also sets out National Policy Objective 13, which states that:

> *"In urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well-designed high quality outcomes in order to achieve targeted growth. These standards will be subject to a range of tolerance that enables alternative solutions to be proposed to achieve stated outcomes, provided public safety is not compromised and the environment is suitably protected."*

The Guidelines sets out in detail the approach to building heights that all planning authorities should adopt going forward. The Guidelines begin with the concern that generic maximum height limits applied by planning authorities can undermine national policy objectives for the more compact forms of urban development sought by the NPF, while also hindering innovation and encouraging poor design outcomes. 'Traditional' building heights are typically no more than 6 – 8 storeys in the urban centres of cities and major towns, and lower outside of these areas. Para 1.3 states that *"… the planning process has to strike a careful balance between on the one hand enabling long-term and strategic development of relevant areas, while ensuring the highest standards of urban design, architectural quality and place-making outcomes on the other."*

The Guidelines set out a series of Specific Planning Policy Requirements (SPPRs). Significantly, para 1.14 states that these SPPRs *"take precedence over any conflicting, policies and objectives of development plans, local area plans and strategic development zone planning schemes"*. Para 2.3 states that "… *increased building height is a significant component in making optimal use of the capacity of sites in urban locations where transport, employment, services or retail development can achieve a requisite level of intensity for sustainability".*

Para 2.12 confirms that increased building heights may be appropriate in a location such as the Site in this case, which is well provided with local services and transport options, subject to additional consideration of *"the visual, functional, environmental and cumulative impacts of increased building height"*.

The Guidelines themselves, at paragraph 3.1, state unequivocally that *"In relation to the assessment of individual planning applications and appeals, it is Government policy that building heights must be generally increased in appropriate urban locations. There is therefore a presumption in favour of buildings of increased height in our town / city cores and in other urban locations with good public transport accessibility"*.

Section 3.2 of the Guidelines then sets out a series of guiding principles for delivering good urban design and architectural standards where increased building height is proposed, which include the following:

At the scale of the relevant city / town:

- The Site is well served by public transport with high capacity, frequent services and good links to other modes of transport.
- Development proposals incorporating increased building height, including proposals within architecturally sensitive areas, should successfully integrate into / enhance the character and public realm of the area, having regard to topography, its cultural context, setting of key landmarks, protection of key views. Such development proposals shall undertake a landscape and visual assessment, by a suitably qualified practitioner such as a chartered landscape architect.
- On larger urban redevelopment sites, proposed developments should make a positive contribution to place-making, incorporating new streets and public spaces, using massing and height to achieve the required densities but with sufficient variety in scale and form to respond to the scale of adjoining developments and create visual interest in the streetscape.

At the scale of district / neighbourhood / street:

- The proposal responds to its overall natural and built environment and makes a positive contribution to the urban neighbourhood and streetscape.
- The proposal is not monolithic and avoids long, uninterrupted walls of building in the form of slab blocks with materials / building fabric well considered.

- The proposal enhances the urban design context for public spaces and key thoroughfares and inland waterway / marine frontage, thereby enabling additional height in development form to be favourably considered in terms of enhancing a sense of scale and enclosure while being in line with the requirements of *The Planning System and Flood Risk Management, Guidelines for Planning Authorities* (Department of Environment, Heritage and Local Government & Office of Public Works, 2009).
- The proposal makes a positive contribution to the improvement of legibility through the site or wider urban area within which the development is situated and integrates in a cohesive manner.
- The proposal positively contributes to the mix of uses and / or building / dwelling typologies available in the neighbourhood.

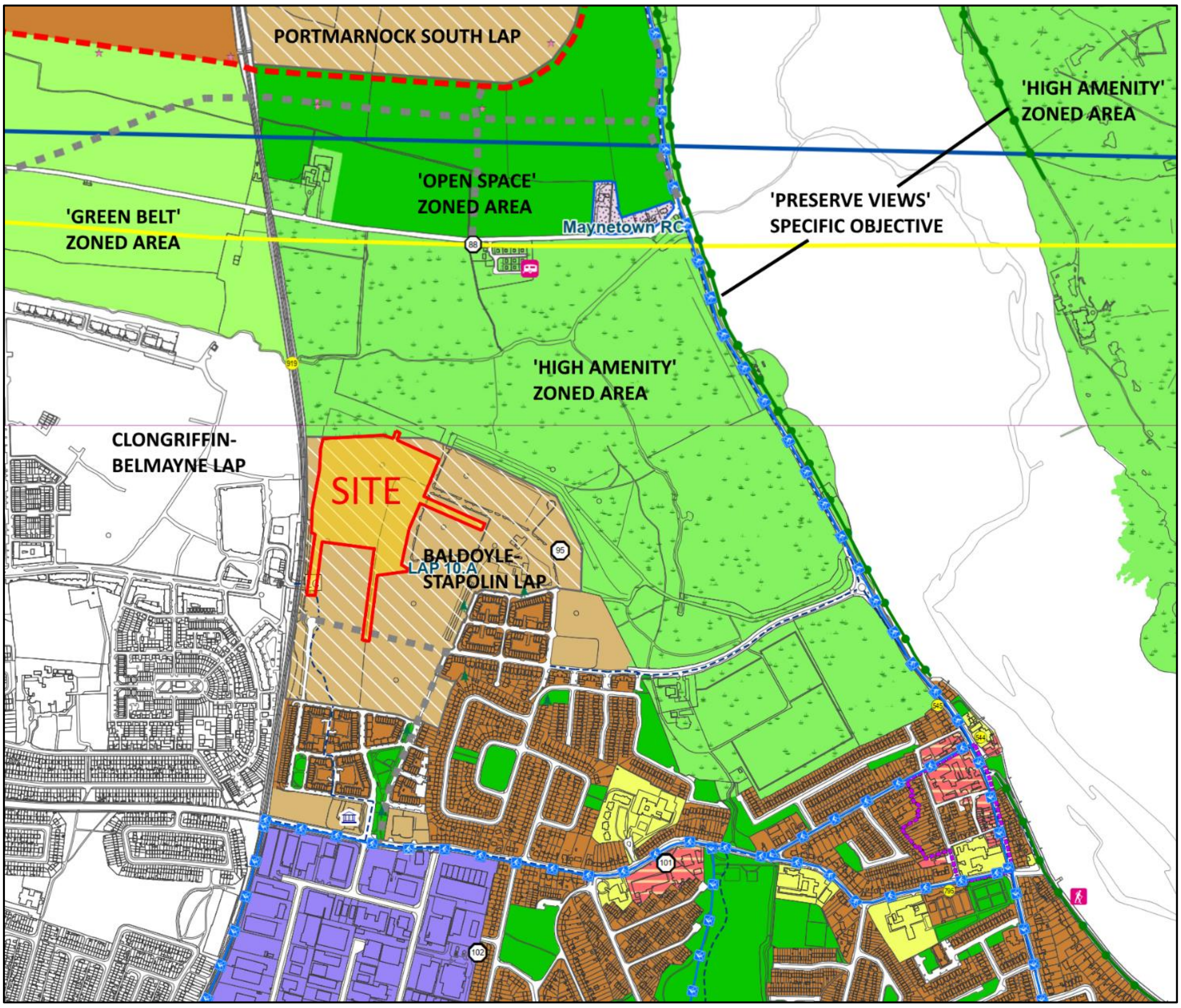
The proposed Project will be assessed against these and other criteria in detail later in this Chapter.

13.2.5 Local Planning Policy

The proposed Project occupies a substantial part of Local Area Plan (LAP) 10A 'Baldoyle-Stapolin', which lies immediately east of Clongriffin train station and the railway line. The northern / north-eastern margin of the LAP is defined by the adjoining High Amenity area, while new residential development adjoins the eastern and southern margins of the LAP area.

The Clongriffin-Belmayne LAP area lies immediately west of the station and railway line. Further north beyond the R123 lies the Portmarnock South LAP lands. Together with the Baldoyle-Stapolin LAP, these represent substantial areas of urban grown in the locality.

Figure 13.2: Fingal Development Plan 2017-2023 Sheets 9 and 10[58]



13.2.5.1 Fingal Development Plan 2017 – 2023

The Fingal Development Plan 2017 – 2023 (the 'Development Plan' hereafter) covers the Site of the proposed Project and sets out the principal local planning policy. Figure 13.2 illustrates the Site's location and zoning context.

Key elements of Development Plan policy with regard to landscape and visual amenity are:

- High Amenity Zoning of adjoining lands, which may provide: scenic landscape of high quality; expansive / interesting views of the surrounding area; views and prospects; define coastal character; a backdrop to coastal views; groups of trees or woodlands; elevated positions or public access. Such landscapes may also be unique or special.

[58] Combined extracts, annotated.

- Preserve Views: these occur along the coast road / coastal path and from Links Road approaching the golf course at The Burrow.
- Adjoining residential areas: protect and improve residential amenity.

High Amenity Areas are subject to Objectives NH51 and HH52:

- ***NH51:*** *"Protect High Amenity areas from inappropriate development and reinforce their character, distinctiveness and sense of place."*
- ***NH52:*** *"Ensure that development reflects and reinforces the distinctiveness and sense of place of High Amenity areas, including the retention of important features or characteristics, taking into account the various elements which contribute to its distinctiveness such as geology and landform, habitats, scenic quality, settlement pattern, historic heritage, local vernacular heritage, land-use and tranquility."*

The *Landscape Character Assessment* for Fingal Development Plan places the Site within / adjoining an Estuary Character Type of landscape:

> *"The Estuary Character Type is categorised as having an exceptional value, recognised by the EU designations (candidate Special Areas of Conservation and Special Protection Areas) that apply to each in addition to national designations such as proposed Natural Heritage Areas and Ramsar. The aesthetic quality of the estuaries is also outstanding."*

The Estuary Character Type has an 'exceptional' landscape value (Table LC01) and is a highly sensitive character type.

> *"The coastal fringe is very sensitive to development due to the exposed nature of many of the coastal and estuarine areas making them particularly vulnerable to intrusive development. Finding sites for new development along the coast will be difficult as new development is likely to be conspicuous. The setting and character of coastal areas are particularly sensitive and could easily be damaged by inappropriate development."*

The guiding principles for development appear to target smaller scale development within this landscape character type, though the following points may be considered:

- Protect skylines, horizons and ridgelines from development.
- Choose sites with natural boundaries.
- Consider the form of new developments and their integration with the landscape.
- Retain hedgerows and trees and use strong planting schemes to aid integration.

- Avoid disturbing estuary margins.
- Prevent inappropriate development on the seaward side of coastal roads.
- Retain the character of coastal visual compartments and prevent intrusive development.

The above is developed further in Objectives NH33 to NH39. Views and prospects are addressed by Objective NH40, to *"Protect views and prospects that contribute to the character of the landscape, particularly those identified in the Development Plan, from inappropriate development".* Development Plan Maps 9 and 10 and GI Map 14 identify designated views and prospects from the coast road between Baldoyle and Portmarnock and from Golf Links Road, both overlooking the estuary and adjoined by highly sensitive landscape areas as a setting to the estuary.

Importantly, the supporting text states that *"In assessing views and prospects it is not proposed that this should give rise to the prohibition of development along these routes, but development, where permitted, should not hinder or obstruct these views and prospects and should be designed and located to minimise their impact".*

13.2.5.2 Baldoyle-Stapolin Local Area Plan 2013 – 2019 (as extended)

Chapter 4 of the LAP confirms the finding of the *Landscape Character Assessment* as described above, with the Site being in an estuary landscape with outstanding aesthetic qualities and high sensitivity to development, confirming this to mean Racecourse Park and the northern half of the LAP are to be highly sensitive to development (that is to say, the areas adjoining the northern and eastern boundaries of the proposed Project). The landscape is open and flat with a broad lack of trees belts and hedgerows, affording views to recent developments at Red Arches, Myrtle and west of Clongriffin train station. This chapter duly considers the likely landscape and visual effects of the proposed Project on views to / from / across this area.

The model of higher density development employed at Red Arches and Myrtle is seen as the preferred approach to development alongside a proportion of more 'traditional' housing. Key nodes should be punctuated with more distinctive forms of development, including greater height. A height gradient should increase from the lower-density quieter margins to a greater height at the village centre and fronting Racecourse Park.

The vision for the development of this area states that:

> *"At the heart of the vision is a commitment to high quality design that can create a real sense of place and harness the unique qualities of the area to create a compact, cohesive neighbourhood with a strong identity and distinctive character. It will have its own identity, with a neighbourhood core and open spaces that link the site together, drawing on its coastal setting to help create its own character."*

Objective 3 identifies the role of open spaces and river corridors throughout the LAP lands to provide for visual amenity and recreation as well as nature conservation and flood mitigation.

A key view from / through the Site extends from Station Square along a central west-east axis through the Site, focused on Ireland's Eye in the distance.

13.2.5.3 Nearby Planning Applications / Consents

Development has been permitted for GA1 within the Baldoyle-Stapolin LAP under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). It is currently the subject of a new planning application (ABP case ref. TA06F.310418) for alterations to the previously permitted development.

To the west of the railway line, within the Clongriffin-Belmayne LAP, consent has been issued for an amended SHD scheme (SHD Reg. Ref. 305316-19) for plots 6, 11, 17 and 25-29 within the LAP area, which includes most plots adjoining the railway line and fronting the western side of the Site. Buildings generally range from 4 to 7 residential storeys with a 17 storey tower element adjoining Station Square (block 17) and an 8-15 storey building at block 26. This development is referred to as the Gannon Homes Scheme later in this chapter.

An analysis of the cumulative landscape and visual impacts of GA3 and GA1 (as permitted and proposed) and the Gannon Homes scheme (SHD Reg. Ref. 305316-19) is presented in Section 13.6. Refer to Chapter 21 (Cumulative Impacts) for a full account of key plans and projects in the surrounding area.

13.3 Baseline Environment

13.3.1 Site Description

The Site is located in Baldoyle-Stapolin Growth Area 3 (GA3), at Baldoyle, Dublin 13, c. 10 km north-east of the City centre. The Site boundary extends to c. 6.89 ha. The Site is partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development to the south), with the exception of a network of access roads traversing the land.

The Site itself has no notable landscape features, comprising a relatively flat topography with a mixture of disturbed ground, grassland and scrub. There are no trees or landscape features worthy of retention. It makes no positive contribution to local green space or visual amenity for the surrounding neighbourhoods.

13.3.2 The Wider Area

The wider area is essentially flat and broadly divided between the mixed urban areas south and west of the Site, and more open green space / countryside to the north and east, including the former Baldoyle Racecourse and Portmarnock coastal area. The area is undergoing rapid change in character, driven primarily in recent years by development associated with the Clongriffin-Belmayne LAP and the Fingal Development Plan 2017 – 2023. Good road and rail connections to the city are helping to drive this growth.

A short distance to the southwest of the Site lies the new Clongriffin train station and forecourt, terminating Main Street at the eastern edge of the current district centre. Contemporary buildings of 4 – 6 storeys characterise this area. New residential neighbourhoods of traditional and contemporary housing forms characterise the more immediate surroundings to the east, south and west, with longer-established residential areas to the south.

Views towards the Site are largely constrained to the south and west due to the surrounding urban area, though vistas along some streets orientate views towards the Site. Glimpsed views occur from locations such as elevated parts of Father Collins Park to the west and the R809 Grange Road to the south, where it crosses the railway line. These views have an established urban context, mostly residential, with a low sensitivity to the effects of the proposed Project on landscape character and visual amenity.

From both the north and east, existing development surrounding the station and to the south provides an urban visual backdrop to a mixture of marshland and disturbed former agricultural land, creating a tension and anticipation of change, without a strong sense of place or destination. Glimpsed views occur along the R123 Moyne Road, with more open views from the R106 Coast Road between Baldoyle and Portmarnock and at The Burrow on the opposite side of Baldoyle Estuary, an area of High Amenity as described in the preceding section.

Long distance views can be found at the beach in Sutton and from elevated parts of Howth Head, which have panoramic views across north Dublin. These views can be expansive, due to the flat topography and relatively few trees and hedgerows, and occur mostly in the context of the coastal / estuarine zone, much of which is zoned as an area of High Amenity value.

Figure 13.3: View from Deer Park public golf course, Howth, across Sutton and Baldoyle[59]

13.4 Potential Impacts of the Proposed Project

A description of the proposed Project is set out in the introduction to this chapter, and in Chapter 5 (Description of the Proposed Project), while key elements of relevance to landscape and visual impacts are described in more detail below.

13.4.1 Construction Phase

Significant temporary and ***short-term negative*** impacts upon landscape character and visual amenity are likely to arise from the construction phase. Impacts are likely to arise from the following:

- Temporary hoardings, parking, materials and Site offices;
- Demolition of existing site structures;

[59] Image: Google Maps / Christy Hunt.

- Cranes, scaffolds and other temporary structures;
- Construction activities from mobile plant on-site;
- The presence of dynamic, partially-completed buildings;
- Traffic movements entering and leaving the Site; and
- Temporary lighting and signage.

Most construction impacts will be reasonably localised, though the height of some buildings and the cranes that will be necessary for their construction are likely to be visible over a wider area. Construction is anticipated to take a period of 54 months (4.5 years), meaning construction phase impacts will be ***temporary to short-term***. As there are no significant existing landscape features to be removed, there will be no permanent construction phase impacts on landscape character or visual amenity.

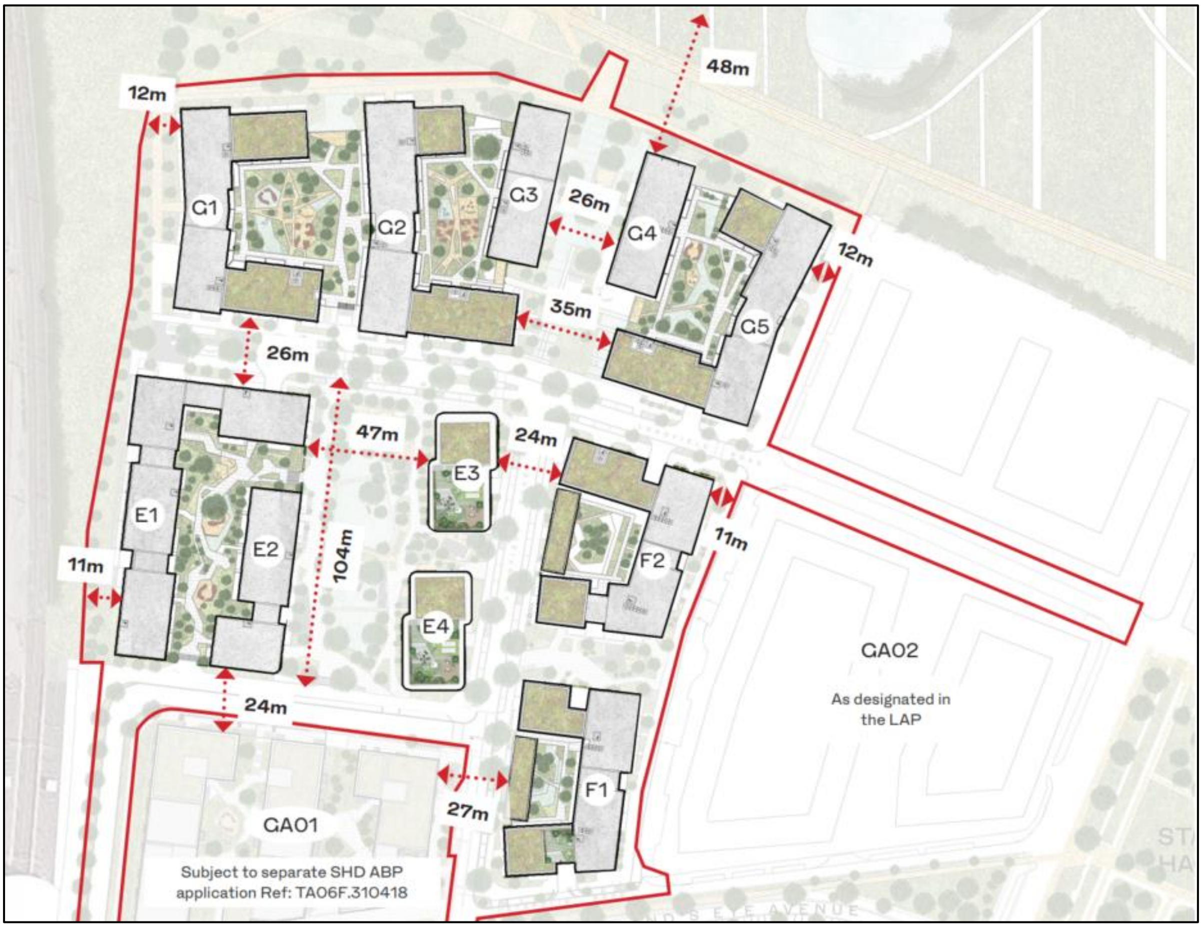
13.4.2 Operational Phase

Changes from the LAP illustrative masterplan include enlarging and moving the community park eastwards; reducing vehicular access and improving pedestrian priority and amenity within the street network; configuring blocks to maximise semi-private communal amenity spaces while linking them to the primary green streets and open spaces – Longfield Road, the community park and Racecourse Park – and increasing building heights in some instances and reducing them in others to enhance character, place-making and amenity.

Potentially ***negative*** impacts arise from the increased scale and height of some taller buildings, while potentially ***positive*** impacts arise from the richer design response.

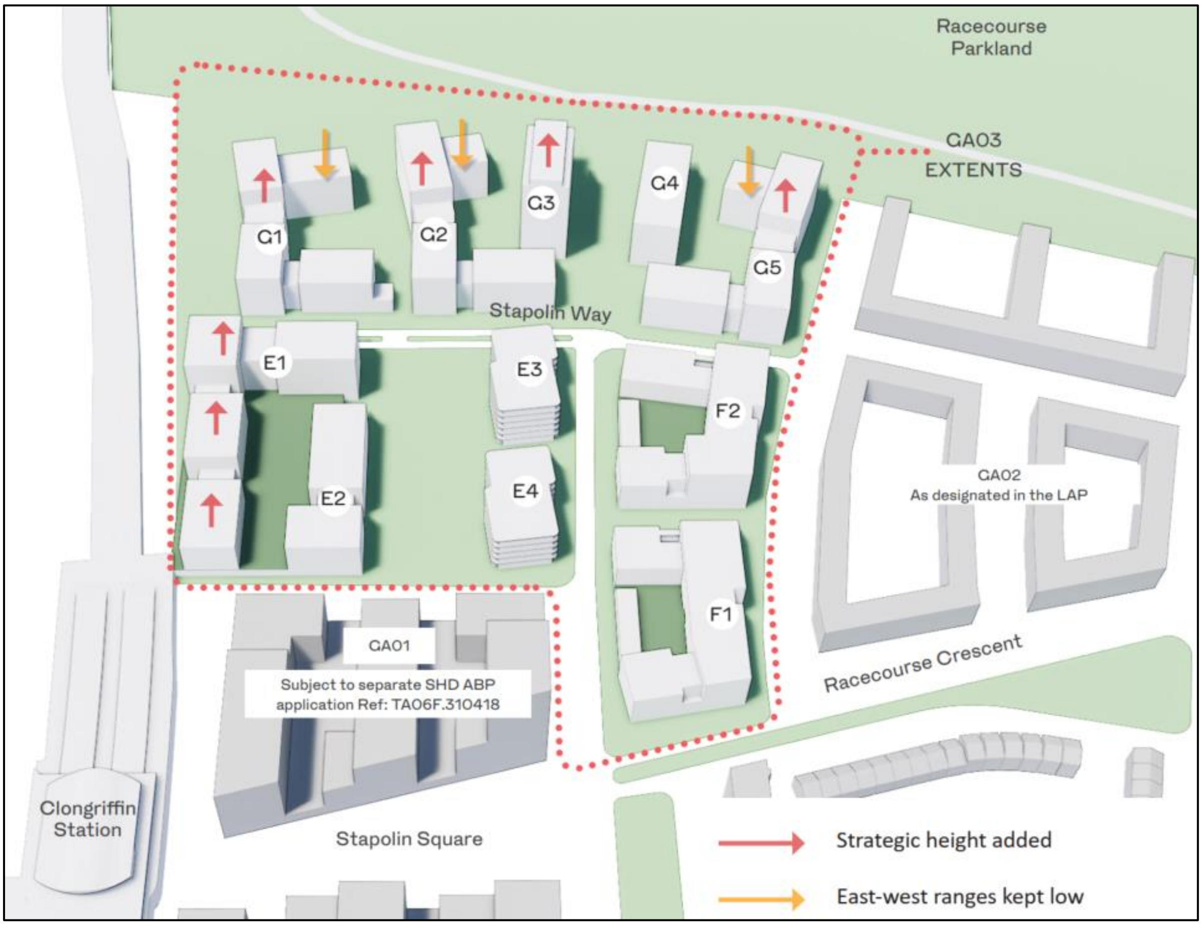
The figures and text that follow illustrate the approach to building heights, including changes from the LAP Masterplan, and present some of the key building elevations to demonstrate typical building character. This aids the subsequent account of potential landscape and visual impacts.

Figure 13.4: Proposed Site Plan[60]



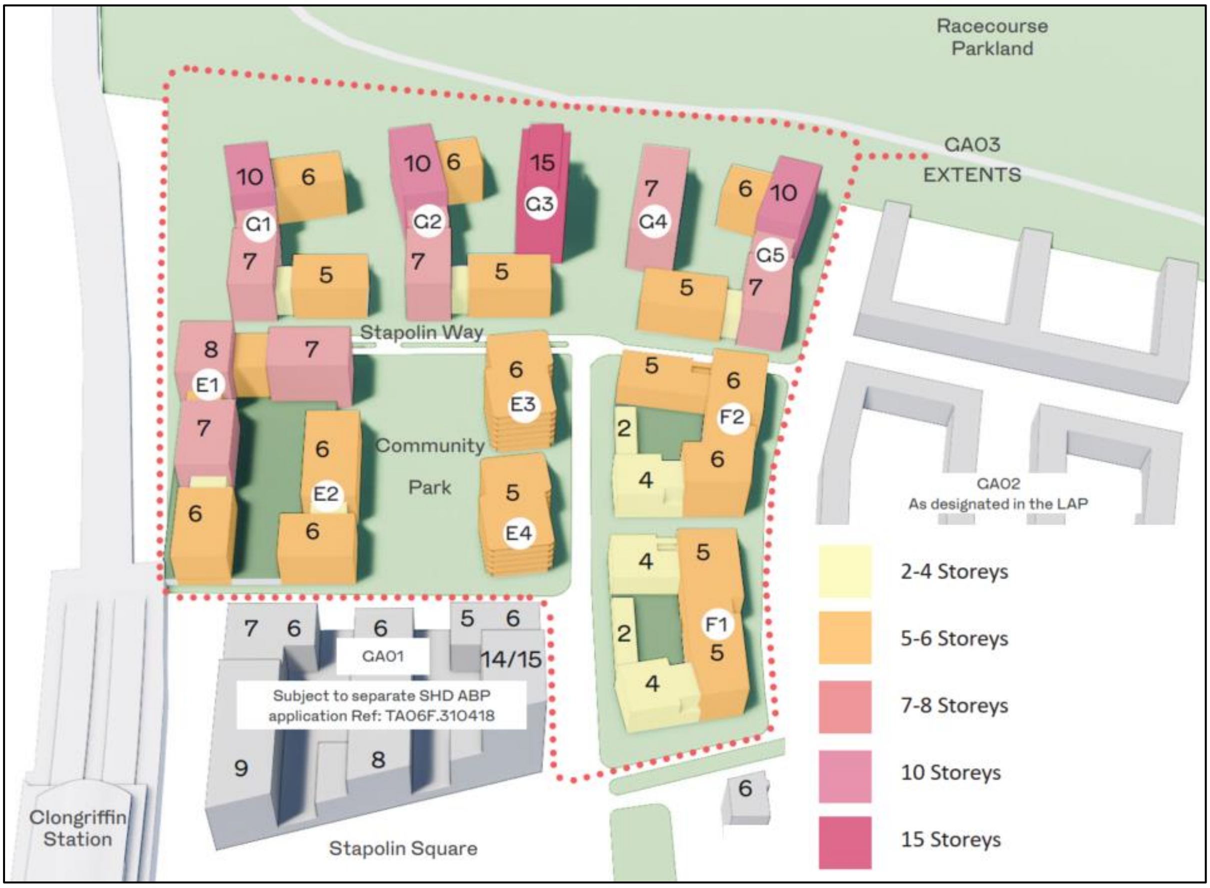
[60] Henry J Lyons Architects

Figure 13.5: Approach to Building Heights[61]



[61] Henry J Lyons Architects

Figure 13.6: Range of Building Heights[62]



Taller buildings (generally 7 – 10 storeys) are located along the northern and western margins of the Site, defining strong edges fronting onto the future Racecourse Park and railway line. This provides a consistent edge to the railway line, echoing that proposed for GA1 to the south. Along the northern margin, the taller blocks are interspersed with much lower blocks (6 – 7 storeys) and openings into the communal amenity spaces to provide a dynamic urban edge with a strong sense of permeability. A single block stands at 15 storeys, providing a focal element on this edge and highlighting the adjoining north-south green spine (including Longfield Road) where it emerges into Racecourse Park.

Lower blocks of mainly 4 – 6 storeys, with occasional 2 storey elements, characterise the central, eastern and southern parts of the Site where they complement adjacent proposed developments at GA1 and GA2.

[62] Henry J Lyons Architects

Figure 13.7: 'Urban Park Apartments' E2 (E1 behind), looking NW across the community park[63]

Figure 13.8: 'Park Pavilions' E4 (E3 to the right), looking NE across the community park, with G2 and G3 in the background[64]

Block E1 / E2 and E3 / E4 frame a central community park. The buildings are characterised by heights of 5 – 7 storeys, and while Blocks E1 / E2 to the west are broadly consistent with the design approach adopted throughout much of the development area, Blocks E3 / E4 adopt a much more distinctive form as a contrast, the latter fronting the community park on one side and Longfield Road on the other. E3 and E4 are relatively low-rise feature buildings within the centre of the proposed Project.

[63] Henry J Lyons Architects
[64] Henry J Lyons Architects

Figure 13.9: Block F1, looking NE from Longfield Road[65]

Blocks F1 / F2 provide a restrained scale of development, from 2 – 6 storeys high, presenting a dynamic series of elevations, fronting onto the broad green spine of Longfield Road, and providing strong contrast to Blocks E3 / E4 on the opposite side of the road.

Figure 13.10: Blocks G1 to G5 (right to left) viewed from the north / Racecourse Park

[65] Henry J Lyons Architects

Figure 13.11: Stapolin Way looking west, with Blocks E3 and F2 on the left and the southern elevations of Blocks G1 to G5 to the right[66]

Development Area G provides a distinct contrast between the more striking and dynamic northern elevations fronting Racecourse Park and the more restrained scale and detailing of the southern elevations that contribute to the streetscape of Stapolin Way.

Potential ***adverse*** impacts upon landscape character may arise from:

- The scale and intensity of built development and the relationship between buildings, streets and open spaces;
- The scale and character of the proposed Project compared to neighbouring / nearby developments, both existing and proposed;
- The contrast and interface between the proposed Project and the unbuilt parkland of Racecourse Park and the naturalistic estuary landscape beyond.

Potential ***adverse*** impacts upon visual amenity from the surrounding area may arise from:

- The change in urban character and impact upon the skyline / urban edge seen in the context of existing / proposed adjoining neighbourhoods and the broadly low-rise character of the existing landscape, especially as seen in relatively open views from the north and east;

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- The visual effects upon, and perception of, the nearby High Amenity coastal landscape; and
- The interruption of existing views towards the nearby coastal landscape.

13.5 Mitigation Measures

13.5.1 Construction Phase

- The construction phase of the proposed Project will be completed expediently through careful construction planning and management prior to commencing on-Site and throughout the construction phase.
- The Contractors' compounds, including Site offices and parking, will be located within the Site and away from nearby houses where possible, where it will have minimal visual impact.
- Perimeter hoardings will be installed along the Site boundaries and maintained in good condition and free of unsolicited graffiti and fly-posting.
- A construction materials and waste storage area will be located within the Site, screened from public view by intervening buildings as well as perimeter hoardings.
- Visual impacts will increase and extend to a wider area with the installation of tower cranes across the Site and the gradual emergence of the building structures. The tower cranes will be the tallest and most visible elements, but are temporary structures for the duration of construction only. These will be 'parked' in an orderly manner when not in use (e.g. without overhanging neighbouring residential areas) and removed from the Site at the earliest opportunity.
- Plant generally within the Site, especially during the early stages of construction, are likely to be partially visible from neighbouring streets and open spaces. When not in use, these will be parked in compound areas and / or away from the Site perimeter in order to minimise visibility outside of working hours.
- A Construction Traffic Management Plan (CTMP) will be implemented, to minimise visual impacts and other impacts on neighbouring streets and residents, including the defined haul routes and times of operation; consolidation of vehicle movements for deliveries to site or removal of materials from site; and staggering of vehicle movements to minimise or avoid queuing on neighbouring streets.

Even with all reasonable mitigation measures in place (as described above), construction activities will most likely have ***significant, negative*** effects on visual amenity for adjoining buildings, streets and open spaces for a planned period of 54 months (4.5 years), with ***moderate to slight, negative*** effects further afield. These effects will be ***temporary to short-term*** in duration. Completing the construction programme in this period represents an expedient construction programme and will ensure that negative landscape and visual impacts are removed as quickly as possible.

13.5.2 Operational Phase

The proposed Project minimises or avoids potential adverse landscape and visual impacts upon the neighbouring sensitive landscape areas to the north and east by virtue of the following design considerations:

- The proposed Project is part of a much wider and carefully-considered consolidation of the urban edges fronting the Baldoyle-Portmarnock estuarine area, providing a clear separation between built-up areas and the more sensitive natural / scenic estuarine area, and seeking a strong positive interface between the two.
- The Baldoyle-Stapolin and Portmarnock South LAPs are widely separated by an area of open space that broadens on the approach to the estuary, maintaining wide views opening out to viewers approaching the coast along the R123.
- The proposed Project is set back from the nearby estuary, giving space to the intervening High Amenity land and future park / recreation areas as a landscape buffer to the estuary and coast beyond.
- The proposed Project contributes to a distinctive outwards-facing development that positively addresses the nearby recreation and High Amenity land, each as a setting to the other. Rather than trying to screen development, the approach is to make a positive contribution to the wider landscape, using place-making that establishes strong architectural character and identity that frames and complements the intervening High Amenity area.
- Building heights vary and taller buildings are clustered towards the western and northern edges of the Site, resulting in a modulated roofscape that provides visual interest in the wider landscape and avoids the monotony of relatively uniform building

heights seen elsewhere. Vertical emphasis from taller buildings provides a contrasting and complementary backdrop to the strong horizontal character of the flat coastal plain.

- The proposed Project complements other permitted developments, including those under construction, in the Clongriffin-Belmayne LAP lands to the west, and more recent development to the south and southeast. Restrained building heights and contrasting but complementary design approaches / details in the central, eastern and southern parts of the Site create a rich and cohesive character that complement neighbouring development and reads as a whole in the wider landscape.
- Generous public / communal open spaces and wide planted streets (Longfield Road and Stapolin Way) are interlinked and provide visual and spatial permeability throughout the proposed Project, linking into the neighbouring Racecourse Park to the north.

The proposed Project minimises or avoids potential *adverse* landscape and visual impacts upon neighbouring residential areas by virtue of the following design considerations:

- The proposed Project consolidates an emerging new urban neighbourhood centred around Clongriffin train station and the district centre. The current matrix of developed and undeveloped plots of land results in a disjointed relationship and unfinished appearance. The proposed Project will bring about greater continuity and consistency between plots, enhancing the landscape and visual amenity of neighbouring residential areas.
- Building heights are restrained throughout much of the Site, broadly according with height guidance in the LAP. Building heights are also responsive to neighbouring developments, providing a satisfactory transition of scale and height towards taller buildings. However, building heights have also responded to the latest guidance contained in the Urban Development and Building Height Guidelines for Local Authorities, seeking to make optimal use of the site while giving full consideration to their setting and the quality of built environment created. Taller buildings to the northern and western edges respond to the scale of open space that is Racecourse Park, and to the railway corridor and neighbouring LAP developments to the west.

- The proposed Project incorporates a range of buildings solutions including apartment blocks and duplex apartments, incorporating a wide variety of elevation details, roofscapes and materials.
- A richly detailed approach to hard and soft landscaping adds further visual interest and diversity to new streetscapes along with substantial open hard and soft landscaped spaces, making a positive contribution to the residential street network, aiding legibility and providing continuity with the civic space at Clongriffin train station and Station Square.

The proposed Project incorporates a carefully considered range of scale, form, detailing and materials to express a coherent yet diverse suite of building elevations and character areas:

- Zone E comprises four apartment blocks in total, two to each side of the central community park. The community park is a broad and predominantly green space, while a generous communal courtyard lies between the two blocks
- Block E1 overlooks the railway line and Stapolin Way, standing at 8 storeys along Stapolin Way and reducing to 6 storeys to the south; Block E2 overlooks the community park to the east and stand 6 storeys high. Form and massing are broken down by a stepped roofscape and recessed elements in the facades. Elevation detailing is simple and uses contrasting soft grey brick tones to further break down the scale and mass of the buildings. Projecting balconies in warm-coloured metal finishes add further depth, shadow and detail to the elevations. Refer to Figure 13.7, above.
- East of the community park lies the two 'Pavilion Blocks' E3 and E4. These are central to the proposed Project, with ground floor (internal) amenity space fronting onto the public open spaces of the community park, Stapolin Way and Longfield Road. They are orientated at a slight angle to the prevailing grid of streets and buildings, while their façade detailing is distinctive and provides a pleasing contrast to the surrounding buildings. Fibre-cement panelling and a wrap-around metallic 'lattice' of continuous balconies are the key defining features. In conjunction with their open space setting, they provide a focus within the new urban landscape of the proposed Project. Restrained heights of 5-6 storeys aids the legibility of the proposed project and maintains a human scale to the buildings and surrounding streets / open spaces. Refer to Figure 13.8 above.

- Zone F comprises apartments of 2-6 storeys high, some of the lowest in the proposed Project, making a respectful transition to neighbouring masterplan area GA2, and allowing openness and light onto Longfield Road. Simple detailing and pinkish brick tones set the character of the public facades. With the Pavilion buildings opposite, the height, form and detailing of buildings provide a rich visual experience on Longfield Road.
- Zone G comprises the 'Racecourse Apartments' to the north of Stapolin Way, set out in five blocks surrounding internal courtyards and Longfield Plaza, the green pedestrian link extending the Longfield Road corridor northwards to Racecourse Park. A splayed arrangement of buildings maximises visual connectivity between the central courtyards and the park, creating an open and visually permeable northern edge to the proposed Project. Building heights of 5-7 storeys along Stapolin Way are restrained, maintaining a human scale to the street and maximum daylighting to the central courtyards. Heights then increase northwards up to 10 storeys, with an 'accent building' of 15 storeys within the central Block G3. These elements address the scale of the landscape beyond the Site and provide a visually dynamic built form along this new urban edge. A range of brickwork is the prevailing material along with selected areas of wet dash render. A mix of projecting and recessed balconies along with metal mesh screens add further detail and visual richness to the building elevations.
- A series of richly landscaped linear parks and open spaces provide a setting for adjacent buildings and streets. The community park and Longfield Plaza are the principal open spaces, comprising a rich mixture of hard and soft landscape amenity spaces. These are complimented by the broad green streets of Longfield Road and Stapolin Way, together bringing a rich green landscape to the streets and open spaces for public and communal amenity, leisure and inviting pedestrian and cycle movement throughout the proposed Project.

13.6 Residual Impacts

Residual impacts are described below in accordance with guidance in Section 3.7.3 of the Draft EPA Guidelines (2017). A development of this nature, by definition, will bring about permanent change to the landscape by way of its transformation from open unbuilt land to a new high density residential neighbourhood. Individual impacts, such as those from individual buildings, are determined by their design life, which can reasonably be expected to be 40+ years, making their impacts ***long-term***. The impacts of green and open spaces can be more dynamic and changeable, where planned spaces will have impacts that may change in the medium to long-term as soft landscape grows and matures, or when the function of such spaces changes to meet evolving needs.

13.6.1 Impacts on Landscape Character

Residual landscape impacts upon the Site itself are profoundly positive, transforming a disturbed / neglected urban infill site into an attractive contemporary urban neighbourhood. It will contribute to a more complete urban landscape, reducing the sense of an 'unfinished' urban development area. Development blocks will contribute a range of built character that complements other new developments, existing and proposed, in neighbouring areas. The proposed Project will provide a network of green streets and open spaces linking the Racecourse Park at the north to Clongriffin Station, the district centre adjoining and existing / proposed residential areas to the south and southeast. This has a ***moderate to significant positive*** impact upon landscape character of the site and adjoining areas.

The proposed Project comprises apartment blocks set around private communal courtyard spaces, accompanied by broad green streets and generous public / community spaces. These complement the character of adjoining residential and commercial areas. The varied expression of built forms, height, roofscapes and elevation details, along with richly detailed hard and soft landscape throughout, creates a diversity of scale and character within the proposed Project, aiding legibility and enriching the sequential experience of moving through streetscapes and open spaces. This has a ***major positive*** impact upon place-making and the landscape character of the local street / open space network.

At the same time, careful consideration of building heights throughout Site ensures a satisfactory transition between the proposed Project and existing or permitted developments that adjoin the Site. This is a ***positive, permanent*** impact upon existing neighbouring residential areas, complementing the scale and character of adjoining areas an avoiding the adverse impacts of abrupt changes of scale and character.

In the wider landscape, the proposed Project consolidates new development within a carefully planned urban framework (the Baldoyle-Stapolin LAP) that acknowledges the higher landscape sensitivities of adjoining lands, including the High Amenity land to the north and east and the wider estuarine / coastal landscape. This relieves potential housing pressure for more sporadic development throughout the wider area, which might be more harmful to the highly sensitive estuarine and coastal landscapes. The proposed Project will form part of a new urban backdrop to the nearby High Amenity area, framing it with a more clearly defined edge, making a ***significant, positive*** contribution to the character of this emerging urban area.

As part of the wider urban framework proposed in the LAP, the proposed Project will help to reinforce a distinct separation between the urban landscape and the adjacent sensitive estuarine landscape, using nearby Racecourse Park to help make the transition. The magnitude of change to the estuarine landscape itself will be low and the resulting impact upon its landscape character will be ***moderate*** and ***neutral***.

13.6.2 Impacts on Visual Amenity

The following visual assessment references the booklet of photomontages by Modelworks, submitted under separate cover as part of the planning application.

The photomontages serve two purposes: firstly, to convey the intended character of the proposed Project in terms of the scale, form and variety of buildings, streets and spaces being created, along with the detailing and materials applied to them; and secondly to demonstrate the extent to which the proposed Project may be seen from the surrounding area, and the effects this may have on the character and amenity of those views.

The photomontage booklet sets out the methodology used for their production. They may also be referred to as 'verified views', because the camera position and a range of existing features in the landscape are carefully surveyed to aid the accurate scaling and placement of a computer-generated model into the photographs. Along with the accurate application of materials and lighting to the model, the result is a highly accurate representation of the proposed Project in its completed state set within an existing landscape context. This informs the assessment of likely visual impacts, reducing some of the subjectivity around what will or will not be seen and the character of what will be visible.

The context of a proposed Project can change due to permitted and future development. This is particularly relevant to the proposed Project on account of the rapid change planned and under way in neighbouring locations. For this reason, the photomontages provided include versions that illustrate in outline other permitted developments, including permitted and proposed versions of development at GA1 to the south. The intent is to inform the cumulative impact of these developments alongside the proposed Project, as well as to demonstrate whether views of the proposed Project will change in the future by way of visibility or context.

It is also important to recognise certain limitations of photomontages:

- Vantage points are selected to represent the range and extent of public views that can occur from the surrounding area. To a degree, they represent the 'worst case scenario' as it is usually the case that the majority of vantage points from surrounding streets and public spaces do not have views towards a site, being screened by intervening buildings or vegetation. This is especially true in urban areas and in landscapes with variable topography and / or significant tree cover. For example, viewpoints from residential neighbourhoods surrounding the proposed Project have been selected where the street axis aligns with the Site, offering the greatest chance of a view / vista to the proposed Project beyond the end of the street. Most streets do not offer such opportunities.
- As a static view from a fixed position, a photomontage does not demonstrate changes in visibility that can occur from small changes to the vantage point (e.g. crossing the street, or walking along a footpath). Again, the selected vantage point is often chosen to show where the proposed Project is likely to be most visible, representing a worst-case scenario.
- As a snapshot in time, a photomontages cannot demonstrate the visual effects of changing weather conditions or from seasonal change. The latter may sometimes be addressed by producing summer and winter views for selected vantage points where tree / hedgerow cover is likely to make significant differences; this was not considered necessary in the case of the proposed Project.

Figure 13.12 sets out the location of the photomontage viewpoints selected and referred to in the following text.

Figure 13.12: Photomontage View Location Map

13.6.2.1 Adjacent Residential Areas

Photomontage View 1 (Existing) illustrates the view north along Longfield Road. Longfield Road is a quiet residential street where contemporary development provides a moderately attractive streetscape, incorporating a variety of building elevations (3 – 4 storeys) in a rendered finish and private / on-street landscaping. At present there is nothing to terminate this view, which instead looks beyond the intervening fence and gates to the rough grassland and scrub that presently characterises the GA1 site (foreground), with the GA3 site beyond. The existing Site does not contribute any significant features to this view and has a ***neutral*** impact upon this view as a result. With an established contemporary residential street in the foreground, sensitivity to the proposed Project is low.

Photomontage View 1 (Proposed GA3) illustrates how the proposed Project now features as a relatively distant backdrop to this vista along Longfield Road. Buildings in Zones E are partially visible to the left, while buildings in Zones F and G are feature at the centre of the view. The range of building heights creates a dynamic roofscape, while the range of material colours and façade detailing create a cohesive and contemporary urban landscape as a backdrop to this view. There is a slight magnitude of change and a ***slight, positive*** visual impact arising from the proposed Project.

Photomontage View 1 (Proposed GA3 + Permitted GA1) illustrates a marked change to the current outlook, where a richly landscaped street within GA1 continues Longfield Road northwards into the Site. To the right is the residential development permitted under Reg. Ref. F16A/ 0412 (ABP Ref. PL06F.248970), standing three storeys high with a distinctive articulated roof, and incorporated on-street soft landscaping. The permitted development at GA1 lies mainly to the left, with glimpses of Blocks C2, C3 and A3 partially hidden by the intervening houses and existing and proposed on-street landscaping. The proposed Project is now largely screened from view, with the exception of the tower element of Block G3, which provides a focal feature at the end of the extended vista along Longfield Road.

The combined effect of the permitted developments and proposed Project is to reinforce the existing residential character of Longfield Road, framing the street with buildings of similar scale but diverse character, and with a substantially enriched and green streetscape. The visual effect is ***moderately positive*** as a result, removing views of the undeveloped sites and making a ***positive*** contribution to urban street character.

Photomontage View 1 (Proposed GA3 + Proposed GA1) illustrates a subtle change to the view along Longfield Road as a result of changes proposed to the GA1 development. While there are minor changes to the buildings on the left in the foreground, a new tower element within GA1 features behind the foreground street tree in this view, though it would be clearly visible from another position nearby. It would be seen in conjunction with the G3 tower beyond, where the pair of taller buildings would provide a visual focus and a sense of perspective that leads the eye along the street towards the park beyond. Visual impacts would remain ***moderately positive***.

Photomontage View 4 (Existing) extends west along Red Arches Road and overlooks the GA1 site, an area of fenced-off scrubby rough grassland. To the left out of view is part of the development permitted under Reg. Ref. F16A/ 0412 (ABP Ref. PL06F.248970), currently under construction. The existing streetscape is quite ordinary but benefits from private landscaped front gardens and street tree planting. In the background at the end of this vista are the curved roofs of Beau Park, close to Station Square, while to the right beyond the Site is the unattractive rear of Clongriffin train station plaza, with the 5 / 6 storey apartment block behind it. The unkempt character of the GA1 site and the disjointed visual relationship to the development beyond it has a ***moderately negative*** visual impact upon this view. As an established contemporary residential street, sensitivity to the proposed Project is low.

Photomontage View 4 (Proposed GA3) demonstrates that the proposed Project lies out of view to the right, as indicated by the red outline against the intervening buildings. There is ***no visual effect*** arising from the proposed Project as a result.

Photomontage View 4 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) illustrates a ***moderate*** magnitude of change and ***positive*** visual effects arising from the removal of the unkempt GA1 development site and screening of the rear of Clongriffin train station, along with the introduction of a broad green streetscape framed by new contemporary buildings. To the left, development permitted under Reg. Ref. F16A/ 0412 (ABP Ref. PL06F.248970) tightly frames the view and provides a feature corner due to its prominent position and height (three storeys) with a minor glimpse of the block beyond it. To the right are glimpsed views to new two-storey houses (Block B4) and apartments (Block A3) within GA1, along with a glimpse of the tower within the Gannon Homes Scheme (SHD Reg. Ref. 305316) beyond the railway line.

The resulting effect of the permitted developments is to remove the adverse visual effect of the existing GA1 site and rear of the station area, while introducing the ***positive*** visual attributes of a broad residential street with extensive soft landscaping. The permitted GA1 development provides continuity with the existing street and a visual transition from the 'traditional' scale of residential street to the taller buildings beyond, which remain substantially screened from view. While the proposed Project (GA3) makes no contribution to the changes in this view, visual impacts are ***moderately positive*** as a result.

Photomontage View 04 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) demonstrates subtle insignificant minor changes to this view as a result of the proposed GA1 development, where the combined visual impact of permitted and proposed Projects remains ***moderately positive***.

Photomontage View 5 (Existing) encompasses the vista west along Red Arches Drive from near the junction with Red Arches Close. This is a quiet residential street with apartments lining the left side of the street, while there is a filtered outlook through intervening trees onto undeveloped land to the right, appearing as informal parkland in this view. The street itself has little soft landscaping but benefits from the green outlook onto neighbouring land to the right, which is part of the Stapolin Haggard public park (under construction). The Site lies out of sight beyond the trees to the right, with no visual effect upon this view.

Photomontage View 5 (Proposed GA3) demonstrates that the existing view will remain unchanged as a result of the proposed Project, indicated by the red outline against the trees to the centre and right of the view. There will be ***no visual impact*** from the proposed Project as a result.

Photomontage View 5 (Proposed GA3 + Permitted GA1) demonstrates that the permitted GA1 development will also be entirely screened from view by the intervening trees, as indicated by the red outline centre and left in this view. The combined effect of the two developments will have ***no visual impact*** as a result.

Photomontage View 5 (Proposed GA3 + Proposed GA1) demonstrates that the majority of the proposed GA1 development will remain screened from view due to intervening trees and buildings. Only the upper half of the tower element in Block D3 will be visible, and will terminate the view beyond the intervening trees, with a slightly urbanising effect on the character of this view as a result. This is not an adverse change, as it adds depth to the urban landscape, signalling the presence of an extended urban area beyond the immediate streetscape, and providing a focal point for the vista. The magnitude of change is minor and the resulting visual impact is ***slight positive***, though the proposed Project itself makes no contribution to this change.

Photomontage View 7 (Existing) illustrates the view northeast from the rear of Station Way / Railway Road. It is a very ordinary modern residential streetscape with weak landscaping and a poor outlook to the rear / underside of the station concourse and railway line. The Site makes no contribution to the view other than its openness, the same being true of the GA1 site, which lies adjacent to the station and to the right. As a rather bland modern residential street, sensitivity to the proposed Project is low.

Photomontage View 7 (Proposed GA3) illustrates a minor change to this view as a result of the proposed Project. Very subtle changes occur beyond the intervening fence, with the introduction of the upper floors of several proposed buildings in the background, while the principal change it the top five floors of Block G3 visible above the intervening station forecourt / ramp. This is a minor magnitude of change to the view, with its character in keeping with the contemporary urban foreground, resulting is a ***neutral*** visual impact.

Photomontage View 7 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) illustrates a substantial change to this view as a result of the permitted GA1 development and permitted Gannon Homes Scheme. Apartment Blocks A1 - A3 of GA1 occupy the centre and right of the view, while part of the Gannon Homes Scheme adds a major building to the left beyond the existing apartments. These lend a distinctly urban character to the view, reinforcing a positive urban character in conjunction with the existing apartment block at the left, but with contrasting scale. A red outline in this photomontage indicates the proposed Project is entirely screened from view by the intervening permitted developments. The station concourse continues to detract from the quality of this view, as does the small pocket of undeveloped land in the middle ground – in due course, this is likely to be landscaped as part of the development permitted under SHD Reg. Ref 305316-19. The magnitude of change is high and visual impacts are ***moderately positive***, though the proposed Project does not contribute to these visual effects.

Photomontage View 07 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) demonstrates a more intensive change to the view as a result of the proposed GA1 development. While this continues to have a ***moderately positive*** visual impact upon this view, the proposed Project remains screened from view, as indicated by the red outline, and has ***no visual effect*** itself.

Photomontage View 19 (Existing) illustrates a view from Red Arches Road looking towards Rowan House and Alder House across the intervening park. Following Red Arches Road west from the coast road, these and neighbouring apartments greet the viewer as they enter The

Coast. The Site lies centre of view, beyond and screened by the intervening apartments. The view encompasses a moderately attractive contemporary urban residential landscape with a low sensitivity to the proposed Project.

Photomontage View 19 (Proposed GA3) uses a red outline, centre and right, to demonstrate that the proposed Project will be entirely screened from view by the intervening apartments. With no magnitude of change, there will be ***no visual impact*** as a result of the proposed Project.

Photomontage View 19 (Proposed GA3 + Permitted GA1) demonstrates no change to this view with the introduction of the permitted GA1 development, as indicated by the red outline centre and left. Even with the increase in building heights within the proposed GA1 development, there will be no change to this view, as demonstrated by the red outline in *Photomontage View 19 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme).* Neither the permitted nor proposed developments within the GA3 and GA1 areas result in any change to this view, therefore there will be ***no visual impact*** as a result.

Photomontage View 21 (Existing) illustrates the vista along Belltree Avenue, a new residential area within the Clongriffin-Belmayne LAP area west / north-west of the Site. Beyond the immediate streetscape of houses and front gardens, the vista extends across the railway line into the Baldoyle-Stapolin LAP area, encompassing some of the distant fields, hedgerows and trees therein. It is an evidently new suburban residential landscape with street trees and garden planting yet to mature, and has a low sensitivity to the proposed Project.

Photomontage View 21 (Proposed GA3) demonstrates that the proposed Project will be partially visible as a terminating feature of the vista along Belltree Avenue. Apartment Blocks within Zone G are partially visible, including a glimpse of the tower element of Block G3 to the left, while there is also an insignificant glimpse of Block E3. The scale and character of the proposed Project provides a complementary urban element to this urban landscape, fitting well with the foreground streetscape, where the minor magnitude of change has a ***slight, neutral*** visual impact.

Photomontage View 21 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) demonstrates that part of the development permitted under SHD Reg. Ref 305316-19 will give rise to a moderate magnitude of change as it terminates the view along this vista. The permitted GA1 development lies out of sight to the right, screened by intervening houses as indicated by the red outline in the photomontage. There remains an insignificant glimpse of the taller northern blocks in the proposed Project, including the tower element of Block G3. While the scale and massing of the permitted development gives rise to a ***slight, adverse*** visual impact, the proposed Project does not make a significant contribution to the changes in this view, remaining ***neutral***.

Photomontage View 21 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) demonstrates that the proposed GA1 development remains screened entirely from view and contributes no additional visual as a result.

Photomontage View 24b (Existing) illustrates the view north from the junction of Longfield Road and Myrtle Avenue, encompassing a substantial part of the GA1 site in the foreground and extending to Clongriffin train station and the surrounding apartments / commercial buildings. The GA3 site lies beyond and to the right but makes no contribution to the existing landscape other than its open unbuilt character. Perimeter fencing and disturbed ground in the foreground currently have a ***significant negative*** impact upon the character and amenity of this view, and on the adjacent residential neighbourhood behind the viewer. Sensitivity to the proposed Project is low.

Photomontage View 24b (Proposed GA3) illustrates the partial visibility of the upper floors of several buildings within the proposed Project, glimpsed above / through the intervening fence. The upper floors of Blocks E1 and E2 are visible centre-right while the 10 / 15 storey buildings within Zone G punctuate the skyline towards the right. Through the fence further to the right is a glimpse of Block F2. The presence of these news buildings complements the existing buildings visible centre and left beyond the railway line, within the Clongriffin-Belmayne LAP area. The magnitude of change is minor and with the dominance of the adverse visual effects of the foreground setting, the visual impact arising from the proposed Project is ***neutral.***

Photomontage View 24b (Proposed GA3 + Permitted GA1) demonstrates the profound magnitude of change to this view that will result from the permitted GA1 development – a new contemporary residential neighbourhood will replace the existing vacant and disturbed land, removing the adverse visual effects that arise from it. Longfield Road continues northwards towards the proposed Project with permitted housing in GA1 Zone C to the left and right. Further along Longfield Road lies the taller apartment Block A3, stepping up the scale of development and providing a terminal focus to the vista. The result of this new residential landscape is a ***highly positive*** visual impact, though the proposed Project is not entirely screened by the intervening buildings and trees, as indicated by the red outline, and contributes nothing to the changes in this view. A slightly different viewing position may give rise to a minor glimpse of the tower at Block G3, but its contribution to visual impact appears likely to be ***insignificant***.

Photomontage View 24b (Proposed GA3 + Proposed GA1) demonstrates by way of a red outline that the proposed Project will remain completely screened from view from this vantage point, though the tower element of Block D3 within the GA1 development now draws the eye as a focal feature towards the end of this vista. Collectively, visual impacts remain ***highly positive***.

Photomontage View 26 (Existing) illustrates the vista north-east from Beau Park Square along Station Way, the latter linking to Beau Park Crescent and Railway Road beyond. Station Way is a narrow street with few houses and little landscaping fronting the road. The vista is currently terminated by the curved roof of Clongriffin train station but also dominated by the unattractive ramp structure that serves the station forecourt. It is an ordinary and relatively urban residential landscape, a glimpse along a side street, with low sensitivity to the proposed Project.

Photomontage View 26 (Proposed GA3) illustrates the introduction of a glimpse of one block in Zone G and the rooftop of one building in Zone E, set behind the station and forecourt. The proposed Project as a whole is substantially screed from view. The magnitude of change is insignificant and visual impact is ***neutral***.

Photomontage View 26 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) demonstrates by way of red outlines that the Gannon Homes Scheme will obscure both the proposed Project and permitted GA1 developments, and as a result, there will be ***no visual impact*** arising from the proposed Project. Similarly, the Gannon Homes Scheme will screen the proposed GA1 development from view, as illustrated by the red outlines in *Photomontage View 26 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme)*. The Gannon Homes Scheme itself will give rise to a moderate to major magnitude of change, introducing contemporary apartments as context for this new urban landscape. This will have a ***slight positive*** visual impact upon this view.

Photomontage View 27 (Existing) illustrates the view from Station Way at its junction with Railway Road, looking north-east towards Clongriffin train station, where the Site lies beyond the station. In the foreground / middle-ground lies an undeveloped plot with Clongriffin train station terminating the vista along the road and new apartment / office buildings 5 – 6 storeys high, centre and left of the view. The character of the view is presently open, urban and dynamic, anticipating further intensification of built development, the foreground streets softened slightly by nearby front gardens and street trees. Sensitivity to the proposed Project is low.

Photomontage View 27 (Proposed GA3) demonstrates a low magnitude of change where a partial view of the proposed Project occurs beyond the station to the right. There is a partial view of Block G3 where the tower element extends above the intervening canopy of the railway station, along with an insignificant sliver of another building to the right. The tower element of Block G3 complement the scale and character of the buildings in the foreground near the station. Its visual effect upon this view is neutral and visual impact is ***neutral****.*

Photomontage View 27 (Proposed GA1 + Permitted GA3 + Gannon Homes Scheme) introduces a block model of the Gannon Homes Scheme, which occupies much of the foreground in this view and completely obscures views of the proposed Project along with the permitted GA1 development. The Gannon Homes Scheme introduces a profound magnitude of change to this view, and is likely to result in a ***major positive*** visual impact as a result of removing the disturbed and vacant development site and replacing it will a high quality urban landscape. The proposed Project makes no contribution to this visual effect and will have ***no visual impact***.

Photomontage View 27 (Proposed GA1 + Proposed GA3 + Gannon Homes Scheme) demonstrates the same result, where the permitted Gannon Homes Scheme screens visual effects arising from the proposed Project and proposed GA1 development.

13.6.2.2 Clongriffin Train Station and Main Street

Photomontage View 6 (Existing) illustrates part of the civic landscape space at Clongriffin train station concourse. It is a reasonably attractive and high quality urban landscape though currently lacks the presence of additional development that would helpfully frame it, and the station feels a little 'lost' in this landscape. There are almost no landscape features to draw the viewer's eye beyond the station concourse, and the Site is behind the station to the left. As a distinctly urban space with a public focus, sensitivity to the proposed Project is low.

Photomontage View 6 (Proposed GA3) demonstrates that there is no view of the proposed Project from this vantage point, as indicated by the red outline to the left. With no change, there will be ***no visual impact*** from the proposed Project in this location, though it is likely to be gradually revealed as the view advances along the road past the station and beyond the concourse.

Photomontage View 6 (Proposed GA3 +Permitted GA1) illustrates a significant magnitude of change to this view, where the presence of new apartment buildings at Blocks A begin to frame the station concourse to the right and draw the viewer's eye beyond into the Site. The permitted Gannon Homes Scheme does not feature in this view. There is a greater balance to this urban landscape now that visual detractors such as the temporary railings / barriers and stair enclosure have been removed and replaced with contemporary apartment buildings and high quality hard and soft landscaping. As a result, visual impacts are ***moderately to highly positive***.

Photomontage View 6 (Proposed GA3 + Proposed GA1) illustrates a very significant magnitude of change to this view, where the presence of new apartment buildings at Blocks A and D frame the station concourse both left and right, adding depth to the landscape and drawing the viewer's eye beyond into the Site. There is a much greater balance and higher quality to this urban landscape now that visual detractors such as the temporary railings / barriers and stair enclosure have been removed and replaced with simple but attractive apartment buildings and high quality hard and soft landscaping. As a result, visual impacts are ***highly positive***.

Photomontage View 9 (Existing) illustrates the vista along Main Street into the centre of Clongriffin. It is a modest boulevard with a strong presence of street trees and a coherent contemporary selection of buildings framing the street, generally at 5 – 6 storeys high. The imminent transition from open streetscape, where the viewer stands, to an enclosed urban street make this feel like the gateway it is, lending a sense of arrival at a destination. The quality of this urban landscape is relatively high, making an attractive approach to Clongriffin, and the Site lies towards the left behind the buildings. As a contemporary and primarily residential landscape, sensitivity to the proposed Project is low.

Photomontage View 9 (Proposed GA3) demonstrates that the proposed Project will not be visible in this view, as indicated by the red outline towards the left, and will have ***no visual impact*** as a result.

Photomontage View 9 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) demonstrates the slight to moderate magnitude of change that occurs with the presence of the Gannon Homes Scheme, which appears as two tall blocks towards the end of the vista between the existing buildings. The permitted Gannon Homes Scheme has a ***slight to moderate, neutral*** visual impact, as a result of an intensification of the contemporary urban landscape through additional height and massing. However, the red outline indicates that both the proposed Project and permitted GA1 development are hidden behind the existing buildings and permitted Gannon Homes Scheme, with ***no visual impact*** as a consequence.

Photomontage View 9 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) demonstrates by way of a red outline that the proposed GA1 development remains hidden from view behind the permitted Gannon Homes Scheme, despite its additional height, along with the proposed Project, resulting in ***no visual impact*** arising from these. The permitted Gannon Homes Scheme remains partially visible with a ***slight to moderate, neutral*** visual impact.

13.6.2.3 Local Road Network

Photomontage View 8 (Existing) is taken from the R809 Grange Road where it crosses the railway. This is one of few elevated views within this part of the Greater Dublin Area and extends broadly across to the north and east, encompassing a glimpse of the Site beyond the intervening Myrtle residential area, with a slight glimpse of taller building near Clongriffin train station; between these is a distant glimpse to the greener skyline of Portmarnock. This is an ordinary residential landscape with no distinguishing positive features, where the railway corridor, adjacent vacant development plot and monotonous residential skyline have a low sensitivity to the proposed Project.

Photomontage View 8 (Proposed GA3) illustrates a low magnitude of change to this view as a result of the proposed Project. Apartment blocks E1 / E2 are clearly visible beyond the railway corridor with partial views of Blocks G1 and G2 beyond them. To the right beyond the rooftops of intervening houses is a partial view of the tower at Block G3 and a glimpse of the upper floors of Block G5. Together these add a contrasting element to this residential landscape and animate the skyline with a range of building heights, with the taller blocks echoing the pattern of taller stair cores in the nearby existing apartments to the right. The result is an intensification of the urban landscape with a slight improvement to its richness and character, with a ***slight positive*** visual impact as a result.

Photomontage View 8 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) demonstrates how these future developments add further depth and variety to this emerging urban landscape. The Gannon Homes Scheme has a strong presence to the left of this view, its significant height framing the railway line and Clongriffin train station on one side with the GA1 development framing the opposite side. Both convey a strong sense of an urban centre and destination. The taller buildings within the proposed Project continue to punctuate the skyline beyond the GA1 development, where their form, grain and colour palette will complement the character of both the GA1 and the Gannon Homes schemes. The proposed Project continues to make a minor contribution to this emerging urban landscape with a ***low positive*** visual impacts as a result, while the cumulative developments result in a ***moderately positive*** visual impact.

Photomontage View 8 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) reflects the additional height incorporated into the proposed GA1 development, resulting in a more varied and rich assembly of buildings, a slightly more dynamic skyline, and greater balance with the Gannon Homes Scheme to the left of the station. While the cumulative developments continue to have a ***moderately positive*** visual impact, the proposed Project contributes an insignificant to low magnitude of change in this view and results in an ***insignificant, positive*** visual impact.

Photomontage View 20 (Existing) illustrates a glimpsed view south-east from the R123 Moyne Road north of the Clongriffin-Belmayne LAP area. It encompasses a broad view across open fields with new development surrounding Clongriffin train station area at the right, more distant glimpses of existing development at Red Arches within the southern / eastern part of the Baldoyle-Stapolin LAP area, and a distant view across Baldoyle and Sutton to Howth Head in the distance at the left. The foreground is characterised by arable land subdivided by fragmented mature hedgerows that allow intermittent glimpses of existing development beyond, forming a predominantly low horizon. It is designated greenbelt but falls outside the designated High Amenity area. The character of this view is urban / rural fringe where the Site presents no discernible features by contributes to the openness of the landscape. Sensitivity to the proposed Project is moderate.

Photomontage View 20 (Proposed GA3) demonstrates a high magnitude of change to this view where the northern part of the proposed Project is substantially in view. Blocks G1 - G5 are clearly visible centre and left of the view, exhibiting a range of contrasting building heights and material finishes to form a dynamic edge overlooking the adjacent countryside. Block E1 lies centre right of this, drawing building heights downward slightly towards the station. The contemporary urban character established by the proposed Project is consistent with, and complementary to, existing development at the right of the view, reinforcing the character and presence of these new urban neighbourhoods and framing the countryside that lies in the foreground. The view of Howth Head is slightly obscured at this point on the road but will fully emerge as the viewer travels eastwards towards the High Amenity area. Despite the strong presence of the proposed Project, the greater clarity and distinction between urban and rural areas resulting from the proposed Project is a ***positive*** visual effect, as is the 'reveal' of the High Amenity landscape as the viewer travels eastwards towards it. As a result, visual impacts are ***moderately positive***.

Photomontage View 20 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) demonstrates how the permitted GA1 development provides continuity of this emerging new urban landscape, though it appears somewhat restrained and uniform in building height, while the Gannon Homes Scheme adds a focus element to the landscape by way of the permitted tower. The result is a cohesive urban landscape beyond the open countryside of the foreground, and in conjunction with the proposed Project, visual impacts remain ***moderately positive***.

Photomontage View 20 (Proposed GA1 + Proposed GA3 + Gannon Homes Scheme) illustrates the greater variety and visual richness of the new urban landscape resulting from the changes to building heights within the proposed GA1 development. The more dynamic roofscape and the feature element of the Block D3 tower complement and balance the proposed Project and the permitted Gannon Homes Scheme. The collective visual impact is ***moderately positive***, in the context of which the proposed Project will contribute a ***moderately positive*** visual impact.

Photomontage View 11 (Existing) illustrates a view south from the R123 Moyne Road, which encompasses a broad open panorama across the intervening fields towards the Site. Fragmented hedgerows along the roadside make such views intermittent from here. Remnant hedgerows and rough grassland lend the foreground a somewhat wild appearance in contrast to the contemporary buildings near Clongriffin train station, visible at the right of this view. The horizon is low and the buildings at the right have a strong presence in this flat landscape, while glimpses of built development beyond the Site make an unclear interface between built-up areas and open countryside. The Site itself contributes to the openness of this view and there are partial views of the open ground and hedgerows / scrub within the Site. The foreground is part of the designated area of High Amenity and the sensitivity of this view to the proposed Project is therefore high.

Photomontage View 11 (Proposed GA3) illustrates a very high magnitude of change to this view as a result of the proposed Project. The full extent and character of the northern elevations of Blocks G1 to G5 (right to left) are clearly visible from this vantage point, illustrating the variety of building heights and the complementary range of detailing and finishes that create a cohesive and visually rich urban landscape. The photomontage also demonstrates how the broad spaces between the blocks allow visual permeability into and through the proposed Project.

The proposed Project defines a comprehensive urban edge to this emerging urban landscape, fronting onto the intervening open space and High Amenity area. It also complements and balances the existing apartment building near the station, which remains visible. The intervening open space, adjoining and within the High Amenity Area, will ultimately incorporate substantial enhancements for biodiversity, amenity and recreation as part of wider development in the LAP area, including the Racecourse Park, which are not illustrated in the photomontage. In this changing and managed landscape context, the proposed Project will have a ***significant positive*** visual impact.

Photomontage View 11 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) illustrates the tower element permitted under SHD Reg. Ref 305316-19 towards the right, rendered as a simple massing model. This adds an element with significant bulk and scale to this emerging urban landscape, complementing and balancing the proposed Project in this view. Its contribution to the change in this landscape is minor however, with the bulk of change remaining attributable to the proposed Project, which together have a ***significant positive*** visual impact.

Photomontage View 11 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) demonstrates that the proposed GA1 development will introduce insignificant change to this view, glimpsed between Blocks G1 and G2, as it remains almost entirely screened by the proposed Project. Visual impacts will not change as a result and will remain ***significant, positive***.

Photomontage View 13 (Existing) illustrates a typical view from the coastal path adjoining the R106 Coast Road. This is a significant public amenity route and part of a designated view / prospect that extends along the coast road on both directions. It broadly represents the nature of views from the nearby coastal margins towards the Site and encompasses part of the High Amenity area in the foreground. There is already a consistent backdrop of development beyond the intervening grassland and scrub, comprising development around Clongriffin train station to the right and recent development at The Coast (Red Arches) centre and left in this view. It has a less 'wild' feel than at vantage point 11 and sensitivity to the proposed Project is considered moderate in this case. The Site lies centre and right in this view.

Photomontage View 13 (Proposed GA3) introduces a moderate magnitude of change to the nature and extent of built development in this view. Elements of development Zones E and F lies immediately left of centre, intensifying the established urban backdrop to this part of the view, while the taller buildings in development Zone G provide exhibit the distinctive scale and character of the proposed new urban edge fronting Racecourse Park at the far right. It is complementary to the established urban context, particularly the existing apartments at Red Arches visible a the left of this view, demonstrating a range of building heights and finishes that comprise a distinctly contemporary and coherent urban landscape as a contrasting background to the open green space in the foreground. Visual impacts are ***slight positive*** as a result.

Photomontage View 13 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) contribute minor additions to this emerging urban landscape established by the proposed Project. The permitted GA1 development is largely hidden by intervening vegetation, left of centre, while the permitted Gannon Homes Scheme introduces a tower element at the centre of this view and continues the new urban edge westwards at the far right of this view. The latter demonstrates how the proposed Project is coordinated with permitted development in the neighbouring Clongriffin-Belmayne LAP with regard to a consistent interface with the adjoining open countryside (greenbelt). The tower helps to balance building heights seen in this view. Visual impacts are ***slight to moderate, positive*** as a result.

Photomontage View 13 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) illustrates the effects of additional height proposed in the GA1 development. The principal change is the introduction of the Block D3 tower at the centre of the view, visible to the front / side of the Gannon Homes tower, appearing to be clustered together from this vantage point. This provides further balance to building heights in this view, while the more varied roofscape within he proposed GA1 development adds further visual richness to this new urban landscape and visual impact are ***moderately positive*** as a result.

Photomontage View 22 (Existing) illustrates a vista northwest along the R106 Station Road at Sutton, just north of the railway crossing. The street is characterised by one- and two-storey houses with small mature front gardens. It is a heavily-trafficked road. The Site lies approximately 2 km away and makes no contribution to this view at present. Sensitivity to the proposed Project is low.

Photomontage View 22 (Proposed GA3) demonstrates the proposed Project will be screened from view by intervening buildings and vegetation, as indicated by the red outline in the photomontage. With no change to this view, there will be no visual impacts.

Photomontage View 22 (Proposed GA3 + Permitted GA1) demonstrates that the permitted GA1 development will also be entirely screened by intervening buildings and vegetation, with no visual impact as a result. Only the tower element of the Gannon Homes Scheme will be visible from this vantage point as a minor incursion on the horizon, as illustrated in *Photomontage View 22 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme)* with an ***imperceptible*** visual impact as a result.

13.6.2.4 High Amenity Area

Photomontage View 15 (Existing) illustrates a panoramic view across Baldoyle Estuary from a position next to the Portmarnock Beach public car park. The foreground comprises natural unmanaged marsh vegetation extending out to the water / mudflats beyond, comprising part of a designated High Amenity area. Recent built development within the Baldoyle-Stapolin LAP and Clongriffin-Belmayne LAP area provides a rather sprawling urban backdrop, within which the apartments at Red Arches to the left and apartments / offices around Clongriffin train station towards the right have a distinct presence, as do the very distant chimneys of the former power station in the Dublin Docklands. The Dublin Mountains are faintly visible in the distant background. In spite of the height of some existing buildings at 5 – 6 storeys, the landscape creates a broad and relatively flat panorama in this view. As a view from within the natural landscape of the designated High Amenity area, sensitivity to the proposed Project is high.

Photomontage View 15 (Proposed GA3) demonstrates a moderate to high magnitude of change to this view. The proposed Project delivers an intensification of the urban neighbourhood surrounding Clongriffin train station, with significant increases in building heights being the most significant feature in this wide and relatively flat panorama. These buildings appear as a dense cluster with a range of material colours and a dynamic roofscape. While being more prominent in the landscape that existing urban development, the proposed Project removes the sense of sprawling urban development in the background and instead provides a clearly defined urban character area as a focal element within a richly varied landscape. The proposed Project also avoids interrupting views to the distant Dublin Mountains from this vantage point. The result is a positive change to the landscape and visual impacts are considered to be ***slight, positive*** as a result.

Photomontage View 15 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) continues the positive changes introduced by the proposed Project. The permitted GA1 development contributes a subtle consolidation of new buildings behind the proposed Project, while the Gannon Homes Scheme adds significantly to the new urban edge that now defines the backdrop to the High Amenity area. New tower elements in the Gannon Homes Scheme complement and balance the Block G3 tower element with the proposed Project, and the result is a clearly consolidated urban edge framing the foreground and providing clarity and legibility to the landscape as a whole. The proposed Project continues to make a ***slight, positive*** contribution to visual impacts, in the context of more extensive change that has a ***moderate, positive*** visual impact.

Photomontage View 15 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) demonstrates the subtle changes to the contribution of GA1 to this new urban landscape. A subtly enhanced roofscape results from a more dynamic approach to building heights, while the new tower element within Block D3 of GA1 complements other tower elements that punctuate the skyline nearby, creating more balance and coherence within he urban landscape. The proposed Project continues to make a ***slight, positive*** contribution to visual impacts, in the context of more extensive change that has a ***moderate, positive*** visual impact.

Photomontage View 16 (Existing) illustrates the view south from the public footpath on the R106 Strand Road at Portmarnock, at the top of the Baldoyle Estuary. In the foreground is the edge of the public park and the estuary marshland. The house to the right lies on the Coast Road near the junction with Strand Road, and to the left of it is the signalised junction of the Portmarnock Greenway footpath and cycleway with Strand Road. Beyond the road and greenway lies an expansive area of unmanaged grassland and an undulating landform. The ground has been disturbed by construction plant associated with the nearby St. Marnock's Bay residential area within the Portmarnock South LAP area. The view is characterised by a natural / naturalised landscape with limited built influences and a broad open aspect. The foreground comprises part of a High Amenity area and as such has a high sensitivity to the proposed Project.

Photomontage View 16 (Proposed GA3) introduces views of the upper floors of taller building elements within Blocks G1 to G5, right to left in this view. While these create a consistent pattern of built elements in the landscape, and the magnitude of change is low, their immediate context is not visible and they appear out of character, disconnected from the landscape and intrusive at the skyline. As a result, the visual impact is ***moderate, negative***.

Photomontage View 16 (Proposed GA3 + Permitted GA3 + Gannon Homes Scheme) demonstrates how permitted buildings within the Gannon Homes Scheme, particularly the tower elements, will also be present in this view. *Photomontage View 16 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme)* illustrates a subtle further addition to the horizon by the D3 tower element of the proposed GA1 development. Clustered together in the distance with the taller proposed Project buildings, these begin to convey the character of a new and extensive urban area over the horizon. Nonetheless, as new urban features in an otherwise largely unbuilt view, this will have a ***moderately to highly negative*** visual impact.

However, it is important to note that extensive future development is anticipated in the middle-ground that will fundamentally change this view. Part of the Portmarnock South LAP area lies between the viewer and the proposed Project, which will result in a significant new urban neighbourhood screening most, if not all, of the GA1 and GA3 development, along with the Gannon Homes Scheme. In this context, visual impacts from the proposed Project are likely to be ***negligible*** or ***none***.

Photomontage View 23 (Existing) extends a panorama across Baldoyle Bay to the built frontage of Strand Road, mainly 1 – 2 storeys high, stretching from the edge of Sutton to Baldoyle. Baldoyle Catholic Church lies towards the right as a subtle but distinct landmark in this view. The character of the built landscape is low-lying, complex but visually rich and coherent urban fringe behind a contrasting broad expanse of open water / mudflats. The vantage point lies within a High Amenity landscape but with a strong urban edge as part of the existing view, sensitivity to the proposed Project is considered moderate.

Photomontage View 23 (Proposed GA3) demonstrates a low magnitude change and a subtle contrast in character resulting from the proposed Project. Much of it remain screened from view by intervening buildings, but the taller elements of Blocks G1 to G5 now feature above the intervening roofscape reshape this part of the skyline. The tower element of Block G3 is the tallest element but its pale colouring helps it to recede against the sky, while the darker materials of the lower blocks add contrast and context. Existing development in the foreground, including contemporary apartments, appears to provide the setting for the proposed Project and the result is a ***slight, neutral*** visual impact.

Photomontage View 23 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) illustrates subtle changes to the built horizon resulting from the upper floors of buildings within the permitted GA1 and Gannon Homes developments, along with the more distinct presence above the horizon of the tower element in the Gannon Homes Scheme. In conjunction with the Block G3 tower, this begins to signal an emerging new urban neighbourhood as more coherent part of the skyline, beyond the existing urban waterfront. This adds a degree of depth legibility to the urban landscape as a backdrop to the coastal landscape of the foreground. Visual impacts are likely to be ***slight to moderate*** but ***neutral*** in this context as a result.

Photomontage View 23 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) illustrates the further subtle changes to the horizon and the introduction of the D3 tower within the proposed GA1 development, again lending depth and legibility to the landscape. The coherent character of these collective developments appears likely to result in a ***slight to moderate*** but ***neutral*** visual impact.

Photomontage View 25 (Existing) illustrates a view south-west from the Portmarnock Greenway footpath and cycleway close to its junction with Moyne Road. It overlooks the marshes and grassland that lie at the heart of the High Amenity landscape and form part of the Racecourse Regional Park. Beyond the marshes and grassland, Clongriffin train station is clearly visible along with existing apartments and commercial buildings defining a strong urban edge to the Clongriffin-Belmayne LAP area. The Site lies to the front and left of the station in this view, contributing to the open undeveloped landscape character of the middle-ground. This view, encompassing part of the High Amenity landscape and the emerging urban background and skyline, has a moderate sensitivity to the proposed Project.

Photomontage View 25 (Proposed GA3) demonstrates a high magnitude of change to this view resulting from the proposed Project. The lower Blocks F1 and F2 appear at the centre of this view, with the stronger presence of the taller Blocks G1 - G5 occupying the right of this view. The paler materials of the lower blocks are evident throughout the proposed Project, punctuated by taller buildings and contrasting colours, creating a dynamic but cohesive urban character. Building scale is emphasised by being closer to the viewer than the existing urban area. New tree planting to the edges of the built-up area helps the transition, once established, from buildings to countryside. The visual effect is that of a new urban landscape in a green landscaped setting, providing a stronger contrast and more deliberate transition between urban neighbourhood and surrounding greenspace than exists at present, resulting in a ***moderate, positive*** visual impact.

Photomontage View 25 (Proposed GA3 + Permitted GA1 + Gannon Homes Scheme) demonstrates how the GA1 development continues the new urban edge established by the proposed Project, left of the view, while the tower element of the Gannon Homes Scheme appears to cluster with the Zone G buildings of the proposed Project, together consolidating this new urban landscape. The magnitude of change is remains high and visual impacts are likely to be ***moderate, positive***, with a significant contribution to this from the proposed Project.

Photomontage View 25 (Proposed GA3 + Proposed GA1 + Gannon Homes Scheme) illustrates the greater visual richness that would arise from the proposed GA1 development, with varied and increased building heights resulting in a more dynamic roofscape throughout and introducing a tower element that complements those within the permitted Gannon Homes Scheme and the proposed Project. The overall result is a very cohesive urban landscape incorporating a variety of scale and detailing that provides an attractive background to the High Amenity area in the foreground. Visual impacts are ***moderately to highly positive***.

13.6.3 Cumulative Impacts

The assessment of landscape and visual impacts above includes references to neighbouring developments that are either permitted, proposed or anticipated as part of future LAP areas – mainly the Baldoyle-Stapolin LAP, which the proposed Project forms part of, but also the Portmarnock South LAP area, which lies to the north of the proposed Project. The proposed Project comprises a significant part of the development area within the Baldoyle-Stapolin LAP area. It is, therefore, important to consider the contribution the proposed Project makes to the wider vision for the area.

The existing landscape comprises low-rise urban development adjoining the coastal margins of the Baldoyle Estuary, and with little variation in building heights, this results in a predominantly flat landscape. The separation between urban areas and countryside is sometimes unclear as a result of scattered or incomplete development areas.

The proposed Project occupies a key position within the wider development area of the Baldoyle-Stapolin LAP. This means that the proposed Project defines part of a new urban edge within the landscape, along with a more animated and dynamic skyline, which contrasts with the prevailing urban landscape. The additional height and contemporary building forms introduce greater depth and variety within the landscape, with positive landscape and visual impacts as a result.

These impacts can change as permitted or proposed future development is added into the landscape. In broad terms, development permitted under SHD Reg. Ref 305316-19 (Gannon

Homes Scheme) interrupts or obscures views from the west, while providing additional urban context to views from other directions. Similarly, anticipated development within the GA1 area (permitted or proposed) partially obscures parts of the proposed Project or features more strongly, such as in views from the south. From elsewhere, however, permitted / proposed development at GA1 tends to be screened by the proposed Project and other permitted or existing developments, while the Gannon Homes Scheme provides mainly background context.

Landscape and visual impacts resulting from the proposed Project are important in establishing a coherent urban landscape for existing residential areas that adjoin the Site to the south and east. The proposed Project provides continuity and connectivity between these areas and the central location of Clongriffin train station, as well as key public open spaces and an attractive outlook from neighbouring streets. It also provides continuity with the new urban edge being established by development of the northern edge of the Clongriffin-Belmayne LAP. The proposed Project, therefore, has a ***highly positive*** impact upon landscape character and visual amenity as central element of the wider development objectives for the area.

13.6.4 Summary of Impacts

The proposed Project has addressed national policy by taking a performance-based approach to building height and urban design, in order to create a distinctive development that also successfully integrates with the surrounding urban and coastal landscapes. Massing and building height incorporate a wide variety of scale and form to create visual interest and respond to the constraints or opportunities of adjoining built areas.

The proposed Project avoids inappropriate impacts on neighbouring High Amenity landscape areas by virtue of its separation and the achievement of an attractive contemporary urban landscape character that offsets and emphasises the character of neighbouring semi-natural sensitive landscapes. While the proposed Project features in designated views and prospects from around the estuary, in most instances it does so in a sensitive manner that consolidates and enriches the existing and anticipated urban neighbourhoods as an urban backdrop and setting to the sensitive estuarine landscape.

The proposed Project lies within a designated LAP area and broadly satisfies the objectives and guidance contained in the LAP with regard to building and design objectives. The proposed

Project also has regard to adjacent LAP lands and developments recently permitted there, taking a coordinated approach to layout and design.

The visual impacts arising from the proposed Project are mostly ***positive*** or ***neutral***. From within neighbouring residential areas, the proposed Project typically removes vacant development land and replaces it with new residential streetscapes with a diversity of building types and extensive soft landscaping. The tower element of Block G3 sometimes provides a focal feature to vistas and views. From west of the railway line, the proposed Project frames the station concourse, reinforcing its function as a central hub and its focus as a civic space. The proposed Project also continues the north-south spine route along Longfield Road and extends it as the principal link into Racecourse Park to the north, aiding legibility and connectivity.

From the north and east, where views occur across a more open and undeveloped landscape, which is designated a High Amenity area, the proposed Project builds upon the existing sporadic appearance of development in the landscape and consolidates these into a more comprehensive urban backdrop, with diversity and visual interest in its own right, that than then emphasises the more naturalistic landscape of the estuarine margins from where the view is taken.

The proposed Project will in future be joined by further development anticipated as part of the Baldoyle-Stapolin LAP, which will continue to enriching the local urban landscape and providing a comprehensive backdrop that is set back from the estuarine landscape.

13.7 Monitoring

No monitoring of landscape and visual effects is required. Management and regular maintenance of the buildings and open spaces will be required to ensure the proposed Project maintains a positive impact on urban landscape character and public amenity.

13.8 Reinstatement

Any temporary off-Site effects resulting from the construction phase (e.g. haul routes or Contractors' compounds) will be reinstated at the end of the construction phase to avoid longer-term landscape and visual impacts.

13.9 Interactions

The proposed Project has the potential for interacting with local natural and built heritage, which can contribute to the existing landscape.

Chapter 14 of this EIAR addresses Cultural Heritage, Archaeology & Architectural Heritage. There are no Protected Structures within or close to the Site and no negative impacts are anticipated upon the setting of any Protected Structures or views to / from them. The closest Protected Structures are at Baldoyle, more than 1 km from the Proposed Project.

The surrounding landscape has been traditionally associated with large houses from the 17th to 19th centuries and managed as part of their estates or demesnes. Many of these houses survive, though many of the former estates are occupied by modern housing. Stapolin House and gardens once lay southeast of the Site but have been demolished. The location is now proposed as a green space called Stapolin Haggard. The original house was approached from the south by an avenue of trees, which still remain and are incorporated into the landscape masterplan for the Baldoyle-Stapolin lands.

Chapter 8 of this EIAR addresses Biodiversity. The Site itself contains existing vegetation (grassland, hedgerows and other features) that contribute to the ecological resources of the Site as well as the landscape's character. Significant ecological interests lie outside the Site within the nearby grasslands, marshes and estuary. The proposed Project seeks to preserve and enhance the latter as part of the landscape setting of the proposed Project, providing both a landscape / amenity resource and a reservoir of natural heritage. Enhancements and management of these natural areas is likely to enrich biodiversity and compensate for some of the losses of natural green space within the Site. Ornamental landscaping within the Site, by way of tree / shrub planting and other vegetation, is likely to diversify the range of habitats and opportunities for biodiversity.

No potential was identified for significant landscape or visual impacts to arise as a result of interaction with any of the other environmental topics addressed in this EIAR (including those discussed above). Refer to Chapter 20 (Interactions) for an overview of interactions between environmental topics addressed in this EIAR.

13.10 'Do-Nothing' Impact

If the proposed Project were not to be built and the site were without other development, it would remain, in the short-term at least, as disturbed ground with increasing amounts of natural regeneration occurring in the absence of any management and maintenance. It is unlikely that the land would be opened up for public recreational use. With increasing amounts of residential development to either side of it, including within other parts of the Baldoyle-Stapolin LAP and Clongriffin-Belmayne LAP areas, the Site would appear incongruous and unkempt, an inaccessible open space with poor visual amenity. This would most likely have a ***moderately or high adverse*** visual impact upon the immediate neighbouring areas, including Clongriffin train station, and would also have a ***negative*** impact upon the positive character of this emerging urban neighbourhood.

The Site is key to the masterplan area for residential-led development in the Baldoyle Stapolin LAP area, and key to delivering the new urban edge fronting onto Racecourse Park, with an objective for high quality urban development. Should the proposed Project not go ahead, it is likely that other proposals for development will come forward in the short- to medium-term, the landscape and visual impacts of which cannot be accurately assessed at this stage.

13.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties compiling this chapter of the EIAR.

13.12 References

- Urban Development and Building Heights Guidelines for Planning Authorities (DHPLG, 2018)
- Fingal County Development Plan 2017-2023 (Fingal County Council, March 2017)
- Baldoyle-Stapolin Local Area Plan (Fingal County Council, May 2013)
- Portmarnock South Local Area Plan (Fingal County Council, July 2013)
- Google Maps and Google Streetview (www.google.ie/maps)
- Architectural Design Statement: Alterations to Shoreline GA01 Lands at Baldoyle (Henry J Lyons Architects, May 2021)
- Project Shoreline, Baldoyle: Verified Photomontages (Modelworks, May 2021)

14 Cultural Heritage, Archaeology & Architectural Heritage

14.1 Introduction

This chapter considers and assesses the archaeological, cultural and heritage environment at the Site of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13. It assesses the significance of the receiving archaeological and cultural heritage environment, identifies and evaluates the significance of the impacts of the proposed Project on this environment, and suggests ameliorative measures, as appropriate.

This chapter was prepared by Dr Clare Crowley, EIA Manager at Courtney Deery Heritage Consultancy Ltd. Clare has more than 20 years' experience in the field and holds a PhD in Archaeology (Dublin Institute of Technology, 2009), a BA (Hons) in Ancient History, Archaeology & French (Trinity College Dublin, 1996), a Certificate in Repair and Conservation of Historic Buildings (Dublin Civic Trust, 2004) and a Certificate in Condition Surveys of Historic Buildings (University of Oxford, 2017).

14.2 Methodology

This cultural heritage assessment is based on a desk study and is informed as far as reasonably possible from existing records, including data contained in a suite of reports detailing previous assessments undertaken for the Baldoyle / Stapolin Lands, as referenced in Section 14.13. The proposed Project Site forms Growth Area 3, as designated in the Baldoyle-Stapolin Local Area Plan (2013).

The assessment considers the various categories of special interest as defined by the statutory heritage guidelines. This study aims to assess the baseline architectural, cultural and archaeological heritage in the area in and around the proposed development site, the potential significance and sensitivity of the existing built environment, and to evaluate the likely and significant impacts on the architectural, cultural and archaeological heritage of the surrounding area resulting from the proposed development.

These lands have previously been subject to a series of invasive and non-invasive archaeological investigations and this chapter includes a review of these investigations. An initial cultural heritage appraisal was conducted by Kilfeather (2000) across the Master Plan area of the Baldoyle and Portmarnock Area Action Plan. A subsequent report, including the results of a systematic finds retrieval walkover (Reilly and Sutton, 2002), assessed the overall area of the Baldoyle / Stapolin Lands. In 2003 and 2004, the Baldoyle / Stapolin Lands were subject to a geophysical survey (Leigh and Nicholas, 2003), with areas associated with Phases I and II being archaeologically tested and monitored (Phelan, 2004a; 2004b).

14.2.1 Research Methodology

The desktop study availed of the following sources:

- The *National Monuments*, *Preservation Orders* and *Register of Historic Monuments* lists were sourced directly from the Department of Housing, Local Government and Heritage (DHLGH).
- *Record of Monuments and Places* (RMP) and *Sites and Monuments Record* (SMR): The SMR, as revised in the light of fieldwork, formed the basis for the establishment of the statutory RMP (pursuant to Section 12 of the National Monuments (Amendment) Act, 1994). The RMP records known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs. The information held in the RMP files is read in conjunction with published constraint maps. Archaeological sites identified since 1994 have been added to the non-statutory SMR database of the Archaeological Survey of Ireland (National Monuments Service, DHLGH), which is available online at archaeology.ie and includes both RMP and SMR sites. Those sites designated as SMR sites have not yet been added to the statutory record, but are scheduled for inclusion in the next revision of the RMP.
- Record of Protected Structures (RPS) and Architectural Conservation Areas (ACAs), as identified in the *Fingal County Development Plan (2017 – 2023).*
- The topographical files of the National Museum of Ireland.
- *Fingal Industrial Heritage Survey* (FIHS): The first phase of the FIHS was published in 2011 and represents a paper survey of industrial heritage sites (post-1700) within the county (Phase 2 will involve a field survey). A comprehensive assessment of historical documents and maps identified 1159 sites of industrial heritage interest in Fingal, the most numerous of which were bridges, with extractive industries also featuring quite significantly (in particular quarries).

- Excavations Bulletins and Excavations Database (1970-2020).
- Documentary and literary sources were consulted, including the *Fingal Development Plan (2011 – 2017)*, the *Baldoyle-Stapolin Local Area Plan (2013)* and a number of other published and unpublished documentary sources, as referred to in Section 14.13. A review of historical maps was also undertaken to identify any features of cultural heritage significance within the Site, including historical maps held by the Map Library of Trinity College, Dublin, and available online on the Ordnance Survey of Ireland's website (osi-maps.ie).
- Aerial imagery (Google Earth, 2001–2020; Bing, 2013; OSi, 1995, 2000, 2006).

14.2.2 Standards and Guidelines

The following legislation, standards and guidelines were consulted to inform the assessment:

- National Monuments (Amendments) Acts, 1930-2014, as amended;
- The Planning and Development Act 2000, as amended;
- Heritage Act, 1995;
- The UNESCO World Heritage Convention, 1972;
- ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005;
- Council of Europe Convention for the Protection of the Architectural Heritage of Europe (Granada) 1985, ratified by Ireland in 1991;
- Council of Europe European Convention on the Protection of the Archaeological Heritage (Valletta) 1992, ratified by Ireland in 1997;
- The Burra Charter, the Australia ICOMOS Charter for Places of Cultural Significance 2013;
- The European Landscape Convention (ELC), ratified by Ireland 2002 European Landscapes Convention 2010. (The Department of the Environment, Heritage and Local Government 'Landscape and Landscape Assessment Guidelines' have been in draft form since 2000, however the National Landscape Strategy for Ireland 2015-2025 was published in 2015);
- ICOMOS (2011). *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties – A publication of the International Council on Monuments and Sites*;

- Environmental Protection Agency (EPA) (2017). *Revised Guidelines on the information to be contained in Environmental Impact Statements, Draft August 2017*;
- EPA (2015). *Advice Notes for preparing Environmental Impact Statements, Draft September 2015*;
- EPA (2002). *Guidelines on the information to be contained in Environmental Impact Statements*;
- EPA (2003). *Advice Notes on Current Practice (in preparation of Environmental Impact Statements)*;
- Department of Arts, Heritage, Gaeltacht and Islands (1999). *Framework and Principles for the Protection of the Archaeological Heritage*;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Planning and Development Act 2000;
- Transport Infrastructure Ireland (TII) & the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (2017). *Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland*;
- National Roads Authority (NRA) (2006). *Guidelines for the Assessment of Architectural Heritage Impact of National Road Schemes*;
- NRA (2006). *Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes*;
- NRA (2006). *Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes*;
- Department of Arts, Heritage and the Gaeltacht (2015). *National Landscape Strategy for Ireland 2015 – 2025*;
- Historic England (2015). *Historic Environment Good Practice Advice in Planning, Note 3: The Setting of Heritage Assets*;
- Historic Scotland (2010). *Managing Change in the Historic Environment*;
- The Heritage Council (2010). *Proposals for Ireland's Landscapes*; and
- International Council on Monuments and Sites (2011). *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*.

Excerpts from the relevant legislation are contained in Appendix 14.2 of this EIAR.

14.3 Baseline Environment

14.3.1 Archaeological and Historical Background

The Site of the proposed Project is located in the townland of Stapolin, in the barony of Coolock and the historic parish of Portmarnock.

14.3.1.1 Prehistoric Period

The coastal area of north County Dublin has produced relatively large quantities of flints, many of which may date to the Mesolithic, or Middle Stone Age, (c. 7000–5000 BC). Within the wider landscape of the proposed Project, Mesolithic and Neolithic activity has been noted at the raised beaches at Sutton (Mitchell, 1990; Stout and Stout, 1992) and Portmarnock Football Club (Robswall townland) (Keeling and Keeley, 1994). Further north again, systematic field walking in advance of the development of a site for the Malahide Football Club in 1999 – also close to the coast road – revealed lithic material that appeared to be natural lumps or spalls; there were relatively few actual artefacts in the assemblage (Keeling and Keeley, 1994; Purcell, 1999).

There is a significant body of Neolithic (c. 4,000BC– c 2,300 BC) material from north County Dublin. Evidence includes a large, well-preserved portal tomb at Howth Demesne, at the foot of Muck Rock; excavations at Feltrim Hill, revealed Neolithic ceramics and worked lithics, though no apparent remains of structures. Recent excavations on the Lambay Island revealed areas of Neolithic activity associated with stone axe and flint tool manufacturing, some of which was of extremely high quality (Cooney, 2000). The highest points of Lambay Island also have at least two cairns, mounds of stone that often cover burials, which may also date to the Neolithic.

A number of Early Bronze Age (c. 2400-1800 BC) burial sites are recorded in the wider landscape, including a burial on the Strand Road (RMP DU015-019), a stone cist burial (RMP DU015-022) in the grounds of the Suttonians Rugby Club, a burial from a mound (RMP DU015-023) in the area of the Rugby Club, and a ring-ditch identified in Drumnigh townland (SMR DU015-119). The latter was identified during geophysical survey and confirmed by archaeological testing.

The Maynetown enclosure site (DU015-055), to the north of the proposed Project Site (c. 855m) is the ploughed-out remains of what was thought to be a substantial late prehistoric enclosure. Geophysical survey, carried out in 2000, identified the existence of the enclosure and also revealed responses indicating an unusual entrance feature of two splayed linear elements leading to the south east side of the enclosure ditch (Shiels *et al.*, 2000). These have been interpreted as a formal approach or avenue to the enclosure. This linear avenue is not typical of enclosures generally, and makes this particular monument very unique. A portion of the approach was later confirmed during archaeological testing (Wallace, 2000b) and was subject to further testing in 2008 (Moriarty, pers. comm.). During test excavation, the enclosure ditch was found to be substantial in spite of its eroded state and measured approximately 7m wide and 2m deep. Finds recovered from the ditch included butchered animal bone and a ferrous nail shank. A charcoal sample from the base of the ditch was sent for radiocarbon dating, which returned a medieval date for the enclosure site (Moriarty, pers. comm.).

There is a note on OPW maps from the 1980s that there may have been a fulacht fiadh in the field to the east of the Portmarnock mound (DU015-014), although this appears to have been removed by ploughing (OPW files). The fulacht fiadh or burnt mound is the most common prehistoric monument in Ireland, with over 4500 known sites (Waddell, 1998) and the number is rising all the time. Fulachta fiadh consist of a low mound of burnt stone commonly in horseshoe shape and are found in low-lying marshy areas or close to streams.

The presence of fulachta fiadh is often indicative of Bronze Age seasonal communal activity in river valleys, lakeshores and boggy ground. Scientific dating of a randomly excavated sample has shown a predominance of second millennium BC dates for their use (Brindley & Lanting, 1990). There is no agreement that burnt mounds were cooking places, although it does seem that they were used to prepare large quantities of boiling water and that they were repeatedly used, resulting in a large mound of heat shattered stones accumulating. Other theories for the use of these sites include bathing, saunas or sweathouses, washing or dyeing large quantities of cloth, the preparation of leather and brewing. Fulachta fiadh are commonly found in groups of two or more, which is the case in Grange townland, just over 300m west of the proposed Project Site, where two burnt mounds were uncovered during archaeological testing (DU015-096 & -097).

14.3.1.2 Early Medieval Period

The early medieval period saw the development of a mixed-farming economy managed by kings, nobles and free farmers. There was an increase in settlement during the early medieval period (c. AD 500–AD 1200), and the ringfort, otherwise known as the 'rath' or 'fairy fort', is the best-known native monument of this period (Stout, 1997).

Ringforts are essentially enclosed farmsteads dating to the early medieval period. The majority of these sites are univallate, surrounded by one ditch and bank, but some are surrounded by two and, to a lesser extent, three enclosing ditches and banks (known as bivallate and trivallate raths respectively). Another morphological variation consists of the platform or raised rath – the former resulting from the construction of the rath on a naturally raised area while the latter's height resulting from prolonged occupation over many centuries. Many raths are circular or oval in shape but they can occur as D-, pear- and sub-rectangular-shaped enclosures (Kinsella, 2007). Ringforts were not simple isolated homesteads, and should be considered within their contemporary settlement landscape, which would have consisted of unenclosed settlements, farms and fields, route ways and natural resources.

Many raths are situated on valley sides and on the brows of drumlins and, for the most part, avoid the extreme low and uplands. They also show a preference for the most productive soils (Stout, 1997) and usually command a good view of the surrounding landscape. Stout (1997) has shown that the majority were occupied from the beginning of the 7th until the end of the 9th centuries, covering a 300-year period. Raised and platform raths have been shown to be slightly later in date and were constructed between approximately the mid-8th and mid-10th centuries AD (Kerr, 2007).

That being said, they are a site type that is relatively scarce in the archaeological record for County Dublin, partly because of the urban or suburban nature of much of the county, but also because of the intensive agricultural practices carried out in north County Dublin, which has destroyed surface traces of these sites. This can be witnessed in some of the recorded archaeological sites in the surrounding landscape. The enclosure sites in Grange townland to the west (DU015-063 and DU015-064001 & 002), for example, may have been ringforts.

The survival of destroyed enclosures sub-surface has been demonstrated in the surrounding townlands, where geophysical survey and testing have identified the remains of several possible early medieval enclosed settlements, some of which are quite substantial in size (e.g. SMR sites DU015-117 & DU015-134 in Drumnigh townland). In addition, cropmarks have been recorded in Saint Doolaghs townland, which may represent the remains of a ringfort and associated field system (DU015-123 & 124).

Where ringforts were the major secular component of early Christian settlement, ecclesiastical centres became the focus of the new religion that was readily adopted in the 5th and 6th centuries. Early medieval monastic settlements tend to be defined by a large curvilinear bank and ditch or stone enclosure (topography permitting), enclosing an area circa 90-120m in diameter, often preserved in the line of townland or field boundaries and roads (Swan, 1988). The majority of ecclesiastical settlements had one or more concentric curvilinear enclosures, with the church placed at the centre, in the inner sanctum (frequently preserved in the surviving graveyard boundary), with more secular activities (domestic, commercial and industrial) reserved for the outer enclosures. They usually had a network of radiating roads, with the principal approach road (often from the east) terminating in a triangular market place. Features commonly found to be associated with early ecclesiastical sites include holy wells (usually outside of the main settlement), bullaun stones, high crosses, cross-inscribed stones and round towers.

A possible example of an ecclesiastical settlement is recorded in the wider area in Balgriffin Park townland, c.1.5km northwest of the proposed Project Site (RMP DU015-012001 & -012002). According to D'Alton, the church was confirmed of its titles in 1178 by Archbishop O'Toole, though the Regal Visitations of 1630 describe the church and chancel as ruinous (Ronan, 1941). The site is currently located within the open space of a housing development and a number of archaeological investigations were undertaken prior to the development. A substantial curving ditch (4.75m in width and 1.3m deep) that appeared to be enclosing the site of the church was identified during geophysical survey and archaeological testing at the site. Two smaller linear ditches were associated with the enclosure and contained similar fills, while several sherds of medieval pottery and a medieval glass bead were found in this area. Although an early medieval date could not be confirmed, the enclosing element is suggestive of an early foundation.

The early medieval period also saw the arrival of the Vikings and the establishment of Hiberno-Norse settlements. Fingal was in close proximity to the Viking settlement at Dublin, and the significant Norse influence on Fingal can be seen from both Gaelic place-names, such as Fine Gall or 'territory of the strangers' and Baile Dubh Gaill (Baldoyle: 'town of the dark stranger'). According to Hurley (1983), a Viking harbour is recorded in the vicinity of Baldoyle. Although there has never been any definitive evidence for this, archaeological excavations undertaken at a rectangular cropmark site in Baldoyle village in 2014 provided a radiocarbon date of 9th / 10th century for a cereal grain retrieved from the bottom of one of the features. This implies that there was at least some level of settlement activity there during the Viking period.

Before the battle of Clontarf, Brian Ború is said to have burned Fingal and the district of Howth, and some years later, during a predatory excursion into Fingal, the region is said to have been burned from Dublin to the River Delvin (Ball, 1920). Fingal later came under the rule of Mac Gillamocholmog, who controlled the lands south of Dublin before the arrival of the Anglo-Normans in the late 12th century.

14.3.1.3 Medieval Period

From the 12th century, the Anglo-Normans, with a keen eye for good agricultural land, superimposed the manorial system of landholding they had acquired from England and the Welsh borderlands onto their newly conquered territory in Fingal. Portmarnock, c. 1.3km to the north, was a pre-Norman ecclesiastical site that subsequently became a manorial village when taken over by the Anglo-Normans in the 12th to 15th centuries. The possible remnants of this settlement may have been uncovered during archaeological excavations in 2008, c. 45m north of the recorded mound DU015-014, which identified defined property plots, the foundations of rectangular houses and an associated medieval roadway (SMR DU015-136). A large assemblage of artefacts was recovered during the excavation, including in excess of 2,000 sherds of medieval pottery, mainly locally produced Leinster cooking ware and Dublin-type wares, as well as large numbers of metal objects. Evidence for food waste included large amounts of butchered animal bone as well as quantities of seashell (cockles, muscles, oysters, periwinkles, razor shell, etc.) and carbonised grains. Additional archaeological investigations undertaken at the recorded mound to the south of the settlement suggest that this was the site of an Anglo-Norman motte and bailey (DU015-014 & 014-001).

There is additional evidence for medieval activity at Portmarnock in the form of a tidal mill (DU015-015). Two tidal mills are recorded in the possession of St Mary's Abbey in an inquisition taken in 1541 (de Courcy, 1996), one of which is probably represented by the remains of the old mill at Portmarnock (DU015-015) and the other at Malahide. The mill at Portmarnock was recorded as being in the property of the Plunkett family in 1663, but in a ruinous state after 1903 – *"unroofed and much dilapidated by the storm of 1903"*. The Down Survey refers to a tidal mill at Malahide as *"a mill that goeth by ebb tides"* (Joyce, 1912).

The full extent of the Maynetown enclosure was not identified until November 2000, when geophysical survey was carried out to establish the extent of the site for the creation of a buffer zone around it. The geophysical survey revealed a unique and interesting site when two linear responses identified what appeared to be a formal approach to the entrance of the enclosure. This entrance feature is rare in Ireland and similar in style to the Iron Age enclosures found in Britain. However, a charcoal sample taken from the base of the enclosure ditch during archaeological testing in 2008 was radiocarbon dated to the medieval period. When viewed in context with the other archaeological features found at Portmarnock, an extensive medieval landscape begins to emerge.

Further medieval secular activity is known at Baldoyle village, c. 1.1km to the southeast, which was reputedly the location of a Viking base for many years, established as a manorial village after the arrival of the Anglo-Normans.

Grange Abbey (DU015-069001 & -069002) is situated west of Baldoyle village and had a long association with All Saints Priory. In 1478, the prior of All Saints and lord of the town of Baldoyle made representations on behalf of the inhabitants. They were much distressed by excessive taxes levied upon them by the king's admirals and their deputies. It was therefore enacted by Parliament that the prior should henceforth be admiral of Baldoyle and of all other lands belonging to the priory in Ireland.

Several writers on the subject of Baldoyle have made reference to a parliament that was reputedly called at Grange Abbey in 1369 by the then lord lieutenant, William de Windsor, for the purpose of levying subsidies. However, there would appear to be no substantiation for the claim that de Windsor ever held a parliament in Grange Abbey. In 1609, repairs were made to the abbey by Thomas Fitzsimons and by the parishioners. By 1615, a royal visitation records that it was no longer in use, and in 1630, Archbishop Buckley made the comment that *"the church is altogether ruinous"* (Grange Abbey Restoration Publication).

14.3.1.4 Post-Medieval Period

The 17th century saw significant transfers of land from Catholic to Protestant ownership throughout Ireland, often through the seizure of property following both the Confederate Wars and the Williamite War (1689–1691), and by the 18th and 19th centuries, many of these influential land-owners were consolidating their estates, building new, larger houses and creating landscaped demesnes. The stone manor houses, or what became known in Ireland as the 'big house', were constructed by planter families in County Dublin, as elsewhere in the country, roughly between the years 1670 and 1850, and they are often found near to or on the sites of older ruined castles or tower houses, churches or defunct administrative centres. Big Houses were also often situated within embellished and ornamented demesne lands ringed by high walls (McCullough & Mulvin, 1987).

14.3.2 Recorded Archaeological Monuments (RMP / SMR Sites)

There are no RMP sites recorded within the proposed Project Site or its immediate vicinity. The nearest RMP sites are recorded in Grange townland, to the west and northwest of the proposed Project, and comprise two enclosure sites, both of which are now built over, and a redundant record (DU015-063, -064001 & -064002; Figure 14.1 & Table 14.1). The closest of these is the enclosure site DU015-064001, which is c. 250m from the proposed Project.

In addition to the 15 RMP sites recorded within c. 1.5km of the proposed Project Site, archaeological investigations in the surrounding townlands have identified 17 further sites, all of which have been designated SMR numbers. The locations for these sites are mapped on the non-statutory SMR database of the Archaeological Survey of Ireland (archaeology.ie), along with the locations for the statutorily designated RMP sites.

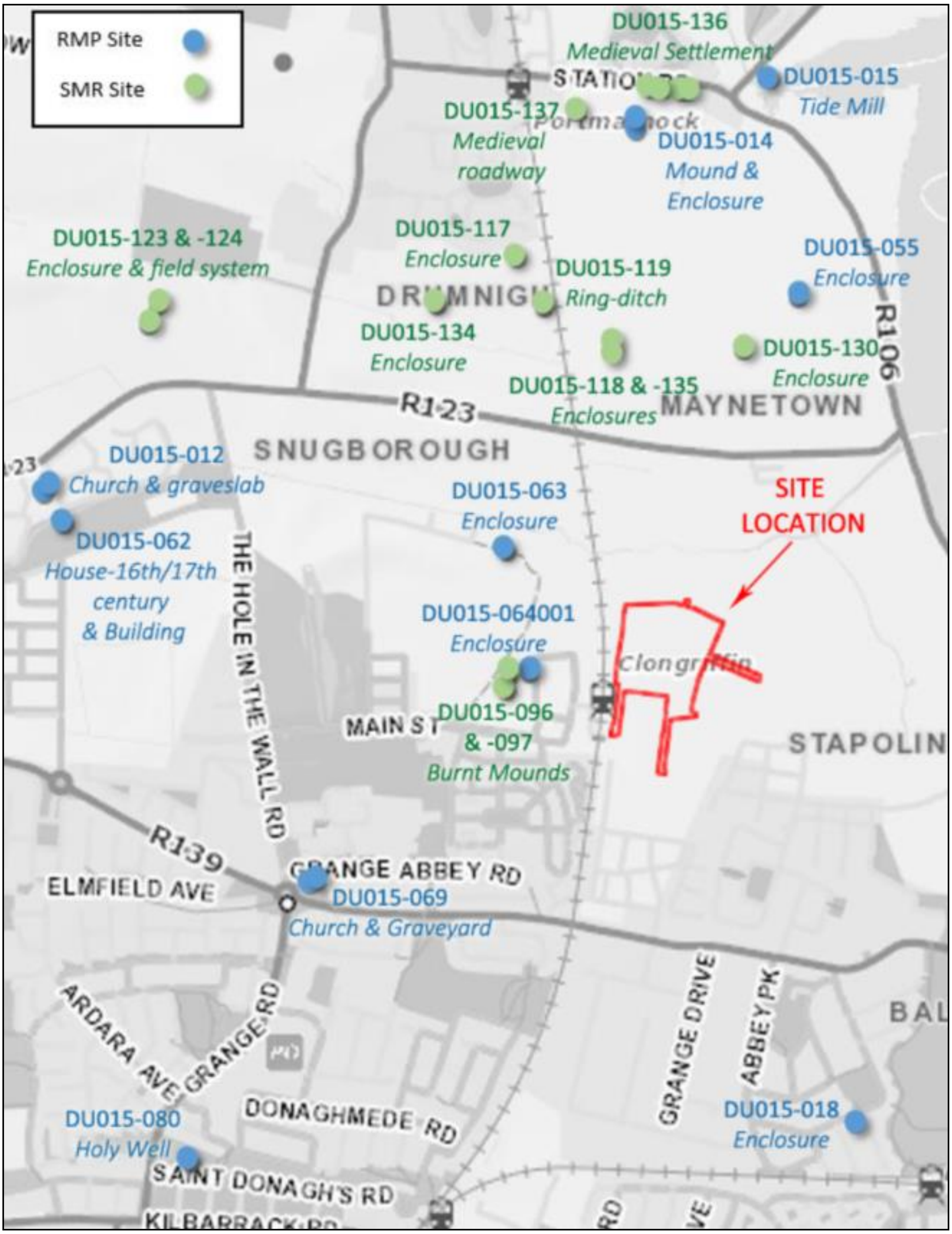
The RMP and SMR sites located within c. 1.5km of the proposed Project Site are listed in Table 14.1 and depicted on Figure 14.1.

Additional detail for each of the sites is contained in Appendix 14.1 of this EIAR.

Table 14.1: RMP and SMR sites within c. 1.5km of the proposed Project

RMP / SMR No.	Site Type	Townland	Distance
RMP DU015-012001	Church	Balgriffin Park	c. 1.5km NW
RMP DU015-012002	Graveslab	Balgriffin Park	c. 1.5km NW
RMP DU015-014	Mound	Portmarnock	c. 1.1km N
RMP DU015-014001	Enclosure	Portmarnock	c. 1.1km N
RMP DU015-015	Tide mill - unclassified	Maynetown, Portmarnock	c. 1.2km N
RMP DU015-018	Enclosure	Baldoyle	c. 1km SE
RMP DU015-055	Enclosure	Maynetown	c. 685m N
RMP DU015-062002	House - 16th/17th century	Balgriffin Park	c. 1.4km NW
RMP DU015-062003	Building	Balgriffin Park	c. 1.4km NW
RMP DU015-063	Enclosure	Grange	c. 280m W
RMP DU015-064001	Enclosure	Grange	c. 250m W
RMP DU015-064002	Redundant record	Grange	c. 250m W
RMP DU015-069001	Church	Baldoyle	c. 765m W
RMP DU015-069002	Graveyard	Baldoyle	c. 765m W
RMP DU015-080	Ritual site - holy well	Kilbarrack Upper	c. 1.5km SW
SMR DU015-096	Burnt mound	Grange	c. 280m W
SMR DU015-097	Burnt mound	Grange	c. 280m W
SMR DU015-117	Enclosure	Drumnigh	c. 980m NW
SMR DU015-118	Enclosure	Drumnigh	c. 630m N
SMR DU015-119	Ring-ditch	Drumnigh	c. 840m NW
SMR DU015-123	Enclosure	Saint Doolaghs	c. 1.5km NW
SMR DU015-124	Field system	Saint Doolaghs	c. 1.5km NW
SMR DU015-130	Enclosure	Maynetown	c. 550m N
SMR DU015-134	Enclosure	Drumnigh	c. 1km NW
SMR DU015-135	Enclosure	Drumnigh	c. 630m N
SMR DU015-136001	Structure	Portmarnock	c. 1.2km N
SMR DU015-136002	Structure	Portmarnock	c. 1.2km N
SMR DU015-136003	Structure	Portmarnock	c. 1.2km N
SMR DU015-136004	Structure	Portmarnock	c. 1.2km N
SMR DU015-136005	Structure	Portmarnock	c. 1.2km N
SMR DU015-136006	Habitation site	Portmarnock	c. 1.2km N
SMR DU015-137	Road - road/trackway	Portmarnock	c. 1.2km N

Figure 14.1: RMP and SMR Sites within c. 1.5km of the Proposed Project



14.3.3 Cartographic Analysis

14.3.3.1 Pre-19th Century Maps

The Down Survey map of c. 1656 for the Barony of Coolock (not illustrated) indicates that the study area lies within the unforfeited lands belonging to the Lord of Howth. No detail is depicted within this area.

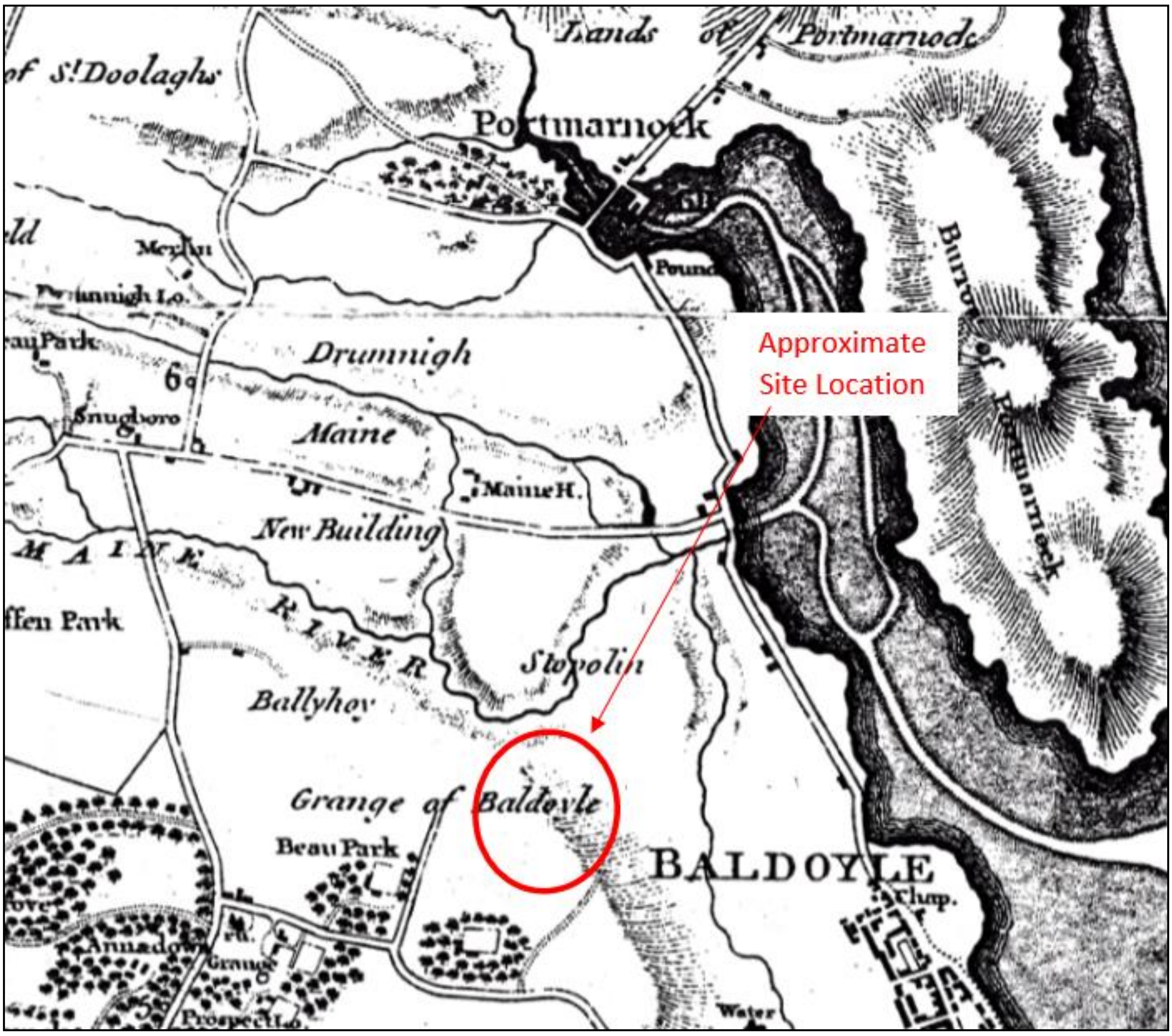
Figure 14.2: Rocque's Map of County Dublin, 1760

Rocque's map of County Dublin (Figure 14.2), dating to 1760, represents the earliest cartographic source showing the study area in any detail. The lands within and around the proposed Project Site are shown as open green fields. Baldoyle and Portmarnock are depicted as small villages, and the Mayne River is shown dividing the townlands of Maynetown and Stapolin. 'Maine Bridge', as it is spelt on Rocque's map, is shown at the mouth of the river, and the mill at Portmarnock is also named (DU015-015).

14.3.3.2 Taylor's Map of the Environs of Dublin, 1816

Taylor's 1816 map (Figure 14.3) also shows the area as largely rural, with Portmarnock and Baldoyle both somewhat expanded. The roads are also laid out as on Rocque's map and these routes remain more or less the same today. Maine House (named as 'Maine Lodge' on the 1936-37 OS six-inch map) is shown, and this house survives today. The Mayne River and its tributaries from the north and south are also indicated. Although the name 'Stapolin' appears on the map, this is a reference to the townland and Stapolin House is not depicted. The scale of this map prevents any detailed analysis of the proposed Project Site.

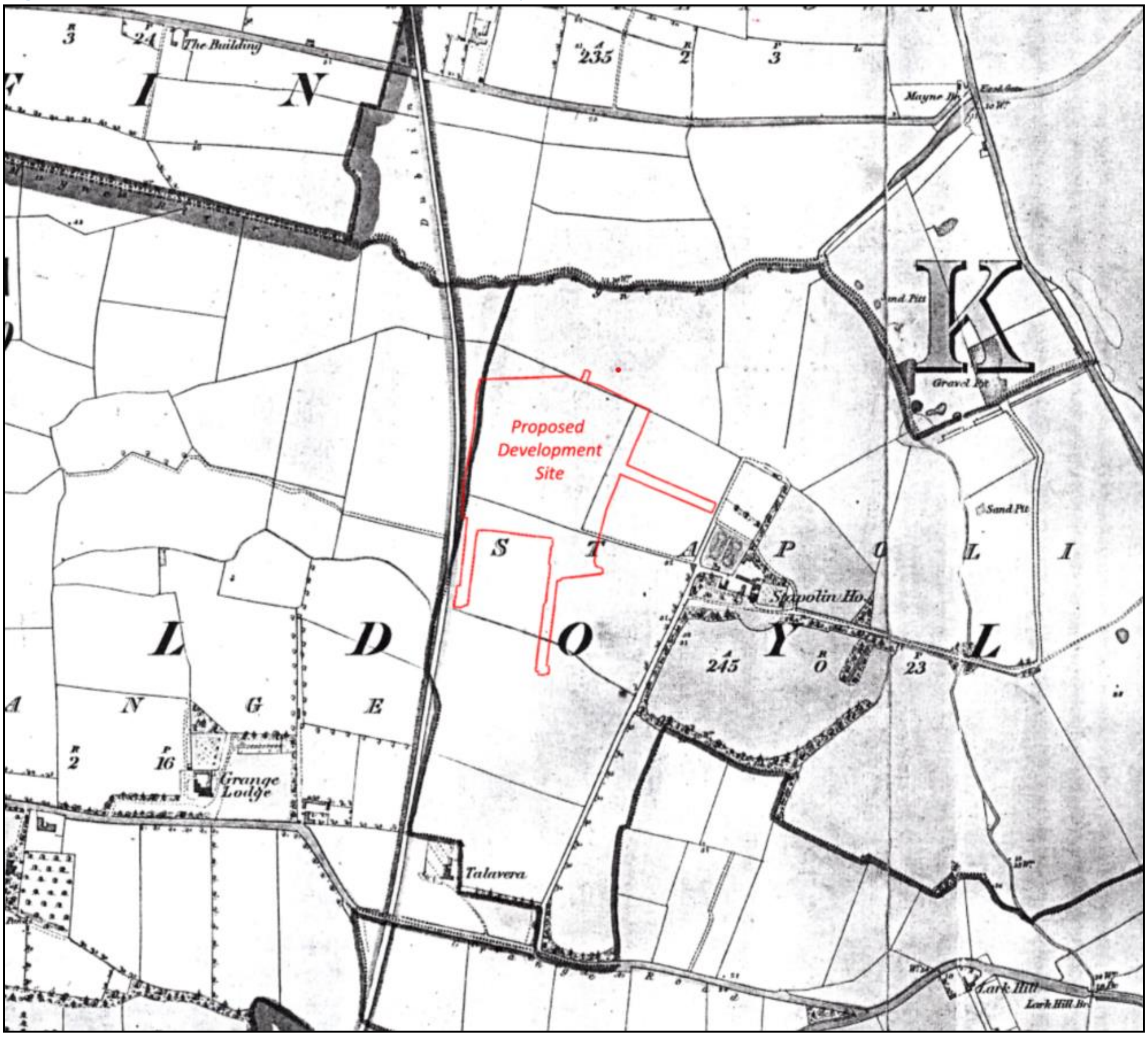
Figure 14.3: Taylor's Map of County Dublin, 1816



14.3.3.3 First Edition Ordnance Survey Map, 1843

The first edition Ordnance Survey (OS) six-inch map of 1843 (Figure 14.4) depicts the Site of the proposed Project to the west of the newly laid Dublin / Belfast railway line. The site encompasses the agricultural fields immediately west of the railway line. To the east are Stapolin House, outbuildings and gardens, and the wider estate grounds, which all lie outside of the proposed Project Site. The principal avenue leading northwards to the house from the Grange Road runs along the north-eastern boundary of the proposed Project Site. A stream flows roughly east-west across the site, along the line of a field boundary. No features of interest are depicted within the proposed Project Site.

Figure 14.4: First Edition Six-inch OSi map (1843)

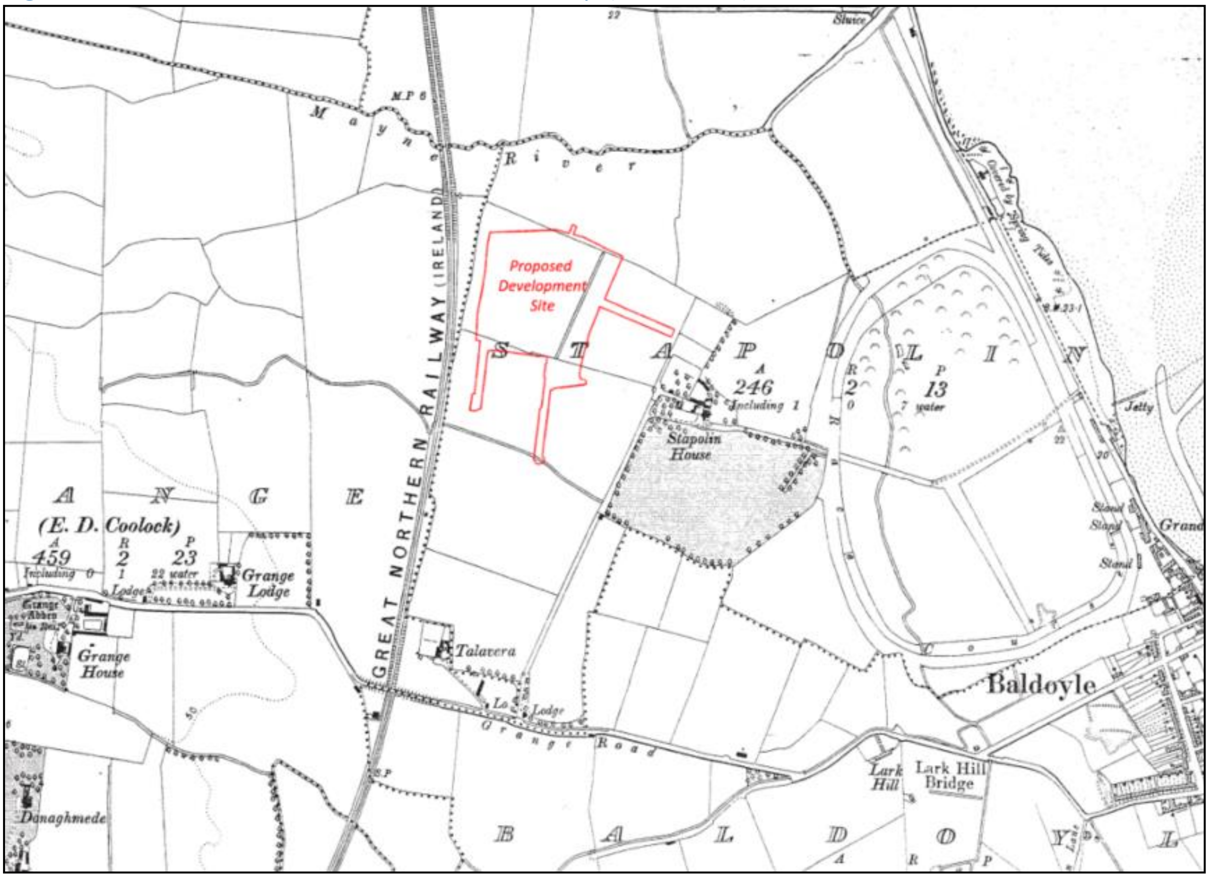


14.3.3.4 Revised Edition Ordnance Survey Maps, 1864, 1906-09 & 1935-8

There have been small changes to the gardens, courtyards and outbuildings around Stapolin House by the time of the 25-inch OS map of 1864 (not illustrated), but none of any significance. Some field boundaries have been adjusted in the aftermath of the railway line construction. There are otherwise no changes depicted within the proposed Project Site on the revised edition OS maps of 1864, 1906 – 09 (Figure 14.4) or 1935 – 38 (not illustrated).

Among the later features in the wider area is a racecourse (Baldoyle Racecourse) in Stapolin townland, to the east of Stapolin House. The course is marked on the 1906 – 09 revision OS six-inch map but not on the first edition map (Figures 14.4 and 4.5). It was closed in 1972 after approximately one hundred years in operation and only traces of features from within the track are still marked on the current OS maps (Bennett, 1991).

Figure 14.5: Revised Edition 25-inch OSi map (1906 – 09)



14.3.4 Placename Evidence

The Ordnance Survey surveyors wrote down townland names in the 1830s and 1840s, when the entire country was mapped for the first time. The mapmakers, soldiers and antiquarians who collected the place names and local history varied in their interests and abilities. While most place names were anglicised or translated relatively accurately, some were corrupted virtually beyond recognition. Nonetheless, a variety of place names, whether of Irish, Viking, Anglo-Norman, English, or in very rare cases, Anglo-Saxon origin, appears throughout Ireland. The appearance of the different languages is often a good indicator of the cultural heritage and, therefore, of the archaeological record of the area.

The names in this part of north County Dublin are derived from Irish, English and Viking sources. English names are relatively rare, with 'Snugborough' being the only apparent English personal name element in the vicinity.

The name 'Stapolin' is somewhat obscure, but would also appear to be of early Irish origin. The prefix 'sta' is probably a corrupted form of *tigh*, a house (as is the case in Stillorgan), and the second part of the name may be a personal name such as 'Pól' or 'Paul', or the feminine, 'Póilín'.

The name 'Maynetown' is of considerable interest. Despite the English suffix 'town,' the prefix 'Mayne' is of Irish origin and is also the name of the river that flows to the north of the proposed Project Site. Morris (1939, RMP file) in an examination of the *Dindsheanchas* (the Old Irish metrical lore of place names, edited by Gwynn in the early part of the 20th century) discusses the description of this area in the texts. 'Mayne' (also known as 'Maine' or 'Cichmaine'), the son of Maedhbh and Ailill of Connacht, is said to have been killed here by fishermen. His burial ground is described as being at the northern end of *Inbhearr Cichmaine*, the inlet or bay of Cichmaine, where he was killed. This folklore is associated with the mound recorded in the townland of Portmarnock (DU015-014), at the northern end of what is now known as Portmarnock Bay. The name 'Portmarnock' is itself derived from '*Port Mo Ernoc'* or '*Ernan'*, interpreted as St Mernoc's bank or landing place.

'Grange' is an English placename and commonly denotes agricultural land belonging to the church.

'Baldoyle', now '*Baile Dúill'*, is probably derived from '*baile dubh ghall'*, the 'town of the dark strangers / foreigners', and appears to be an Irish language reference to the Vikings, who used the harbour here as a base. Fishing fleets landed here until the end of the 19th century (Bennett, 1991).

14.3.5 Previous Archaeological Investigations

14.3.5.1 Previous Archaeological Investigations within the Proposed Project Site

The proposed Project Site has been subject to a series of invasive and non-invasive archaeological investigations since 2000, as part of earlier phases of the Baldoyle / Stapolin lands development (some phases of development have since been completed, as is evident in current aerial photography; Figure 14.7). These investigations, which are described below, included a systematic finds retrieval walkover in 2002, geophysical survey throughout the Baldoyle / Stapolin lands south of the River Mayne in 2003, and limited archaeological testing of the geophysical anomalies that were identified in 2004 (Figure 14.6).

A non-invasive field survey of the Baldoyle-Stapolin lands was first undertaken in January 2000 (Reilly and Sutton, 2002). At the time of the survey in 2000, the area of the Baldoyle-Stapolin lands on the south side of the River Mayne (within which the proposed Project Site is located) was under rough pasture and tillage. It is described as a very gently rolling pastoral landscape, with extensive views northwards and eastwards along the coast; this provides a stark contrast with the present landscape of suburban residential development and extensive construction sites that are visible in modern aerial photography (e.g. Figure 14.7).

The survey established that little remained of the early 19th century Stapolin House and farmyard at that time, apart from the extensive landscaping in the surrounding lands. The long tree-lined avenue was still intact and there were large, mature trees still lining the field to the south of the house site and around the haggards to the north of the house. The yard to the north was heavily overgrown, but still had a relatively well-preserved brick wall. The ruins of the house and outbuildings appeared to be largely of brick, although there were some granite blocks and later concrete inclusions (Reilly and Sutton, 2002). Nothing now remains of the former Stapolin House and its associated yards, outbuildings or landscaped grounds.

A systematic finds retrieval walkover was undertaken in October 2000 in recently ploughed fields on the south side of the Mayne Road (Reilly and Sutton, 2002). A consistent quantity of struck flint was recovered from all of the fields, but few tools or instruments could be identified and there were no concentrations of material that might indicate the presence of archaeological features or sites. No medieval pottery or other artefacts were recovered and modern refuse material was scattered throughout, with varying degrees of concentration;

included amongst the wide range of modern crockery and ceramic material were annotated clay pipe fragments and broken pieces of stone-ware.

The entire Baldoyle / Stapolin lands were subject to geophysical survey from 2000 to 2003, with the survey for the lands to the south of the River Mayne (including the majority of the proposed Project Site) undertaken in 2003 (Leigh & Nichols, 2003). Most of the anomalies in this area were found to be either modern agricultural or natural geological features. The geophysical survey results within the current application area did, however, identify possible field boundaries, possible pit-like features and other small-scale anomalies of a potential archaeological nature (Figure 14.6).

Subsequent archaeological testing of the geophysical anomalies was carried out in the north-eastern section of the geophysical survey area in 2004. The results of this testing showed that the anomalies were modern features and failed to uncover any features of an archaeological nature (Phelan, 2004a; 2004b). One trench (Trench 8) examined anomalies within Area 2, at the eastern edge of the Site of the proposed Project, but identified nothing of archaeological interest (Figure 14.6) (Phelan, 2004b). The geophysical anomalies located to the north-east of the proposed Project Site were confirmed as the remains of 19th century structures, possibly sheds or outbuildings associated with gardens of Stapolin House. The remains of shallow red-brick walls and a possible path feature were also identified. Fragments of 19th century ceramics were retrieved in association with these possible garden features. The location of the relevant test trenches and geophysical anomalies are shown in Figure 14.6.

Given these results, it is likely that archaeological testing of the remaining anomalies identified by the geophysical survey will show similar results. At best, the anomalies within the proposed Project Site are thought to represent discrete and isolated archaeological features (such as pits), rather than being indicative of any coherent or large archaeological sites. It should be noted, however, that geophysical survey undertaken at the site of an enclosure in Drumnigh townland to the north – which was visible on aerial photography – did not yield significant responses, though testing subsequently confirmed the presence of a large enclosure there (DU015-117; refer to Appendix 14.1). This may indicate that geophysical survey results within this landscape may not represent the full extent of the archaeology in this area, as a result of unresponsive soils.

Additional non-invasive field surveys were undertaken immediately north of the proposed Project Site in 2007 and 2011 (Murphy, 2007; Courtney, 2011). Both surveys noted the general disturbances within the area as a result of the ongoing development (including dumped material and debris and ground compaction), with modern road construction already in place throughout the area (and within the current proposed Project Site) and disturbance from drainage infrastructure (Courtney, 2011). No visible features of archaeological potential were identified within the area.

14.3.5.2 Previous Archaeological Investigations in Immediate Vicinity of proposed Project

Archaeological monitoring and testing in advance of a proposed large-scale residential development took place in 2003 in the neighbouring townland of Grange, on the western side of the Dublin / Belfast railway line. In an area already containing two recorded monuments (DU015-063 & -064; Figure 14.1), known cropmarks and the site of Grange Lodge, eight new archaeological sites were identified (Excavations Bulletin Ref. 2003:485, Licence No. 03E1496). These included two fulachta fiadh, four pits, an isolated cremation and a ring-ditch (Excavations Bulletin Refs 2000:0457 to 0460, 0447, 0449, 0450 & 0455; Licence Nos 04E0701 to 04E0704 & 04E0349, 04E0352, 04E0697, 04E0699). The two fulachta fiadh or burnt mounds have been designated as SMR sites DU015-096 & -097 (Figure 14.1).

The proposed Project Site is bounded by the Dublin / Belfast railway line along its western side and these new archaeological sites were uncovered in its immediate vicinity. Notwithstanding the results of the previous archaeological investigations within the proposed Project Site, the discoveries in Grange townland suggest that similar discrete archaeological sites or features might still be uncovered within the site boundaries of the proposed Project.

Figure 14.6: Results of Geophysical Survey and Location of Archaeological Test Trenches

14.3.6 Aerial Photography

No features of archaeological potential were identified on aerial imagery of the Site. Construction in the vicinity has heavily impacted upon the study area and a number of new roads are visible within the proposed Project area, as are piles of construction material. The site of Stapolin House is obscured by a cluster of trees (Figure 14.7).

Figure 14.7: Proposed Project Site on Recent Aerial Imagery (Google Earth, 2018)

14.3.7 Cultural and Industrial Heritage

No features of cultural or industrial heritage interest were identified within the Site. The railway line located immediately west of the proposed Project Site has associations with industrial heritage in Fingal. The *Fingal Industrial Heritage Survey* (FIHS) does not include the railway line itself as an item of industrial heritage interest, though it does list the 19th century stations located along it (at Balbriggan (FIHS0040), Skerries (FIHS0223), Rush and Lusk (FIHS0353), Donabate (FIHS0671), Malahide (FIHS0656) and Portmarnock (FIHS0627)); none of which are located in the vicinity of the proposed Project.

14.3.8 Architectural Heritage

14.3.8.1 General

There are no protected structures either within the proposed Project Site or in close proximity to it, and no features of built heritage interest were identified.

The nearest structures of built heritage interest as listed in the National Inventory of Architectural Heritage (NIAH) are located in Baldoyle village, just over 1km southeast, and are all 19th to early 20th century in date, including the Catholic Church, two convents and several houses (NIAH Refs. 11358039 to 11358043). Of these, the church, a thatched house and an early 20th century former Christian Brother Retirement Home are protected structures (RPS Refs 544, 545 & 795), representing the only protected structures within a c. 1km radius of the proposed Project.

The surrounding area is particularly notable for the survival of houses dating from the 17th to 19th centuries; large estates or demesnes, which took advantage of the good agricultural land in the area, were a later feature of the Dublin landscape, and many of the houses associated with them remain. Some archaeological remains were incorporated as design features when the estates were landscaped during the 18th and 19th centuries, while many others were levelled for land improvements. Today, the area is characterised by modern housing developments, interspersed with open tracts of land surviving from the estates.

14.3.8.2 Stapolin House

The open space area to the north-east of the proposed Project Site (referred to as Stapolin Haggard) is the site of the former Stapolin House (now demolished). There were several such estate houses or sites of large houses in the surrounding environs of the proposed Project, such as Talavera House to the south. The first edition of the OS six-inch maps, dating to 1843, shows Stapolin House for the first time (Figure 14.4). It is depicted as a relatively large house, approached from Grange Road by a long, tree-lined avenue. The avenue runs along the eastern boundary of the proposed Project Site; it is still present in the landscape today and has been incorporated into the phased development of the Baldoyle-Stapolin lands. The house itself appears to have had two walled enclosures / gardens to the north. There is also a long, partly tree-lined vista or pathway that extends eastwards before turning north; this pathway linked the house to gravel and sandpits and is partly preserved within Baldoyle racecourse shown on the 1906 – 09 OS six-inch edition map (Figure 14.5). To the north of the house, a tree-lined boundary consisting of mature Sycamores is shown on both the 1843 and 1906 – 09 six-inch editions of the OS map. Also shown on both maps is a tree-lined field to the south of the house. Although simple, this does represent a significant landscaping effort for what was otherwise a relatively modest country residence. On the 1906 – 09 OS six-inch edition map, a lodge is depicted adjacent to the Grange Road at the entrance of the avenue that leads to the house. Along with the main house, a number of outbuildings and structures are shown.

The site of the former Stapolin House, which lies outside of the proposed Project Site, was inspected during the 2011 field survey (Courtney, 2011). This area had been largely levelled and a foul drainage pumping station built within it. Clusters of mature trees and scrub land were noted across the area in an east-west direction (these are still visible in current aerial photography). This area was formerly occupied by Stapolin House and its gardens. Sections of upstanding walls and opes within the walling were identified within the overgrown area. One section of rubble stone wall was noted to be approximately 20m in length and over 2m high in places, and approximately 35cm thick. Brick openings and insertions were also noted, as were the remains of later concrete outbuildings / sheds. There was no visible evidence of the house or its gardens. These few sections of walls and brick openings, as well as the remains of more recent concrete sheds and outbuildings located in amongst mature trees and scrub, are all that remain of the built heritage associated with Stapolin House. This area will form an open green space, Stapolin Haggard, for the residential developments within the Masterplan lands.

14.4 Potential Impacts of the Proposed Project

The Site is located within an area which, until the end of the 20th century, had been open green fields set within a coastal and riverine context. The wider coastal landscape of the proposed Project has yielded evidence for human activity in the form of flint artefacts, Bronze Age burials and medieval tidal mills. Greenfield areas are considered to have an inherent archaeological potential, with agricultural practices tending to obscure surviving subsurface archaeology. The nearby River Mayne is also of interest, as rivers and their environs are a potentially rich source of archaeological material, as both settlement and ritual activity are often associated with rivers, particularly at fording points. In addition, the presence of known archaeological monuments to the north and west of the proposed Project (DU015-063, DU015-064 and DU015-055) suggests that this area was a focus of both prehistoric and historic activity.

However, the proposed Project Site and its immediate environs have been subjected to a number of disturbances related to the development of earlier phases of the Baldoyle-Stapolin lands, with access roads and drainage infrastructure previously constructed within the study area.

A geophysical survey was undertaken within the proposed Project Site and adjacent lands and a number of anomalies and features of possible archaeological merit were identified. Some of these subsurface features were subsequently tested (within and adjacent to the proposed Project Site), revealing 19th century deposits associated with the former Stapolin House to the north-east and confirming that anomalies in other areas where modern features. The testing failed to uncover any features of an archaeological nature. The anomalies identified within the proposed Project Site, if they are archaeological in nature, are thought to represent discrete and isolated archaeological features, rather than being indicative of any coherent or large archaeological sites. It should be noted, however, that geophysical survey undertaken at the site of an enclosure in Drumnigh townland to the north – which was visible on aerial photography – did not yield significant responses, though subsequent testing confirmed the presence of a large enclosure there (DU015-117; refer to Appendix 14.1).

Notwithstanding the disturbed nature of the proposed Project Site and the results of the archaeological investigations, there is the potential that archaeologically enriched soils, features and deposits may survive subsurface. The chance discovery of isolated (stray) finds should also be borne in mind. In the event that such remains do survive below ground, ground disturbance works associated with the construction of the proposed Project would have a ***moderate, negative, permanent impact*** on same.

No architectural, cultural or industrial heritage impacts are predicted to occur as a result of the proposed Project.

14.5 Mitigation Measures

14.5.1 Construction Phase

In order to avoid / minimise potential impacts on unrecorded subsurface archaeological deposits, the following mitigation measures shall be implemented during the construction phase:

- Monitoring of topsoil-stripping across the entire Site of the proposed Project will be undertaken as an archaeological exercise, to determine whether there are any archaeological features or deposits present. Given the way that subsurface features and sites present in this landscape, this strategy will ensure comprehensive archaeological mitigation. This exercise will be undertaken by a suitably qualified archaeologist, and will include the area where testing of geophysical anomalies has already been undertaken.
- Should any subsurface archaeological stratigraphy be encountered, an appropriate ameliorative strategy will be implemented. This will entail licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ.
- Archaeological monitoring will be carried out under licence to the DHLGH and the NMI, and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface.
- All archaeological issues will have to be resolved to the satisfaction of the DHLGH and the NMI.
- The archaeologist will:
  - Have provision to inspect all excavation to natural soil level and to temporarily halt excavation works, if and as necessary.
  - Be given provision to ensure the temporary protection of any features of archaeological importance identified.
  - Be afforded sufficient time and resources to record and remove any such features identified.

- The developer will make provision to allow for, and to fund, the necessary archaeological monitoring, inspection and any excavation works that will be needed on the site during and prior to construction, either directly or indirectly via the contractor.

14.5.2 Operational Phase

The operational phase of the proposed Project will have no impact on the cultural heritage environment of the area, as it is anticipated that any impact to archaeological, architectural and cultural heritage features would be encountered at the site preparation stage and resolved prior to the operational phase. As such, no mitigation measures are required for this phase.

14.6 Residual Impacts

No residual impacts are predicted, assuming the implementation of the above-listed mitigation.

14.7 Monitoring

There will be no requirement for monitoring post-construction.

14.8 Interactions

No noteworthy interactions were identified during the assessment process.

14.9 Cumulative Impacts

Since the potential impacts of the proposed Project on the cultural, archaeological and architectural heritage resource will be limited to the Site, no cumulative impacts (arising as a result of the proposed Project in combination with one or more existing, permitted or proposed plan or project) were identified in the course of this assessment.

14.10 'Do-Nothing' Impact

The Do-Nothing scenario (i.e. that in which the proposed Project were not progressed) would either entail (i) no redevelopment of the Site, in which case there would be no adverse impacts on any as yet undiscovered subsurface archaeological deposits; or (ii) redevelopment of the Site (likely for similar residential redevelopment) under the scope of a separate application, in which case the impacts would be similar to those assessed for the proposed Project herein.

14.11 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered during the assessment process.

14.12 References

- Aalen, F. H. A, Whelan, K., & Stout, M. (1997). *Atlas of the Irish rural landscape*, Cork University Press, Cork.
- Ball, F. E. (1920). *A History of the County of Dublin: The people, parishes and antiquities from the earliest times to the close of the 18th century, Vol. VI*, The H.S.P. Library, Dublin
- Bennett, D. (1991). *The Encyclopaedia of Dublin*, Dublin
- Brindley A.L & Lanting J.N. (1990). 'The dating of fulachta fiadh' in V. Buckley (Ed) *Burnt offerings.* Bray: Wordwell.
- Clancy, P. (2005a). *Environmental Impact Statement, Baldoyle Phase III.* Co. Dublin, Margaret Gowen & Co. Ltd.
- Clancy, P. (2005b). *Environmental Impact Statement, Baldoyle Phase IV.* Co. Dublin, Margaret Gowen & Co. Ltd.
- Courtney, L. & Nicholls, J. (2002). *Cultural Heritage Impact Assessment, Flood Alleviation Scheme Baldoyle-Mayne Road*. Co. Dublin, Margaret Gowen & Co. Ltd. (unpublished)
- D'Alton, J. (1838) (1976 reprint). *The History of the County of Dublin*. Cork
- De Courcy, J.W. (1996). *The Liffey in Dublin*. Dublin
- Duffy , P. (2014). From the bottom up? Grassroots, tree roots and community in the 'Town of the Dark Stranger', *Archaeology Ireland*, 28 (2), 11 – 14.
- Gwynn, A. & Hadcock, R.N. (1970). *Medieval Religious Houses: Ireland.* Cambridge University Press.
- Harbison, P. (1970) (and later editions). *Guide to the National Monuments of Ireland*. Dublin
- Hurley, M.J. (1983). *Where Came a Dark Stranger*
- Joyce, P. W. (1923). *Irish Local Names Explained,* Roberts Wholesale Books Ltd., Dublin
- Joyce, St. John W. (1912). The *Neighbourhood of Dublin*, Hughes & Hughes, Dublin
- Keeling, D. & Keeley, D. (1994). Excavation of a flint scatter on Paddy's Hill (Robswalls), Malahide, County Dublin, *Proceedings of the Royal Irish Academy*, 94C, 1 – 23.
- Kerr, T. (2007). *Early Christian Settlement in North-West Ulster*. BAR British Series 430. Oxford. Archaeopress.

- Kilfeather, A. (2000). *Archaeological Assessment: Baldoyle/Portmarnock*, Co. Dublin, Margaret Gowen & Co. Ltd. (unpublished)
- Leigh, J. (2003). *Geophysical Survey Report, Baldoyle, North County Dublin*, Licence Ref. 02R197, Margaret Gowen & Co. Ltd. (unpublished)
- Leigh, J. (2004) *Geophysical Survey Report, Portmarnock, Co. Dublin*, Licence Ref. 04R149, Margaret Gowen & Co. Ltd. (unpublished)
- Lewis, S. (1837). *A Topographical Dictionary of Ireland*, Vol. 1, S. Lewis & Co., London.
- McCullough, N. & Mulvin, V. (1987). *A Lost Tradition: The Nature of Architecture in Ireland*, Gandon Editions, Dublin.
- Nicholls, J. (2002). *Geophysical Survey, Baldoyle/Portmarnock, Co. Dublin*, Licence Ref. 02R020, Margaret Gowen & Co. Ltd. (unpublished)
- Phelan, S. (2004a). *Archaeological Assessment and Impact Statement, Baldoyle Phase 1 Co. Dublin*, Licence Ref. 04E1024, Margaret Gowen & Co. Ltd. (unpublished)
- Phelan, S. (2004b). *Archaeological Assessment and Impact Statement, Baldoyle Phase II Co. Dublin*, Licence Ref. 04E1249, Margaret Gowen & Co. Ltd. (unpublished)
- Purcell, A. (1999). *Archaeological Monitoring at Robswalls, Portmarnock* Margaret Gowen & Co. Ltd. (unpublished)
- Reilly & Sutton, M. (2002). *Environmental Impact Statement: Section on Archaeology and Cultural Heritage, Baldoyle/Portmarnock, Co. Dublin*, Margaret Gowen & Co. Ltd.
- Shiel, D., Shields, A. and Stephens, C. (2000). *Geophysical Survey Report: Baldoyle, Co. Dublin*, GSB Prospection (unpublished)
- Simms, A. & Fagan, P. (1992). Villages in county Dublin: their origins and inheritance, in *Dublin City and County: From Prehistory to Present*, ed. Aalen, F. H. A. and Whelan, K., Geography Publications, Dublin
- Smyth, W. J. (1992). Exploring the social and cultural topographies of sixteenth and seventeenth-century county Dublin, in *Dublin City and County: From Prehistory to Present*, ed. Aalen, F. H. A. and Whelan, K., Geography Publications, Dublin
- Stout, G. & Stout, M. (1992). Patterns in the past: county Dublin 5000 BC – 1000 AD, in *Dublin City and County: From Prehistory to Present*, ed. Aalen, F. H. A. and Whelan, K., Geography Publications, Dublin

- Sutton, M. (1999). *EIS Archaeology: Proposed Residential/Mixed Use Village Development at Grange Road Donaghmede, Dublin 13*, Margaret Gowen & Co. Ltd. (unpublished)
- Waddell, J. (1998). *The Prehistoric Archaeology of Ireland*, Wordwell, Bray.
- Wallace, A. (2000b). *Archaeological Assessment: Maynetown Enclosure, DU015:055, Baldoyle, Co. Dublin*, Margaret Gowen & Co. Ltd. (unpublished)
- Wallace, A. (2000a). *Archaeological Assessment: Portmarnock Mound, DU015:014, Portmarnock, Co. Dublin*, Margaret Gowen & Co. Ltd. (unpublished)
- Web Sources:
    - archaeology.ie
    - downsurvey.tcd.ie
    - excavations.ie
    - logainm.ie
    - osi.ie
    - Google Earth Pro

15 Microclimate – Daylight / Sunlight

15.1 Introduction

This Chapter of the EIAR was prepared by Carlota Álvarez, Energy & Sustainability Engineer at O'Connor Sutton Cronin. Carlota has a B.Eng. (Hons) in Marine Engineering and over 4 years' experience working as an Energy & Sustainability Engineer.

This chapter assesses the likely potential impacts in term of access to daylight and sunlight associated with the microclimate of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13. The aim of the analysis is to record and analyse the following impacts:

- The impact of the proposed Project on daylight levels within the proposed Project and any likely significant effects on the environment; and
- The impact on daylight levels to the existing adjacent buildings due to the proposed Project and any likely significant effects on the environment.

Natural light refers to both daylight and sunlight. However, a distinction between these two concepts is required for the purpose of analysis and quantification of natural light in buildings. In this assessment, the term 'daylight' is used for natural light where the source is the sky in overcast conditions, whilst 'sunlight' refers specifically to the light coming directly from the sun. The assessment of impacts is presented separately herein in respect of daylight (Section 15.2) and sunlight (Section 15.3).

15.2 Daylight Access Impact Assessment

15.2.1 Relevant Planning Policies

The following planning policies have been used as a point of reference within the daylight and sunlight assessment for the proposed Project.

The *Sustainable Urban Housing: Design Standards for New Apartments* (Department of Housing, Local Government and Heritage, 2020) state that:

> *"Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd Edition) or BS 8206-2:2008 – 'Lighting for Buildings – Part 2: Code of*

> *Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision."(p. 32)*

They also state that:

> *"Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to a design constraint associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution." (ibid.)*

The Fingal County Development Plan (2017 – 2023) states that:

> *"High levels of daylight and sunlight provide for good levels of amenity for residents. The internal layout of residential units should be designed to maximise use of natural daylight and sunlight. Daylight and sunlight levels, as a minimum, should be in accordance with Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (BRE2011) and British Standard (B.S.). 8206 Lighting for Buildings, Part 2 2008: Code of Practice for Daylighting or any update on these documents." (p. 422)*

Sustainable Residential Development in Urban Areas (Department of Environment, Heritage and Local Government, 2009) states that:

> *"Overshadowing will generally only cause problems where buildings of significant height are involved or where new buildings are located very close to adjoining buildings. Planning authorities should require that daylight and shadow projection diagrams be submitted in all such proposals. The recommendations of "Site Layout Planning for Daylight and Sunlight: A Guide to good Practice" (BRE 1991) or BS 8206 "Lighting for Buildings, Part 2 1992: Code of Practice for Daylighting" should be followed in this regard." (p. 57)*

The Government's *Urban Development and Building Heights – Guidelines for Planning Authorities* (2018) state the following:

"At the scale of the site/building:

- The form, massing and height of proposed developments should be carefully modulated so as to maximise access to natural daylight, ventilation and views and minimise overshadowing and loss of light.
- Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'.
- Where a proposal may not be able to fully meet all the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution." (p. 14)

15.2.2 Methodology

In considering the development potential and the quality of amenity for the surrounding properties as well as for the proposed Project once it has been completed, the assessment methodology has been based on the Building Research Establishment (BRE) *Guidelines on Site Layout Planning for Daylight and Sunlight* (the BRE Guide). These guidelines provide the criteria and methodology for calculations pertaining to daylight and sunlight and are the primary reference for this matter. The guidelines give simple rules for analysing sites where the geometry of the surroundings is straightforward, supplementing them with graphical methods for complex sites.

However, it is important to note that the performance targets which are included should be used with a degree of flexibility as per the extract below from the BRE Guide:

"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer.

> *Although it gives numerical guidelines these should be interpreted flexibly because natural lighting [and sunlight] is only one of the many factors in site layout design."*

The impacts to daylight are characterised based on the criteria / definitions stated in the EPA (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, as set out in Section 1.6 of Chapter 1 (Introduction).

15.2.2.1 Dwellings within the Proposed Project

The BRE Guide uses a set of parameters to quantify the potential effect on light levels and states that the guidance "is intended to be used in conjunction with the interior daylight recommendations in the British Standard BS 8206: Part 2 (BS8206-02)[67]".

For new developments, the BRE Guide and BS8206-02, note that the average daylight factor (ADF) may be used. The ADF is a measure of the overall amount of daylight in a space.

The ADF, which was used for this analysis, is a detailed and accurate method of analysis which considers not only the amount of sky visible from the vertical face of the window, but also the window size, room size and room use. Where dimensions for the room to be assessed are available, this is the best method of assessment, but even where they are not, it provides a very informative result.

Table 15.1, below, adapted from BS 8206-02, outlines the average daylight factors for different room types that should be achieved to ensure adequate daylight levels within dwellings.

Table 15.1: British Standard BS 8206-02 Minimum Average Daylight Factors

Room Type	Minimum Average Daylight Factor (%)
Bedrooms	1
Living rooms	1.5
Kitchens	2
Where one room services more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen, the minimum average daylight factor should be 2%.	

[67] BS 8206: Part 2 (BS8206-02) has been withdrawn and replaced with IS EN 17037:2018 Daylight in Buildings. However, since the BRE Guidelines and some planning policy guidelines continue to make reference to BS 8206, this standard has been used throughout this chapter.

Targeting a minimum ADF of 2% in open space kitchen / living rooms, results in significant challenges while seeking to comply with the *Sustainable Urban Housing: Design Standards for New Apartments* (Department of Housing, Local Government and Heritage, 2020), which are as follows:

- ***Amenity spaces:*** Private amenity spaces shall be provided in the form of balconies at the upper levels. Balconies are preferably accessed from living rooms. To achieve the 2% ADF in living / kitchen spaces, balconies would need to be removed at the lower floors.
- ***Floor to ceiling height:*** In order to achieve an ADF of 2%, the floor to ceiling heights would have to be increased on all levels which would have a planning height impact.
- ***Solar gains:*** With the removal of the balconies, increased floor to ceiling height and extensive glazing area, there is a risk of overheating within the apartments.

In addition, it must be also noted that the apartments within the proposed Project contain a kitchen which is expected to be used mainly for food preparation rather than occupants spending a long period of time sitting in the kitchen area. Instead, occupants are expected to spend most of their time in the living room area.

Based on the above, it has been a typical approach and common industry practice to set a benchmark of 1.5% (BS 8206 recommended ADF for living rooms) for open plan spaces that contain a kitchen and a living space.

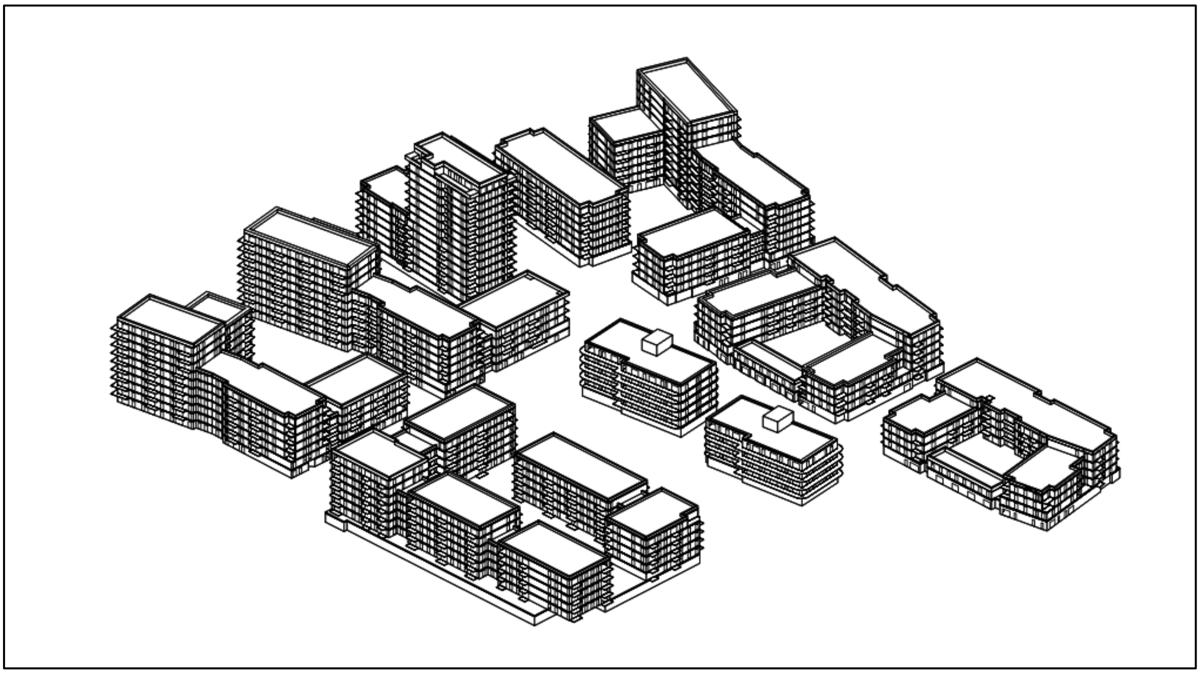
The ADF benchmark of 1.5% was set out for living / kitchen spaces within the apartments of the proposed Project during the assessment carried out for the initial pre-planning stage submitted in November 2020. The assessment completed for the pre-planning meeting indicated a pass rate of 98.3% when compared to the 1.5% ADF. The 2% ADF benchmark was also assessed at the pre-planning stage and showed a compliance rate of 97.8%. It should be noted that whether the 1.5% or the 2.0% ADF is set as the benchmark for compliance, the same level of daylight will be experienced within the proposed Project, with the only change being the benchmark to which the compliance rate is calculated.

However, for this final application report, the higher ADF benchmark of 2%, in line with BS 8206 has been utilised to calculate the percentage rate of compliance.

In order to analyse the daylight requirements for the proposed Project, a detailed 3D model was constructed of the entire proposed Project, using the *Integrated Environmental Solutions Virtual Environment* (IES VE) software package. A number of computer simulations were then undertaken using IES VE to ascertain the ADFs achieved within the dwellings of the proposed Project. An image of for the proposed Project taken from the model is presented in Figure 15.1.

The daylight impact analysis has been completed in relation to the entire proposed Project including the impacts to existing adjacent buildings external to the proposed Project.

Figure 15.1: IES VE Model of the Proposed Project



15.2.2.2 Existing Dwellings Adjacent to the Site

Identifying Sensitive Receptors

In order to undertake the assessment of impacts to adjacent buildings, first the key sensitive receptors around the Site need to be identified. According to the BRE Guidelines, sensitive receptors are described as:

- Windows to habitable rooms facing the Site where the occupants have a reasonable expectation of daylight; and
- Gardens and open spaces on adjacent properties to the proposed Project, excluding public footpaths, front gardens and car parks.

In accordance with the BRE Guidelines, windows are selected as sensitive receptors on the basis of being a habitable room facing the proposed Project.

Similarly, amenities and open spaces are selected on the basis of being in the immediate vicinity of the proposed Project. The primary purpose of a daylight, sunlight and overshadowing assessment is to determine the likely loss of light to adjacent buildings resulting from the construction of the proposed Project.

Therefore, in this case, the proposed Project is identified as the potential source of impact. The sensitive receptors identified for this study are windows of habitable rooms facing, and within, the Site where the occupants have a reasonable expectation of daylight.

Assessment Criteria

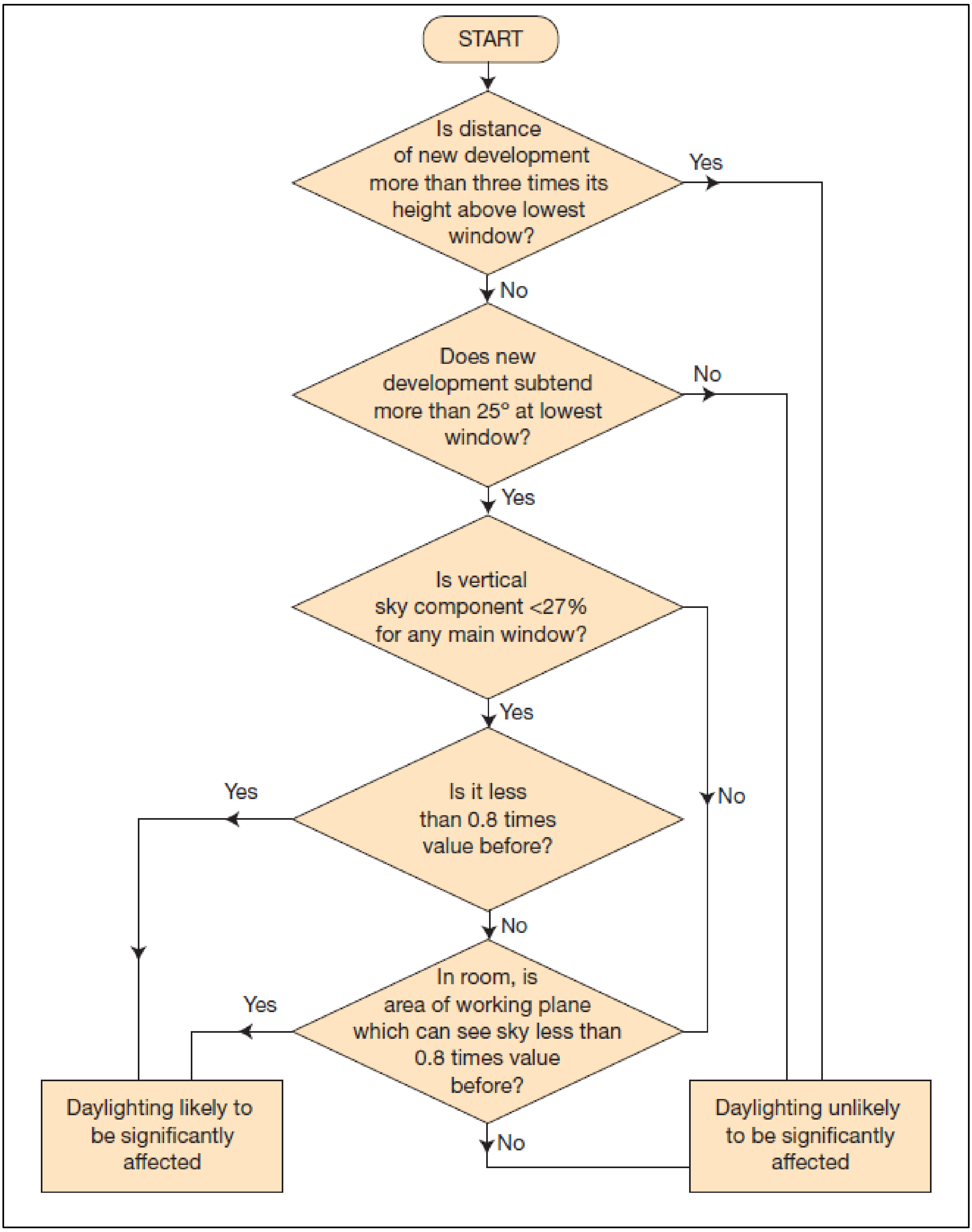
As per the BRE Guidelines, it is important to safeguard the daylight to nearby buildings where a reasonable expectation of daylight is required. The flow matrix below (Figure 15.2) outlines the criteria to be assessed, as per the BRE Guidelines, in order to ascertain any potential impact to adjacent existing buildings from the proposed Project.

As per the flow matrix, the BRE and BS8206 Guidelines provide three main methods for assessing daylight availability:

1. ***25° Line Criteria:*** In the first instance, if a proposed development falls beneath a 25° angle taken from a point 1.6 m above ground level (ABL) from any adjacent properties, then the BRE Guidelines state that no further analysis is required in relation to impact on surrounding properties, as adequate skylight will still be available. If a proposed development extends beyond the 25° line, then further analysis is required (Step 2).
2. ***Vertical Sky Component (VSC):*** The VSC calculation is the ratio of the direct sky illuminance falling on the outside of a window, to the simultaneous horizontal illuminance under an unobstructed sky. The BRE Guidelines state that:
    i. If the VSC at the centre of the existing window exceeds 27% with a new development in place, then enough sky light should still be reaching the existing window.

ii. If the VSC with a new development in place is both less than 27% and less than 80% its former value, then the reduction in light to the window is likely to be noticeable.

Figure 15.2: Daylight Assessment Methodology



This means that even if the VSC is less than 27%, as long as the reduction in the VSC value is still greater than 80% of its former value, this would be acceptable and thus the impact would be considered negligible.

It is important to note that the VSC is a simple geometrical calculation which provides an early indication of the potential for daylight entering the space. However, it does not assess or quantify the actual daylight levels inside the rooms. If the VSC standard is not met on any window, Step 3 is then followed.

3. ***No Sky Line:*** The third method is the No Sky Line or Daylight Distribution Method. This method assesses the change in position of the No Sky Line between the existing and proposed situations. It does take into account the number and size of windows to a room, but still does not give any qualitative or quantitative assessment of the light in the room, only where sky can or cannot be seen. Thus, as this method is limited, Step 2 (VSC) is considered more appropriate.

15.2.3 Characteristics of the Proposed Project

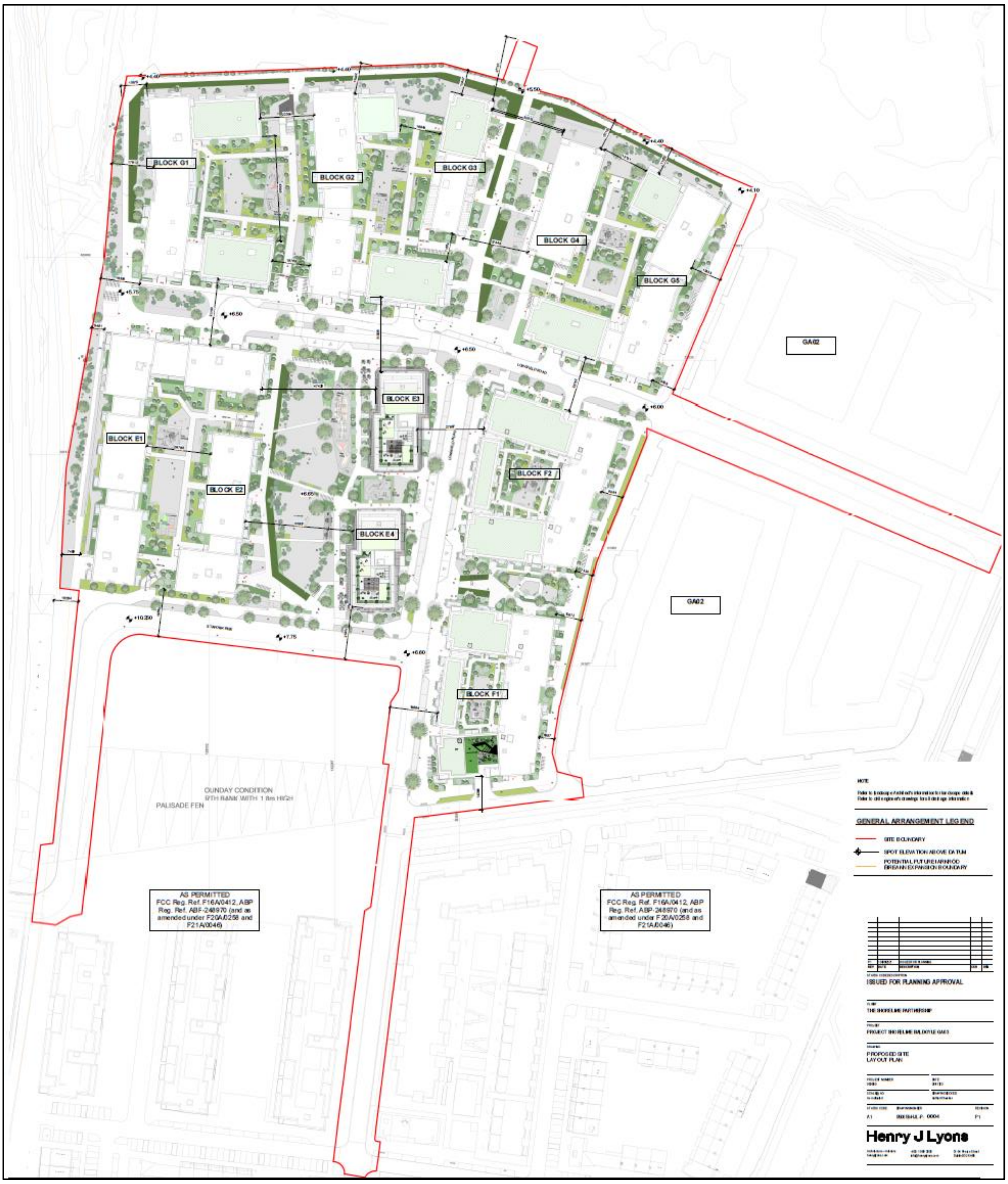
15.2.3.1 Proposed Project

A detailed description of the proposed Project is provided in Chapter 5 (Description of the Proposed Project). Refer also to Figure 15.3, which provides a layout of the proposed Project.

15.2.3.1 Existing Adjacent Properties

As part of the analysis, the impact to the existing adjoining properties due to the proposed Project was analysed. Figure 15.28 in section 15.2.3.2 illustrates the adjoining buildings to the proposed Project that were analysed, and Table 15.27 describes these adjacent buildings.

Figure 15.3: Proposed Project - Layout



15.2.4 Potential Impacts of the Proposed Project

This section will consider the potential impacts of the proposed Project in relation to the following factors:

- The impact of the proposed Project on daylight levels within the proposed Project and any likely significant effects on the environment; and
- The impact of the proposed Project on daylight levels to the existing adjacent buildings and any likely significant effects on the environment.

15.2.4.1 Construction Phase

It is considered that, during the construction phase, there will be no impacts experienced in relation to daylight to the proposed Project, and the impact to the existing properties in the adjoining developments will be ***imperceptible*** with ***no short or long-term effects***.

15.2.4.2 Operational Phase

As previously noted in Section 15.2.2, the performance targets set out in the BRE Guidelines should be used with a degree of flexibility.

It is considered the proposed Project has the potential to achieve high levels of daylight given the Site layout and design. In addition, the absence of adjacent high-rise buildings that could overshadow the proposed Project is a positive for the Site. There will be no impacts experienced to adjacent properties in relation to daylight due to the proposed Project, therefore the impact to the existing properties in the adjoining developments will be ***imperceptible*** with ***neutral, long-term*** effects.

To assess the potential impact of the proposed Project during the operational phase in terms of daylight access for both the properties within the Site and the adjacent buildings, the methodology outlined in Sections 15.2.2 has been followed.

Apartments within the Proposed Project

In line with common industry approach, units presented at the lower levels have been selected for analysis. Units are selected at the lower levels on the basis that they will receive the lowest levels of daylight due to their location, obstruction and position within the proposed Project. Another factor in unit selection is the layout of the apartment. Room depth and location of balconies also play an important role when it comes to daylight penetration within the room.

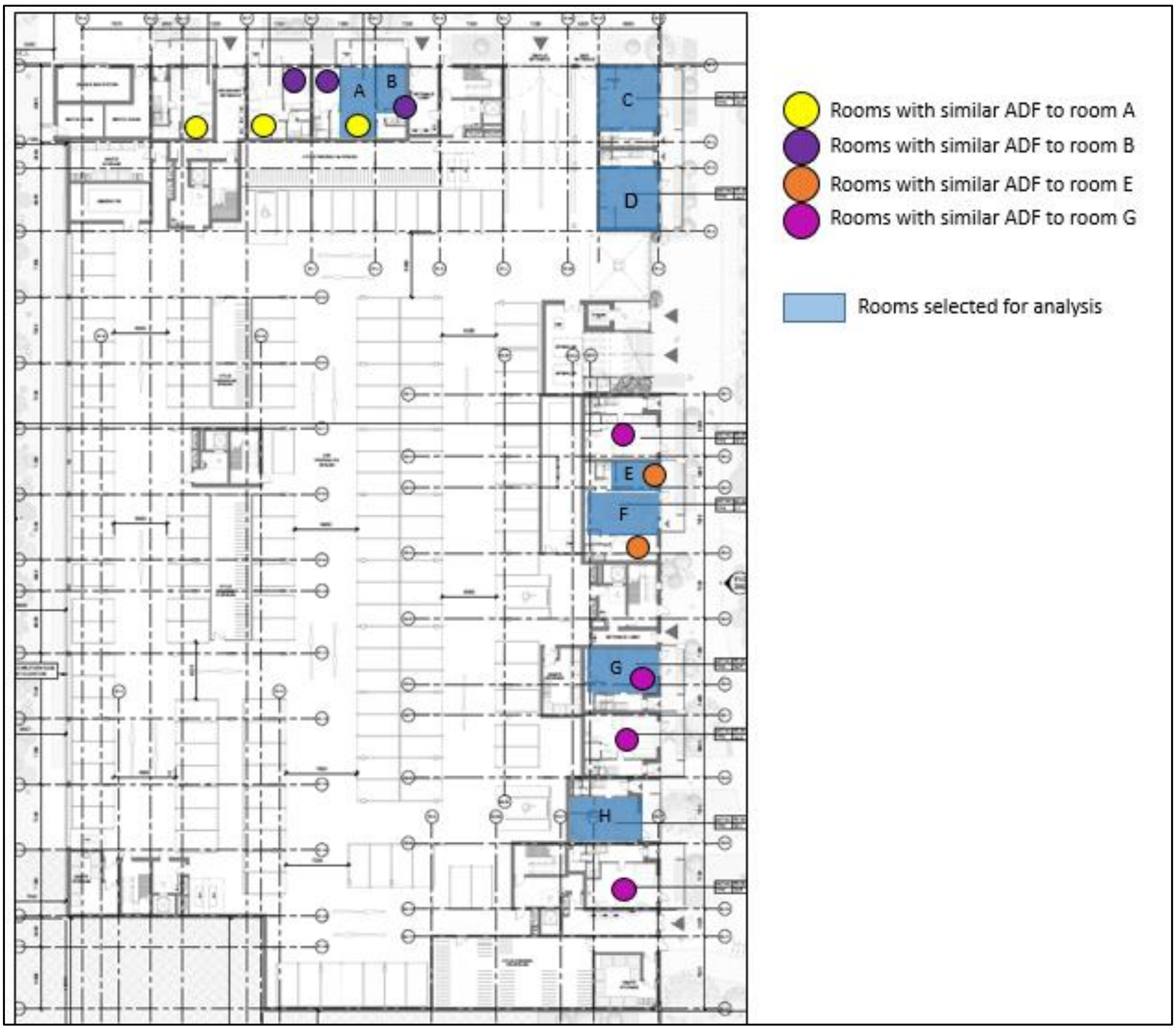
Different types of rooms across the lower levels have been analysed, prioritizing the deep plan and more obstructed rooms.

As previously outlined, the daylight analysis is completed within the IES software and all room results are tabulated. Where a room ADF result falls short of the compliance benchmark, the same apartment type directly above is also modelled to determine whether that room achieves the compliance benchmark in the above level. This process is reiterated on each level above until the compliance benchmark is achieved. Where units at the lower level achieve the compliance benchmark, it is taken that the same unit type directly above will also achieve the compliance benchmark and, therefore, no further modelling is required.

Figure 15.4 illustrates an example of the rationale applied within Block E1 / E2 to calculate the percentage rate of compliance based on a sample of analysed rooms. The rooms highlighted in blue and identified with a text reference (A, B, C, etc.) were selected for analysis. The results recorded for the assessed rooms will show as a pass or fail against the compliance benchmark. This pass or fail result is then applied to rooms with similar characteristics (room configuration, location or level of obstructions), and this rationale is shown in Figure 15.4, where rooms expected to receive a similar ADF result have been identified with a circle of the same colour.

The design and layout of each apartment type has been carefully considered with generous window openings being provided. Where the opportunity arises, rooms have been designed as dual aspect and bathroom and storage areas have been provided to the back of apartments to give living spaces greater access to daylight.

Figure 15.4: Example of Room's Assumption in Block E1 / E2



Daylight Reflectance

The surface reflectance values outlined in Table 15.2 have been used in the analysis.

Table 15.2: Surface Reflectance Values

Surface Type	Reflectance (%)
External Wall	40
Internal Partitions	70
Ceiling	70
Floor	40
Adjacent Buildings	40
Glazing Transmittance	70

Results for Apartments within the Proposed Project

The following images illustrate the rooms tested and their subsequent results are shown in the accompanying tables.

Figure 15.5: Blocks E1 / E2 Ground Floor - Average Daylight Factor Assessed Rooms

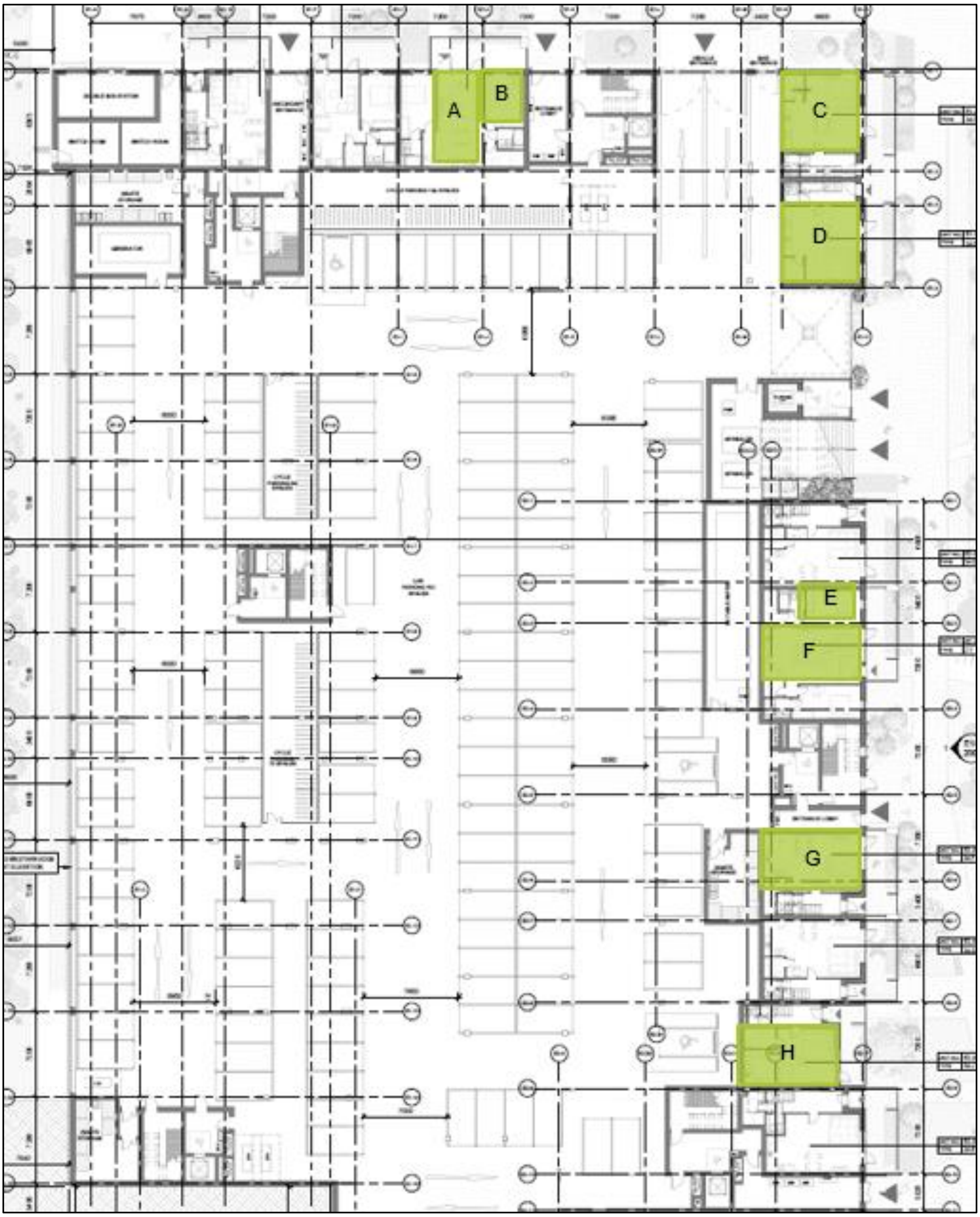


Table 15.3: Blocks E1/E2 Ground Floor - Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	2.2	Y
B	Bedroom	1.0	1.8	Y
C	Living Room / Kitchen	2.0	5.0	Y
D	Living Room / Kitchen	2.0	2.5	Y
E	Bedroom	1.0	1.6	Y
F	Living Room / Kitchen	2.0	2.5	Y
G	Living Room / Kitchen	2.0	2.3	Y
H	Living Room / Kitchen	2.0	1.9	N

Figure 15.6: Block E1/E2 Podium Floor Level - Average Daylight Factor Assessed Rooms

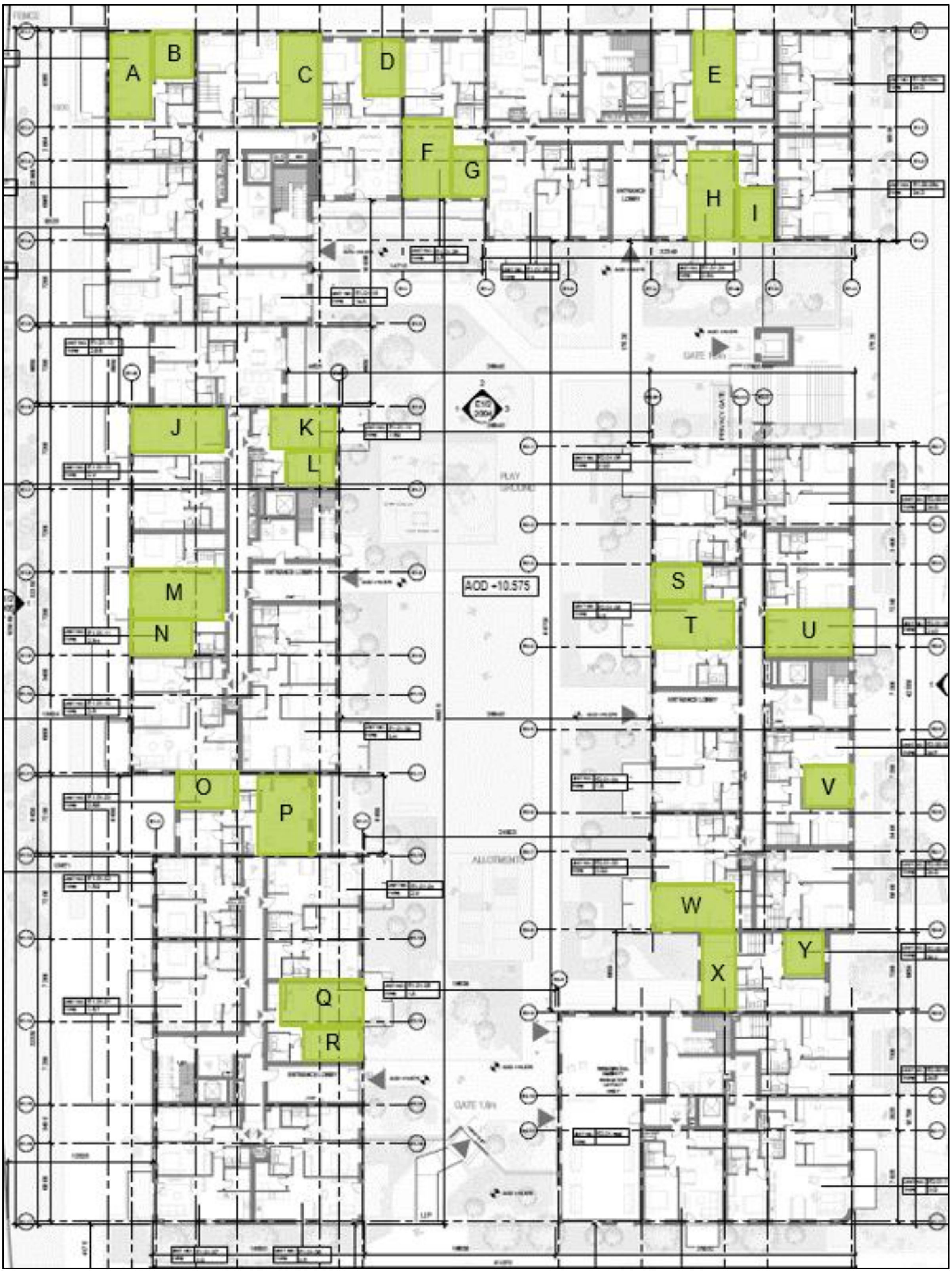


Table 15.4: Blocks E1/E2 Podium Floor Level - Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	6.8	Y
B	Bedroom	1.0	3.0	Y
C	Living Room / Kitchen	2.0	2.2	Y
D	Bedroom	1.0	2.5	Y
E	Living Room / Kitchen	2.0	2.3	Y
F	Living Room / Kitchen	2.0	1.5	N
G	Bedroom	1.0	1.2	Y
H	Living Room / Kitchen	2.0	2.3	Y
I	Bedroom	1.0	2.5	Y
J	Living Room / Kitchen	2.0	2.0	Y
K	Living Room / Kitchen	2.0	2.9	Y
L	Bedroom	1.0	1.2	Y
M	Living Room / Kitchen	2.0	2.0	Y
N	Bedroom	1.0	2.6	Y
O	Bedroom	1.0	2.6	Y
P	Living Room / Kitchen	2.0	1.8	N
Q	Living Room / Kitchen	2.0	2.8	Y
R	Bedroom	1.0	1.2	Y
S	Bedroom	1.0	1.9	Y
T	Living Room / Kitchen	2.0	1.8	N
U	Living Room / Kitchen	2.0	3.0	Y
V	Bedroom	1.0	2.7	Y
W	Living Room / Kitchen	2.0	1.8	N
X	Bedroom	1.0	1.2	Y
Y	Bedroom	1.0	2.8	Y

Figure 15.7: Blocks E1/E2 Second Floor Level – Average Daylight Factor Assessed Rooms

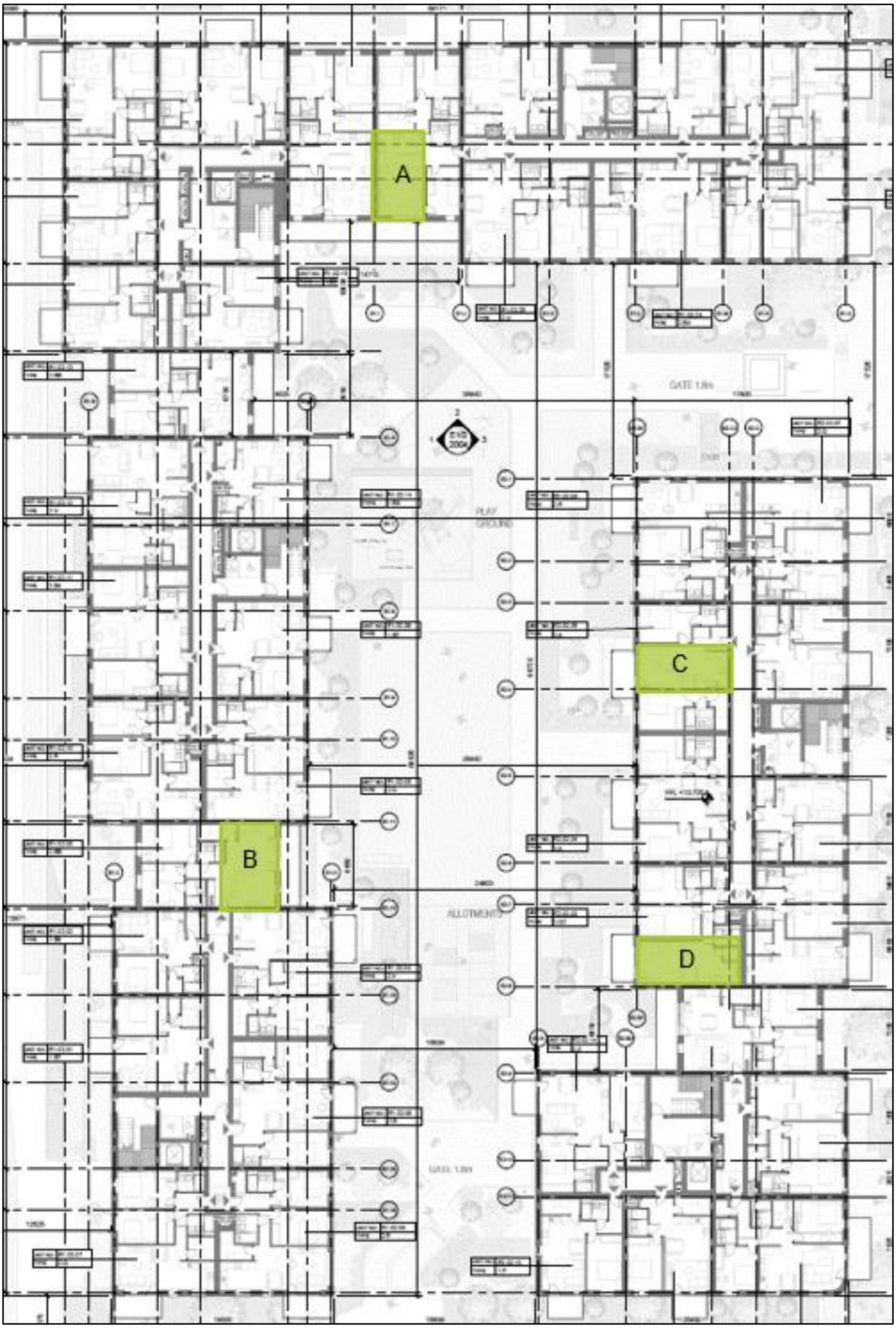


Table 15.5: Blocks E1/E2 Second Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	1.7	N
B	Living Room / Kitchen	2.0	2.1	Y
C	Living Room / Kitchen	2.0	2.1	Y
D	Living Room / Kitchen	2.0	2.1	Y

Figure 15.8: Blocks E1/E2 Third Floor Level – Average Daylight Factor Assessed Rooms

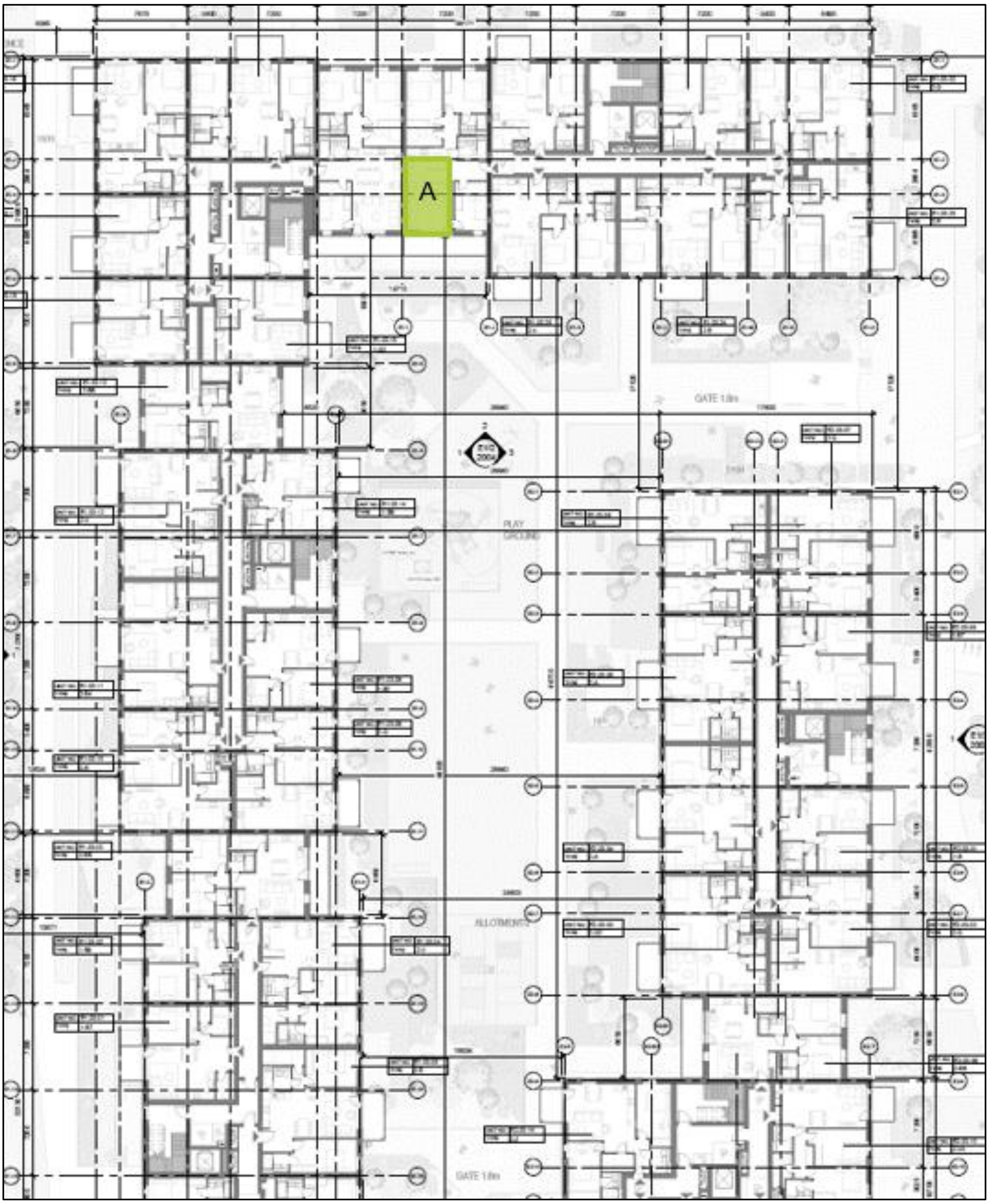


Table 15.6: Blocks E1/E2 Third Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	2.0	Y

Figure 15.9: Blocks E3/E4 Podium Floor Level – Average Daylight Factor Assessed Rooms

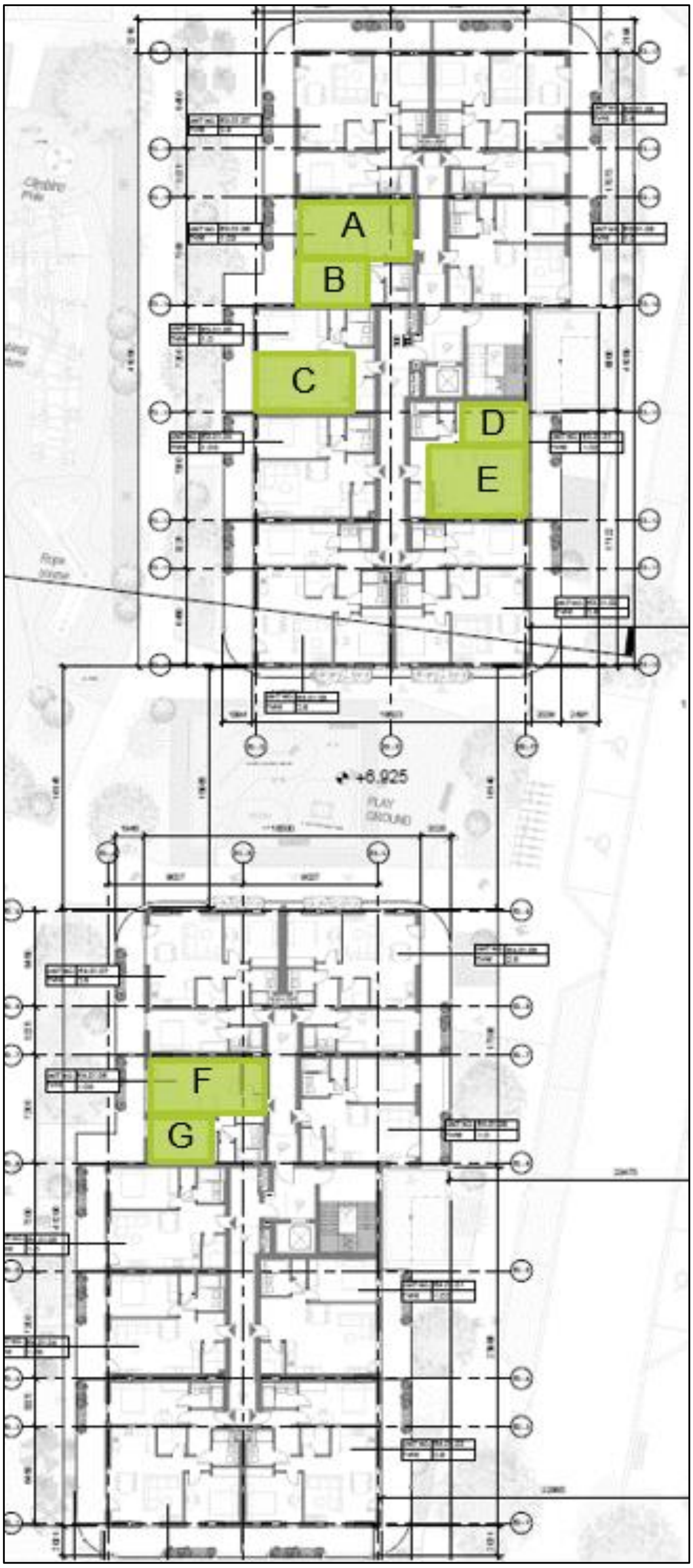


Table 15.7: Blocks E3/E4 Podium Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	2.0	Y
B	Bedroom	1.0	1.4	Y
C	Living Room / Kitchen	2.0	2.4	Y
D	Bedroom	1.0	1.3	Y
E	Living Room / Kitchen	2.0	1.5	N
F	Living Room / Kitchen	2.0	2.0	Y
G	Bedroom	1.0	1.4	Y

Figure 15.10: Blocks E3/E4 Second Floor Level – Average Daylight Factor Assessed Rooms

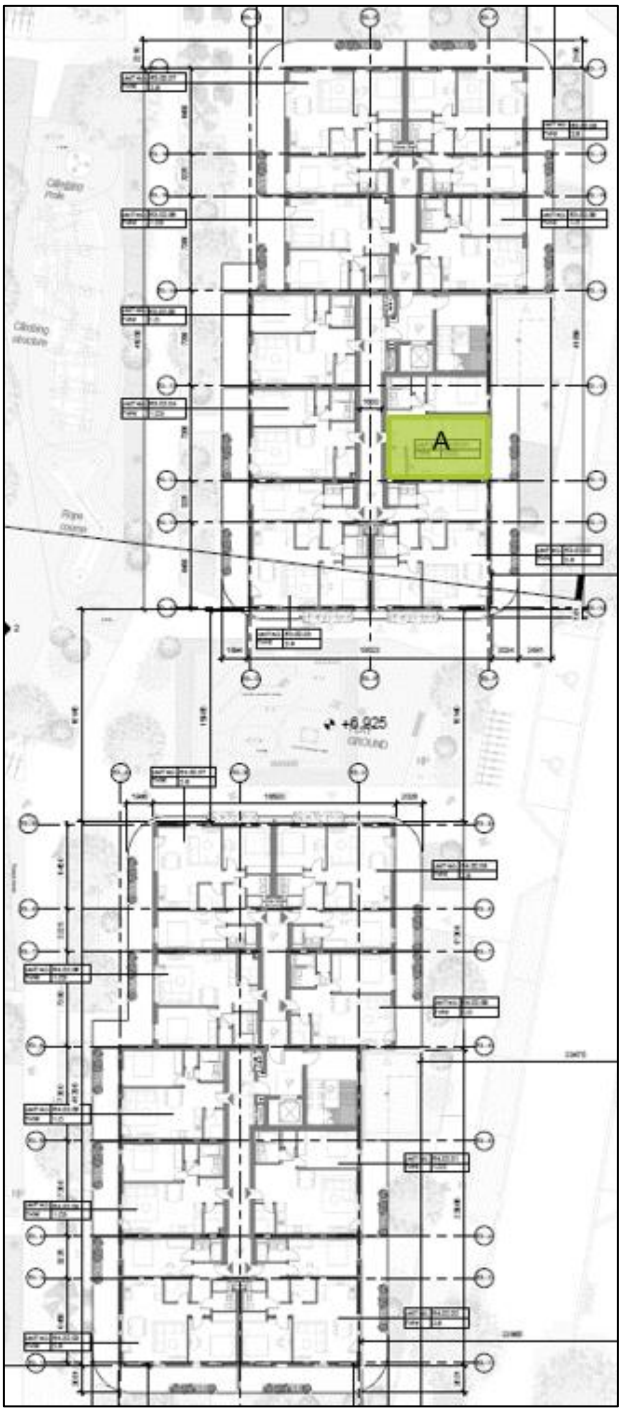


Table 15.8: Blocks E3/E4 Second Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	1.6	N

Figure 15.11: Blocks E3/E4 Third Floor Level – Average Daylight Factor Assessed Rooms

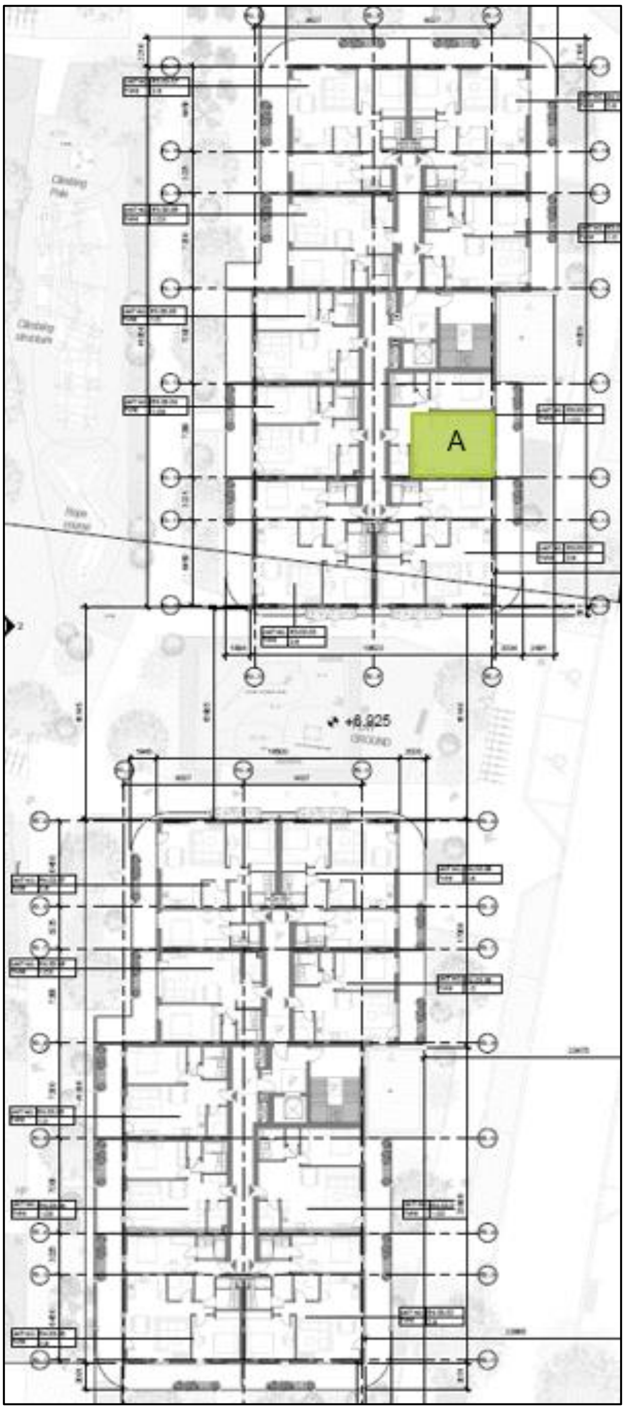


Table 15.9: Blocks E3/E4 Third Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	1.8	N

Figure 15.12: Blocks E3/E4 Fourth Floor Level – Average Daylight Factor Assessed Rooms

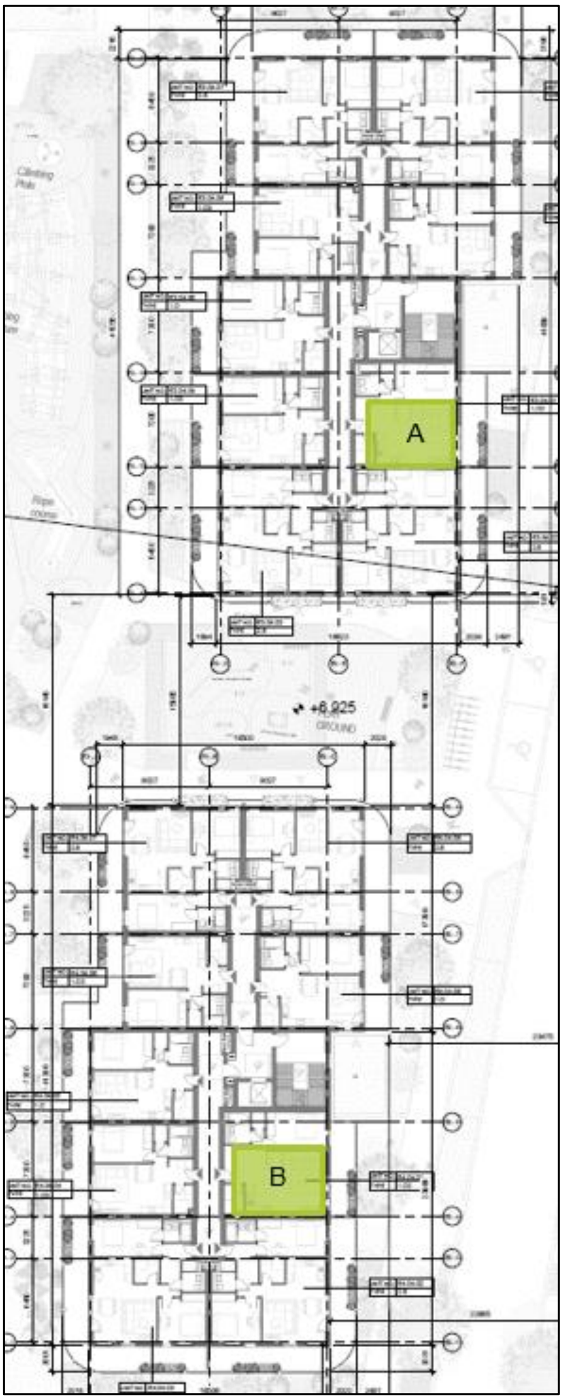


Table 15.10: Blocks E3/E4 Fourth Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	3.5	Y
B	Living Room / Kitchen	2.0	2.3	Y

Figure 15.13: Block F1 Ground Floor– Average Daylight Factor Assessed Rooms

Table 15.11: Block F1 Ground Floor – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	3.9	Y
B	Bedroom	1.0	2.7	Y
C	Living Room / Kitchen	2.0	2.0	Y
D	Living Room / Kitchen	2.0	2.6	Y
E	Bedroom	1.0	3.0	Y
F	Bedroom	1.0	2.8	Y
G	Living Room / Kitchen	2.0	3.6	Y

Figure 15.14: Block F1 First Floor Level – Average Daylight Factor Assessed Rooms

Table 15.12: Block F1 First Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	3.2	Y

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
B	Bedroom	1.0	2.3	Y
C	Living Room / Kitchen	2.0	2.7	Y
D	Bedroom	1.0	3.0	Y
E	Living Room / Kitchen	2.0	2.1	Y
F	Bedroom	1.0	3.0	Y
G	Living Room / Kitchen	2.0	2.5	Y
H	Living Room / Kitchen	2.0	2.4	Y
I	Bedroom	1.0	3.5	Y
J	Living Room / Kitchen	2.0	2.7	Y
K	Bedroom	1.0	2.2	Y

Figure 15.15: Block F2 Ground Floor – Average Daylight Factor Assessed Rooms

Table 15.13: Block F2 Ground Floor – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0	2.4	Y
B	Living Room / Kitchen	2.0	2.8	Y
C	Living Room / Kitchen	2.0	3.2	Y

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
D	Bedroom	1.0	2.6	Y
E	Bedroom	1.0	3.5	Y
F	Bedroom	1.0	3.5	Y
G	Living Room / Kitchen	2.0	2.2	Y

Figure 15.16: Block F2 First Floor Level – Average Daylight Factor Assessed Rooms

Table 15.14: Block F2 First Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	2.1	Y
B	Bedroom	1.0	2.1	Y
C	Bedroom	1.0	2.3	Y
D	Living Room / Kitchen	2.0	2.0	Y
E	Bedroom	1.0	2.4	Y

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
F	Bedroom	1.0	3.0	Y
G	Living Room / Kitchen	2.0	2.4	Y
H	Living Room / Kitchen	2.0	2.1	Y
I	Bedroom	1.0	1.7	Y
J	Bedroom	1.0	2.8	Y
K	Bedroom	1.0	3.2	Y
L	Living Room / Kitchen	2.0	2.5	Y
M	Living Room / Kitchen	2.0	2.3	Y
N	Bedroom	1.0	1.8	Y
O	Living Room / Kitchen	2.0	2.2	Y
P	Bedroom	1.0	1.6	Y

Figure 15.17: Blocks G1/G2/G3 Ground Floor– Average Daylight Factor Assessed Rooms

Table 15.15: Blocks G1/G2/G3 Ground Floor – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	3.6	Y
B	Living Room / Kitchen	2.0	1.8	N
C	Bedroom	1.0	1.9	Y
D	Living Room / Kitchen	2.0	2.8	Y
E	Bedroom	1.0	3.9	Y
F	Living Room / Kitchen	2.0	2.1	Y
G	Bedroom	1.0	1.9	Y
H	Bedroom	1.0	1.5	Y
I	Living Room / Kitchen	2.0	1.7	N
J	Living Room / Kitchen	2.0	2.5	Y
K	Bedroom	1.0	2.9	Y
L	Living Room / Kitchen	2.0	1.9	N
M	Living Room / Kitchen	2.0	3.1	Y

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
N	Bedroom	1.0	2.4	Y
O	Living Room / Kitchen	2.0	2.3	Y
P	Living Room / Kitchen	2.0	2.1	Y
Q	Bedroom	1.0	1.7	Y
R	Bedroom	1.0	1.0	Y
S	Living Room / Kitchen	2.0	1.1	N
T	Bedroom	1.0	2.2	Y
U	Living Room / Kitchen	2.0	1.7	N
V	Living Room / Kitchen	2.0	1.4	N
W	Bedroom	1.0	1.2	Y
X	Bedroom	1.0	1.4	Y
Y	Living Room / Kitchen	2.0	2.5	Y
Z	Living Room / Kitchen	2.0	2.2	Y

Figure 15.18 Blocks G1/G2/G3 First Floor Level – Average Daylight Factor Assessed Rooms

Table 15.16: Blocks G1/G2/G3 First Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	2.1	Y
B	Bedroom	1.0	2.9	Y
C	Living Room / Kitchen	2.0	2.5	Y
D	Bedroom	1.0	3.2	Y
E	Living Room / Kitchen	2.0	1.6	N
F	Bedroom	1.0	1.9	Y
G	Living Room / Kitchen	2.0	1.2	N
H	Living Room / Kitchen	2.0	2.4	Y
I	Bedroom	1.0	2.9	Y
J	Living Room / Kitchen	2.0	1.5	N
K	Bedroom	1.0	1.5	Y
L	Living Room / Kitchen	2.0	2.5	Y

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
M	Bedroom	1.0	3.3	Y
N	Living Room / Kitchen	2.0	2.3	Y
O	Bedroom	1.0	2.0	Y
P	Living Room / Kitchen	2.0	2.8	Y
Q	Bedroom	1.0	3.5	Y
R	Living Room / Kitchen	2.0	1.8	N
S	Bedroom	1.0	1.8	Y
T	Living Room / Kitchen	2.0	1.0	N
U	Bedroom	1.0	1.8	Y
V	Living Room / Kitchen	2.0	2.5	Y
W	Bedroom	1.0	2.4	Y
X	Living Room / Kitchen	2.0	1.4	N
Y	Bedroom	1.0	2.0	Y
Z	Living Room / Kitchen	2.0	1.7	N
AA	Bedroom	1.0	1.9	Y
AB	Living Room / Kitchen	2.0	2.0	Y
AC	Living Room / Kitchen	2.0	2.6	Y
AD	Bedroom	1.0	2.0	Y
AE	Living Room / Kitchen	2.0	2.1	Y
AF	Bedroom	1.0	1.8	Y
AG	Bedroom	1.0	1.8	Y
AH	Living Room / Kitchen	2.0	1.3	N
AI	Bedroom	1.0	1.6	Y
AJ	Living Room / Kitchen	2.0	2.2	Y

Figure 15.19: Blocks G1/G2/G3 Second Floor Level – Average Daylight Factor Assessed Rooms

Table 15.17: Blocks G1/G2/G3 Second Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	1.7	N
B	Living Room / Kitchen	2.0	1.3	N
C	Living Room / Kitchen	2.0	1.8	N
D	Living Room / Kitchen	2.0	1.8	N
E	Living Room / Kitchen	2.0	1.3	N
F	Living Room / Kitchen	2.0	1.5	N
G	Living Room / Kitchen	2.0	2.0	Y
H	Living Room / Kitchen	2.0	1.4	N

Figure 15.20: Blocks G1/G2/G3 Third Floor Level – Average Daylight Factor Assessed Rooms

Table 15.18: Blocks G1/G2/G3 Third Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	1.8	N
B	Living Room / Kitchen	2.0	1.5	N
C	Living Room / Kitchen	2.0	2.2	Y
D	Living Room / Kitchen	2.0	1.9	N
E	Living Room / Kitchen	2.0	1.6	N
F	Living Room / Kitchen	2.0	1.8	N
G	Living Room / Kitchen	2.0	1.6	N

Figure 15.21: Blocks G1/G2/G3 Fourth Floor Level – Average Daylight Factor Assessed Rooms

Table 15.19: Blocks G1/G2/G3 Fourth Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	2.3	Y
B	Living Room / Kitchen	2.0	2.0	Y
C	Living Room / Kitchen	2.0	2.4	Y
D	Living Room / Kitchen	2.0	2.0	Y
E	Living Room / Kitchen	2.0	2.1	Y
F	Living Room / Kitchen	2.0	2.5	Y

Figure 15.22: Blocks G4/G5 Ground Floor– Average Daylight Factor Assessed Rooms

Table 15.20: Blocks G4/G5 Ground Floor – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Living Room / Kitchen	2.0	4.6	Y
B	Bedroom	1.0	2.8	Y
C	Living Room / Kitchen	2.0	3.0	Y
D	Living Room / Kitchen	2.0	2.8	Y
E	Bedroom	1.0	1.4	Y
F	Bedroom	1.0	2.6	Y
G	Living Room / Kitchen	2.0	3.1	Y
H	Bedroom	1.0	1.7	Y
I	Living Room / Kitchen	2.0	2.4	Y
J	Living Room / Kitchen	2.0	2.7	Y
K	Bedroom	1.0	1.4	Y
L	Living Room / Kitchen	2.0	2.1	Y

Figure 15.23: Blocks G4/G5 Podium Floor Level – Average Daylight Factor Assessed Rooms

Table 15.21: Blocks G4/G5 Podium Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	1.0	2.3	Y
B	Living Room / Kitchen	2.0	1.8	Y
C	Bedroom	1.0	1.3	Y
D	Living Room / Kitchen	2.0	1.7	Y
E	Living Room / Kitchen	2.0	3.4	Y
F	Bedroom	1.0	3.1	Y
G	Living Room / Kitchen	2.0	2.5	Y
H	Living Room / Kitchen	2.0	3.3	Y
I	Bedroom	1.0	3.0	Y
J	Living Room / Kitchen	2.0	1.2	N
K	Bedroom	1.0	2.4	Y
L	Living Room / Kitchen	2.0	3.4	Y
M	Bedroom	1.0	3.2	Y
N	Living Room / Kitchen	2.0	2.4	Y
O	Bedroom	1.0	3.6	Y
P	Living Room / Kitchen	2.0	2.5	Y
Q	Living Room / Kitchen	2.0	2.2	Y
R	Living Room / Kitchen	2.0	1.9	N
S	Bedroom	1.0	2.2	Y
T	Bedroom	1.0	1.8	Y
U	Bedroom	1.0	1.5	Y
V	Bedroom	1.0	2.7	Y
W	Living Room / Kitchen	2.0	2.2	Y

Figure 15.24: Blocks G4/G5 Second Floor Level – Average Daylight Factor Assessed Rooms

Table 15.22: Blocks G4/G5 Second Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	2.0	1.4	N
B	Living Room / Kitchen	2.0	2.1	Y

Figure 15.25: Blocks G4/G5 Third Floor Level – Average Daylight Factor Assessed Rooms

Table 15.23: Blocks G4/G5 Third Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	2.0	1.6	N

Figure 15.26: Blocks G4/G5 Fourth Floor Level – Average Daylight Factor Assessed Rooms

Table 15.24: Blocks G4/G5 Fourth Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	ADF target (%)	ADF results (%)	Meets minimum ADF target
A	Bedroom	2.0	2.1	Y

In summary, the vast majority of units not only meet but, in the majority of cases, exceed the Average Daylight Factor target recommended in BS 8206. Of the 3,241 rooms that comprise the proposed Project, only 70 fall short of the BRE Guidelines and BS 8206 recommendations, therefore a 97.8% compliance rate is achieved across the proposed Project.

Table 15.25: ADF Benchmark Compliance

Total no. of rooms	3,241
No. living / kitchen rooms not compliant with BS 8206 guidelines (2.0% ADF)	70
No. bedrooms not compliant with BS 8206 guidelines (1.0% ADF)	0
Total no. rooms not compliant with BS 8206 guidelines	70
Compliance with BS 8206	97.8%

As outlined in Section 15.2.2.1, an ADF benchmark of 2% for living / kitchen spaces, in line with BS 8206, has been utilised to calculate the percentage rate of compliance. However, during the assessment completed for the pre-planning meeting, a pass rate of 98.3% when compared to a 1.5% ADF benchmark for living rooms / kitchens was achieved. The 2% ADF benchmark was also assessed at the pre-planning stage and showed a compliance rate of 97.8% and this remains unchanged. It should be noted that whether the 1.5% or the 2.0% ADF is set as the benchmark for compliance, the same level of daylight will be experienced within the proposed Project, with the only change being the benchmark to which the compliance rate is calculated. The following table outlines the percentage of compliance based on the 1.5% ADF benchmark for living room / kitchen.

Table 15.26: ADF Compliance Based on 1.5% ADF for Living Room / Kitchen Spaces

Total no. of rooms	3,197
No. living / kitchen rooms not compliant with 1.5% ADF benchmark	54
Total no. rooms not compliant with 1.5% ADF benchmark	54
Percentage compliance	98.3%

Apartments with Non-compliant Rooms

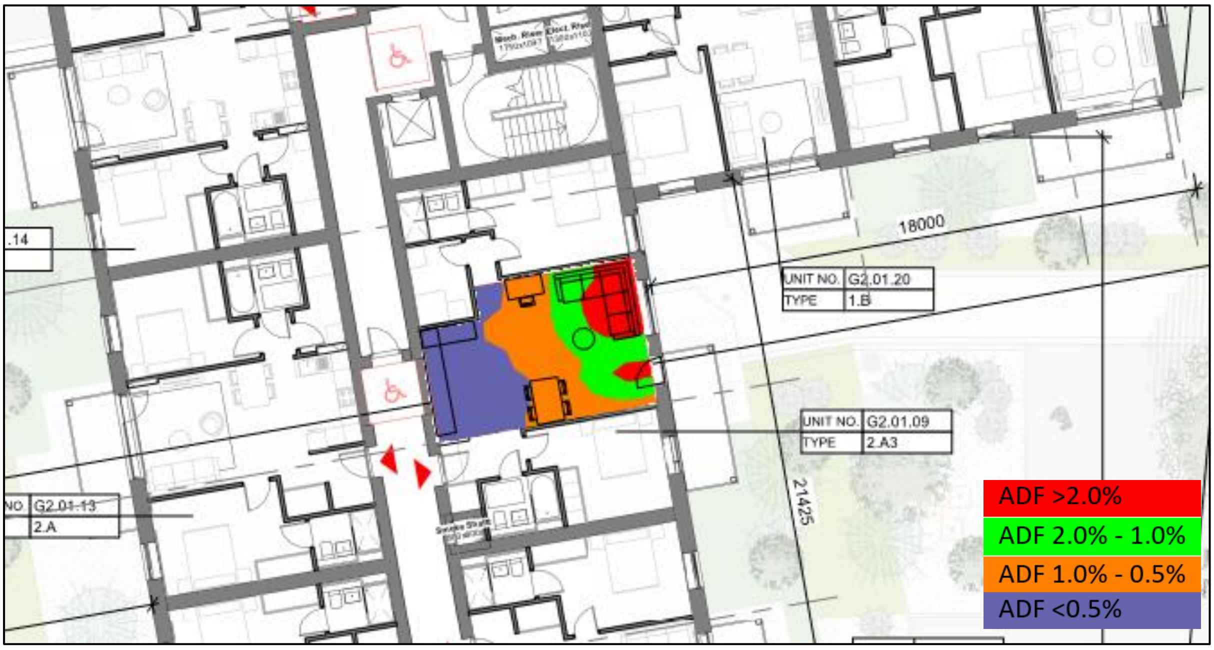
As previously stated, of the 3,241 rooms that comprise the proposed Project, only 70 fall short of the BRE Guidelines and BS 8206 recommendations. Therefore, a 97.8% compliance rate is achieved across the proposed Project.

In order to demonstrate that excellent levels of daylight are achieved in those units falling short of compliance, the following image illustrates the ADF levels being achieved throughout a worst-case living room / kitchen. As expected, daylight levels are excellent within close proximity to the external wall and begin to drop off as you move towards the kitchen area, which is typically located to the rear of the open space.

It should be noted that the apartments within the proposed Project contain a kitchen which is designed to be used mainly for food preparation rather than occupants spending a long time sitting in the kitchen area. Instead, occupants are expected to spend most of their time in the living room area, where daylight penetration will be more appreciated.

Therefore, it can be stated that even though some rooms fall short of the compliance target set, they will still receive excellent levels of daylight within the zone closest to the external wall, where sitting areas are located and where occupants are expected to spend the majority of their time.

Figure 15.27: Block G1/G2/G3 First Floor Level Unit T – 'Worst Case' Living Room – Assessment with ADF Contours



It is worth emphasising again the fact that the guidelines for daylight are not mandatory, as pointed out in the *Sustainable Urban Housing: Design Standards for New Apartments* (2020) (refer to Section 15.2.1).

The proposed Project seeks to deliver a high quality living environment through the provision of high quality open spaces, which residents can enjoy immediately adjacent to their homes, and connected via green networks to surrounding amenity areas. Additionally, the proposed Project provides quality external private open space to all residential units, ensuring maximum opportunities to enjoy their residential living environment.

Properties Adjacent to the Proposed Project

25 ⁰ Line Criteria

In order to analyse any potential impact on the properties adjacent to the proposed Project, a line has been created which is reflective of a 25° angle taken from a horizontal level at 1.6 m above ground to the highest point on the proposed structures.

As illustrated below, the properties located to the west (Ref. 1) of the proposed Project fall outside the 25° line created. Therefore, they are at a substantial distance and the impact will be ***imperceptible***.

The properties to the east (Ref. 2) of the proposed Project fall inside the 25° line and have been selected for VSC analysis (see below). The properties located to the south of the proposed Project (Ref. 3) are subject to a separate SHD application. The daylight / sunlight analysis that was carried out for this separate application (in relation to the GA1 lands) included for the impact of GA3. Therefore, sensitive receptor Ref. 3 was not selected for further analysis as the impact of GA3 has been accounted for within the daylight / sunlight results included within this application.

Figure 15.28: Properties Adjacent to the Proposed Project

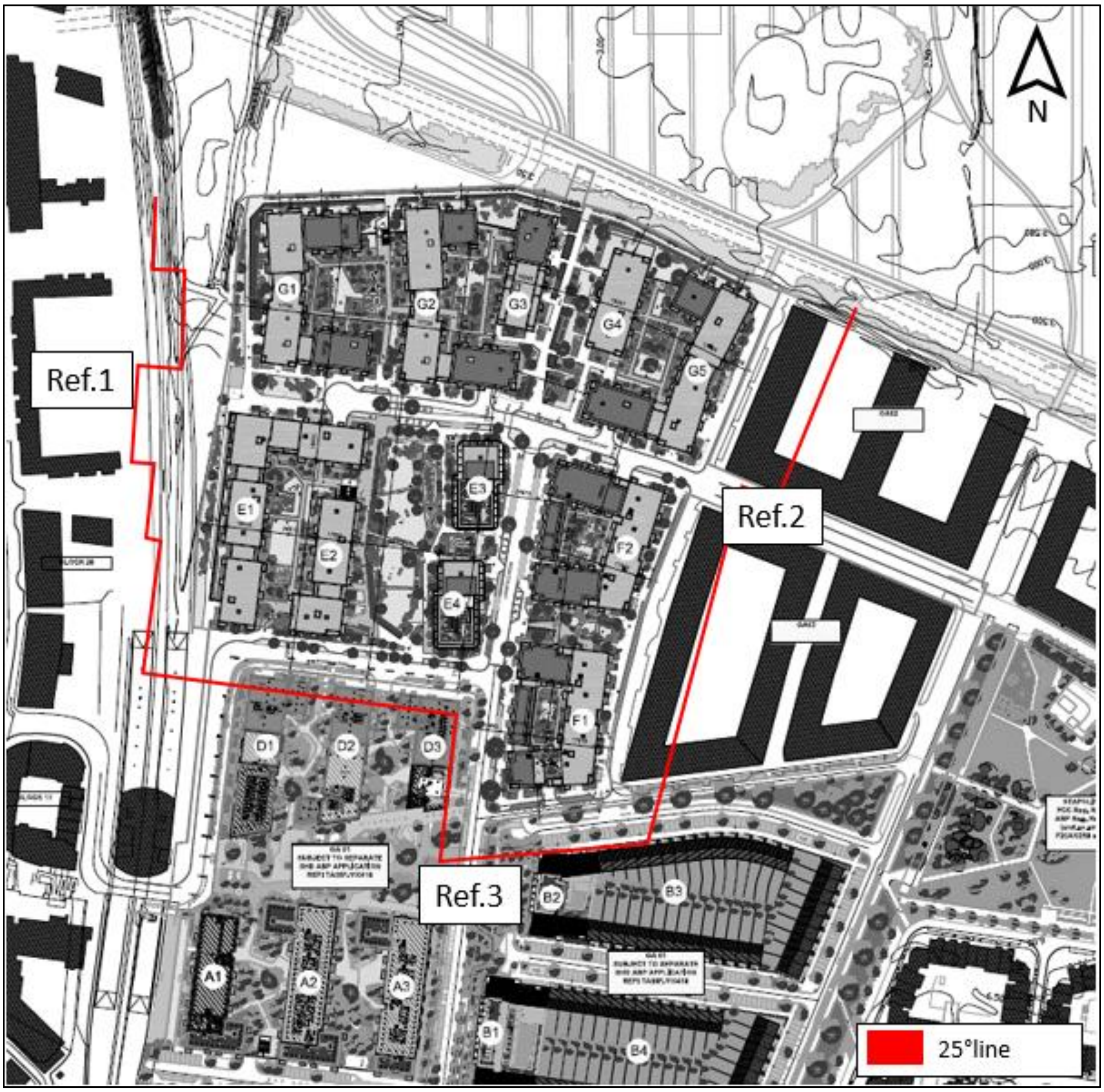


Table 15.27: Sensitive Receptors

Development Ref.	Development Name	Impact Perceived
Ref. 1	Clongriffin Development (DCC Refs.: 2903/16, 3776/15, 2478/17, 4266/16, 2610/16, 3117/16, 4101/16 and 2569/17)	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, ***imperceptible*** impact.
Ref. 2	Growth Area 2 (FCC Reg. Ref. F11A/0290 (/E1), PL06F.239732 – GA2)	The properties to the West of Growth Area 02 development fall inside the 25⁰ line perimeter. This area has been selected for VSC analysis.

Development Ref.	Development Name	Impact Perceived
Ref. 3	GA1 SHD – Site Subject to separate SHD process	A daylight and sunlight EIAR chapter has been carried out for the separate subject application where the impact of GA3 was taken into account within the calculations.

VSC Analysis

As previously outlined, sensitive receptor Ref. 2 falls inside the 25° line and has been selected for VSC analysis. Regents Park Development Ltd. were granted permission on appeal on 11th April 2013 and given a further extension of duration of permission in 2018 (FCC Reg. Ref. F11A/0290/E1) on lands at GA2, as per the Baldoyle-Stapolin LAP. It is understood that a future application will be submitted.

Detailed information on the future development was not available. Therefore, a sample of worst-case windows located at the lower levels were modelled to give a good indication of the daylight impact that will be perceived by sensitive receptor Ref. 2.

Since the VSC with the proposed Project in place is less than 27%, the VSC levels achieved have been compared to a baseline scenario to assess if the reduction of light is in accordance with BRE Guideline recommendations and continues to achieve at least 80% of its former value (baseline) once the proposed Project is in place. When analysing the VSC of the proposed scenario to the existing scenario (empty greenfield), a daylight impact will be perceived for sensitive receptor Ref. 2. This is normal, due to the comparison between an empty site and the construction of any new development. However, the Baldoyle-Stapolin LAP presents a development plan for the site, where it allows for 4 – 4.5 storey buildings within the area. Therefore, the comparison to an empty site would not be a fair approach.

Based on the permitted heights within the Baldoyle-Stapolin LAP, a new baseline has been established for the assessment. The image below illustrates the building heights within the area. The new baseline has been modelled with the same shape and floor to floor height of the proposed development, with the number of storeys recommended within the Baldoyle-Stapolin LAP.

Figure 15.29: Baldoyle-Stapolin Local Area Plan Building Heights

Figure 15.30: Sensitive Receptor Ref. 2– Window References

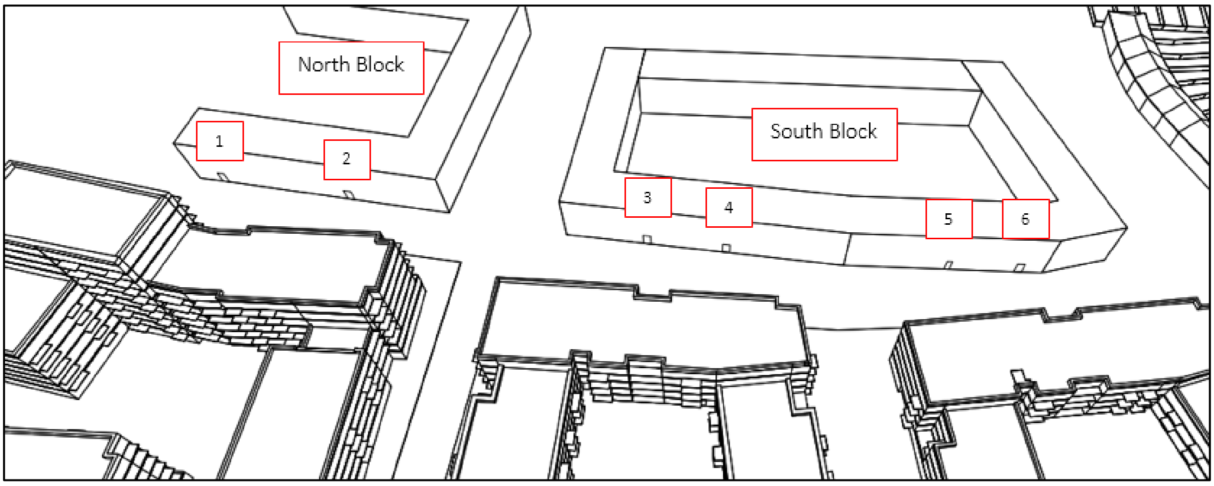


Table 15.28: VSC Results

Window Ref.	VSC received Baldoyle-Stapolin LAP (%)	VSC received once the proposed Project is built (%)	Percentage of its former value (%)	Meets BRE Guidelines VSC>80% of its former value
1	26.5	18.9	71	N
2	26.4	18.6	70	N
3	26.9	21.9	81	Y
4	27	22.5	83	Y
5	25.5	23.3	91	Y
6	23.8	21.5	90	Y

The analysis has shown that an ***imperceptible*** impact will be perceived by the South Block within sensitive receptor Ref. 2 when compared to the Baldoyle-Stapolin LAP. The North Block will perceive a ***not significant*** impact.

15.2.4.3 Cumulative Impacts

In the context of daylight, the long-term cumulative impacts are considered ***imperceptible*** for the 97.8% of rooms within the apartment blocks of the proposed Project, as the daylight assessment has shown that they will comply with the target set out for daylight. The long-term cumulative impacts are considered ***not significant*** for the remaining 2.2% of rooms within the apartment blocks of the proposed Project. In terms of impacts to adjacent buildings, the proposed Project presents only a ***not significant*** impact to the North block of sensitive receptor Ref. 2 with ***imperceptible*** impact to any other adjacent properties in accordance with BRE Guidelines.

15.2.4.4 Do-Nothing Impact

In a Do-Nothing scenario, no buildings will be constructed on the Site and, therefore, the impact will be ***imperceptible*** and ***neutral*** on the adjoining properties and surrounding properties, with existing daylight levels remaining unchanged.

As discussed in Chapter 4 (Consideration of Alternatives), there is also the possibility that, in the event of the proposed Project not being progressed at this Site, that a different development (likely residential) would be progressed at the Site under the scope of a new proposal and application. Since the nature, scale and design of such a hypothetical future development are not known, the associated impacts in terms of daylight and sunlight cannot be assessed.

15.2.5 Mitigation Measures

15.2.5.1 Construction Phase

Since no impacts are predicted in relation to daylight during the construction phase, mitigation measures are not required for this phase.

15.2.5.2 Operational Phase

An ***imperceptible, neutral, long-term*** impact is expected for 97.8% of rooms within apartment blocks of the proposed Project in relation to the daylight levels experienced by the future inhabitants, and to the existing inhabitants of the adjoining sites. A ***not significant, neutral, long-term*** impact is expected for the remaining 2.2% of rooms within apartment blocks of the proposed Project. Therefore no mitigation measures are considered to be required.

15.2.5.3 Worst-case Scenario

Apartment units considered 'worst-case' have been selected for analysis and deemed representative of the apartment units across the proposed Project. These are units at lower levels with less access to daylight. If units at lower levels are compliant with the daylight recommendations, units at upper levels with greater access to daylight will also comply.

15.2.6 Residual Impact

The residual impact will be the same as the impact predicted above, since no mitigation measures are proposed in respect of daylight.

15.2.7 Monitoring

No monitoring is required in relation to daylight during the construction or operational phase.

15.3 Sunlight Access Impact Assessment

15.3.1 Methodology

Similarly to the daylight access impact assessment, the assessment methodology in respect of sunlight access has been based on the Building Research Establishment (BRE) Guidelines on Site Layout Planning for Daylight and Sunlight (the BRE Guide), and impacts have been characterised in accordance with the EPA (2017) draft guidelines (refer to Section 1.6 of Chapter 1 (Introduction)).

In terms of the sunlight impact assessment, two analyses are carried out:

- Annual Probable Sunlight Hours (APSH).
- Sunlight to Open Spaces.

The APSH analysis assessed the amount of sunlight that is received by windows within the proposed Project.

The recommendation set out in the BRE Guidelines state that in order to show that adequate sunlight reaches windows within occupied rooms, the centre of at least one window to a main living room must receive 25% of APSH, including at least 5% of APSH during the winter months, i.e. between 21st September and 21st March.

In relation to the amenity open space, the BRE Guidelines recommend that for an external amenity space to appear adequately sunlit throughout the year, at least half of the garden or amenity space should receive at least two hours of sunlight on March 21st.

In order to analyse the sunlight requirements for the proposed Project, a detailed 3D model was constructed of the entire proposed Project, in the IES VE software package. A number of computer simulations were then undertaken to ascertain the sunlight hours being achieved. An image of the proposed Project taken from the model is illustrated in Figure 15.1.

The sunlight impact analysis has been assessed in respect of the entire proposed Project, as well as the impacts to existing adjacent amenity spaces external to the proposed Project.

To analyse any potential impact to the properties adjacent to the proposed Project, a line has been created which is reflective of a 25° angle taken from a horizontal level at 1.6 m above ground to the highest point on the proposed structures. The properties falling inside this line have been selected for analysis.

15.3.1.1 Existing Dwellings Adjacent to the Site

Identifying Sensitive Receptors

To determine the impact to adjacent buildings, first the key sensitive receptors around the Site need to be identified. According to the BRE Guidelines, sensitive receptors are described as:

- Windows to habitable rooms facing the site where the occupants have a reasonable expectation of daylight; and
- Gardens and open spaces on adjacent properties to the proposed Project, excluding public footpaths, front gardens and car parks.

In accordance with the BRE Guidelines, windows are selected as sensitive receptors on the basis of being a habitable room facing the proposed Project.

In terms of amenities and open spaces, BRE Guidelines outline the need to check the availability of sunlight for all open spaces where it will be required. This would normally include:

- Gardens, usually the main back garden of a house;
- Parks and playing fields;
- Children's playgrounds;
- Outdoor swimming pools and paddling pools;
- Sitting out areas such as those between non-domestic buildings and in public squares; and
- Focal points for views, such as a group of monuments or fountains.

The amenity spaces are selected on the basis of being in the immediate vicinity of the proposed Project. The primary purpose of a daylight, sunlight and overshadowing assessment is to determine the likely loss of light to adjacent buildings resulting from the construction of the proposed Project.

Therefore, in this case, the proposed Project is identified as the potential source of impact. The sensitive receptors identified for this study are windows of habitable rooms facing the Site and within the Site, where the occupants have a reasonable expectation of daylight, as well as open spaces with an expectation of sunlight.

Assessment Criteria for Existing Adjacent Properties

As per the BRE Guidelines, it is important to safeguard the sunlight to nearby buildings, from a proposed Project, where a reasonable expectation of sunlight is required. In order to analyse the sunlight access to surrounding windows the APSH analysis is carried out.

The BRE Guidelines outline that if a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlight of the existing dwelling may be adversely affected, refer to Figure 15.31.

Figure 15.31: BRE Extract of the Methodology for Room Selection – APSH

In the following example when analysing the sunlight impact on the existing windows, no check is required for the proposed extension A and new building C, as they lie within 90° of due north of the window.
Proposed extension B should be checked, as should new building D if it subtends more than 25° to the horizontal, measured in section from the centre of the window. See image on the right.

The sunlight within adjacent properties may be adversely affected if the centre of the window:

- Receives less than 25% of APSH, or less than 5% of APSH between September 21st and March 21st;
- Receives less than 80% of its former sunlight hours during either period; or
- Has a reduction in sunlight received over the whole year greater than 4% of APSH.

It terms of sunlight to surrounding open spaces, the BRE Guidelines state that *"it is recommended that for it to appear adequately sunlit through the year, at least half of a garden or amenity area should receive at least two hours of sunlight on March 21st. If as a results of a new development an existing garden does not meet the above, and the area which can receive two hours of sun on March 21st is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable."*

15.3.2 Characteristics of the Proposed Project

15.3.2.1 Proposed Project

A detailed description of the proposed Project is provided in Chapter 5 (Description of the Proposed Project). Refer also to Figure 15.3, above, which provides a layout of the proposed Project.

15.3.2.2 Existing Adjacent Properties

As part of the analysis, the impact to the existing adjoining properties due to the proposed Project was also analysed. Figure 15.28 in Section 15.2.3.2 illustrates the adjoining buildings to the proposed Project that were analysed and Table 15.29 describes the adjacent buildings.

Table 15.29: Sensitive Receptors

Development Ref.	Development Name	Impact Perceived
Ref. 1	Clongriffin Development (DCC Refs.: 2903/16, 3776/15, 2478/17, 4266/16, 2610/16, 3117/16, 4101/16 and 2569/17)	The distance is substantial from the proposed Project and in compliance with the 25^{o} line criteria. Therefore, imperceptible impact.
Ref. 2	Growth Area 2 (FCC Reg. Ref. F11A/0290 (/E1), PL06F.239732 – GA2)	The properties to the West of Growth Area 02 development fall inside the 25^{o} line perimeter. This area has been selected for APSH analysis.
Ref. 3	GA1 SHD – Site Subject to separate SHD process	A daylight and sunlight EIAR chapter has been carried out for the separate subject application where the impact of GA3 was taken into account within the calculations.

15.3.3 Potential Impacts of the Proposed Project

This section will consider the potential impact of the proposed Project under the following factors:

- Impact of the proposed Project on sunlight levels within the proposed Project and any likely significant effects on the environment; and
- Impact on sunlight levels to the existing adjacent buildings due to the proposed Project and any likely significant effects on the environment.

15.3.3.1 Construction Phase

It is considered that, during the construction phase, there will be no impacts experienced in relation to daylight and sunlight to the proposed Project, and the impact to the existing properties in the adjoining developments will be ***imperceptible*** with ***no short or long-term*** effects.

15.3.3.2 Operational Phase

As previously noted, the performance targets set out in the BRE Guidelines should be used with a degree of flexibility (refer to Section 15.2.2).

It is considered the proposed Project has the potential to achieve high levels of sunlight, given the Site layout and design and generous areas of amenity space. In addition, the absence of adjacent high-rise buildings that could overshadow the proposed Project is a positive for the Site. There will be no impacts experienced to adjacent properties in relation to sunlight due to the proposed Project when compared to the Badoyle-Stapolin LAP and, therefore, the impact to the existing properties in the adjoining development will be ***imperceptible, neutral and long-term***.

Apartments within the Proposed Project (APSH Assessment)

To determine the amount of sunlight that will be received by windows within the proposed Project, the APSH calculation method as outlined in the BRE Guidelines have been used.

The BRE Guidelines state that in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day but especially in the afternoon. The BRE Guidelines also state that sunlight is less important in bedrooms and kitchens; however, all windows to occupied rooms within the proposed Project have been included within the analysis.

The recommendations set out in the BRE Guidelines state that in order to show that adequate sunlight reaches windows within occupied rooms, the centre of at least one window to a main living room must receive 25% of APSH, including at least 5% of APSH during the winter months between 21st September and 21st March.

While the BRE criteria sets out these recommendations for living room windows to receive direct sunlight throughout the year, the guidance set out in the *Design Standards for New Apartments* (Department of Housing, Local Government and Heritage, 2020) states that balconies should adjoin and have a functional relationship with the main living areas of the apartment. They also state that it is preferable that balconies are primarily accessed from living rooms, which can reduce the sunlight being received in some instances.

As the location of balconies have been designed to primarily comply with the apartment design guidelines, the amount of sunlight reaching these living room windows at lower floors will naturally be reduced, and achieving the recommended values within the BRE Guidelines can become challenging. Therefore, in addition to assessing the criteria recommended in the BRE Guidelines, a relaxed value has been set to give further context to the sunlight levels achieved.

The below table summarises the APSH within apartments for the annual period and for the winter period based on the BRE recommendations. Two additional checks with relaxed benchmarks have been carried out to show that the majority of windows still achieve acceptable levels of sunlight across the proposed Project.

Table 15.30: APSH Summary Table – Apartments

	BRE Guidelines Check 1 APSH > 25%	BRE Guidelines Check 2 APSH > 5%	Additional Check 1 APSH > 20%	Additional Check 2 APSH > 15%
	Annual Period	Winter Period	Annual Period	Annual Period
Percentage of Compliance	57%	68%	64%	77%

The results of the analysis show that for the annual period, 57% of the analysed windows achieve the recommended APSH values stated in the BRE Guidelines, while 68% of windows achieve the recommended values during the winter months, when sunlight is more valuable. When a relaxed benchmark of 20% and 15% is applied, 64% and 77% of the analysed windows achieve this alternative value, showing that acceptable levels of sunlight will be achieved across the proposed Project. The shortfall in compliance can be attributed to the projection of balconies and to the north-facing façades.

It should be noted that the results within this chapter should be treated with certain degree of flexibility, based on the following statement in the BRE Guidelines:

> *"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design".*

In addition, BS8206 states that *"the degree of satisfaction is related to the expectation of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".*

The following images illustrate the sunlight levels achieved within the proposed Project showing a colour scale which identifies the percentage of sunlight for the annual period. Please note that while adjacent properties have been included in the analyses, they have been excluded from these images for the sake of clarity.

Figure 15.32: APSH – East Elevation

Figure 15.33: APSH – South Elevation

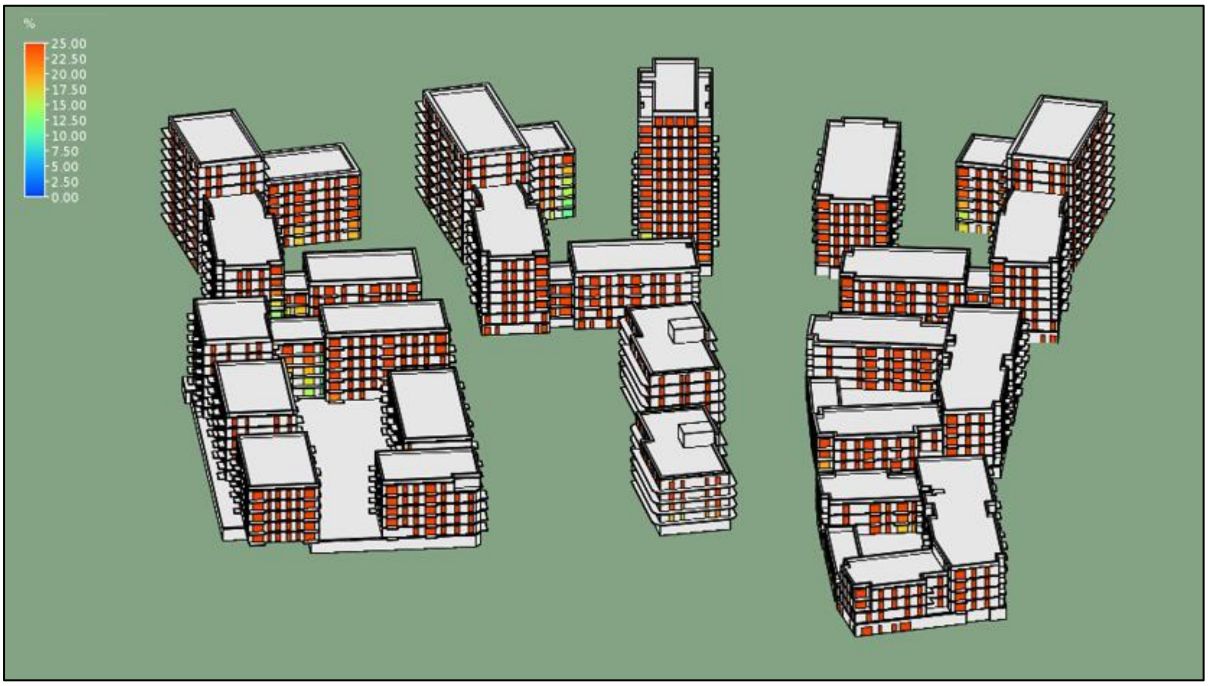


Figure 15.34: APSH - West Elevation

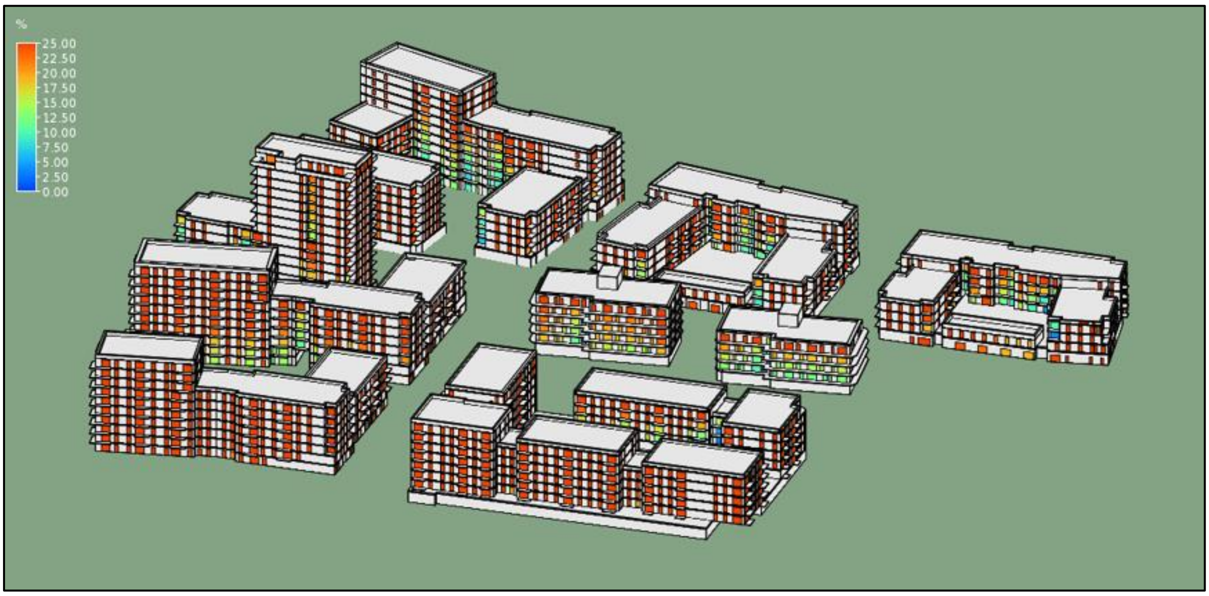
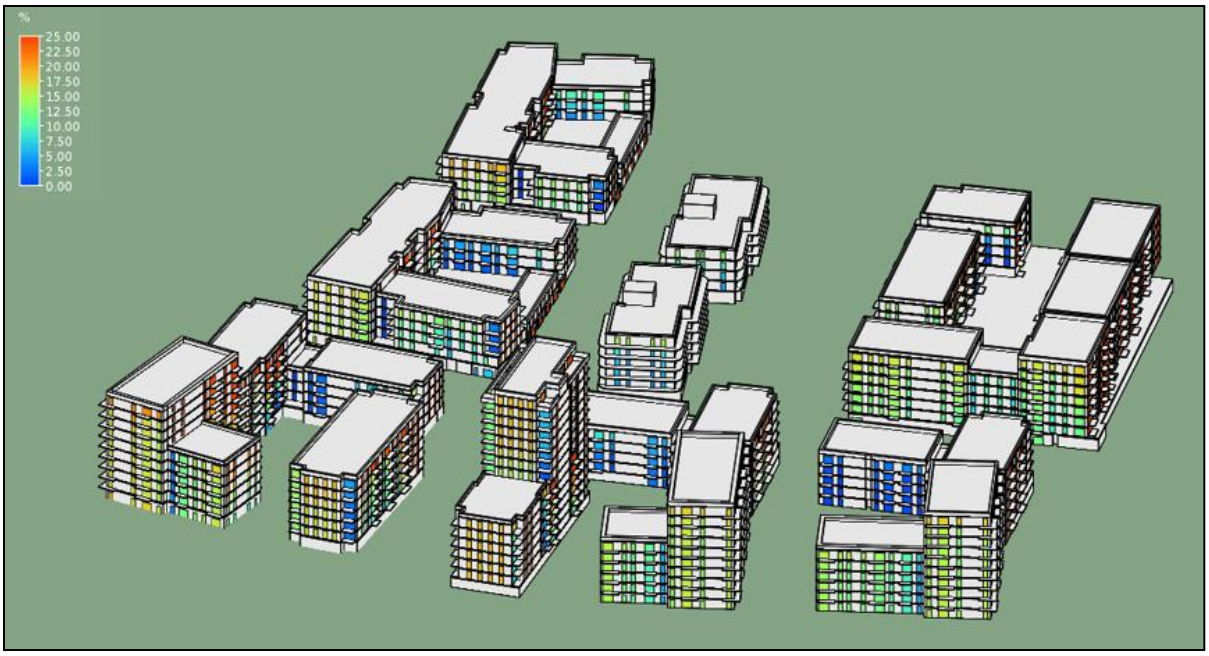


Figure 15.35: APSH – North Elevation



It is important to note that the projection of balconies will impact the sunlight reaching the windows; however, it will provide occupants with an outdoor amenity space that will achieve excellent levels of sunlight.

In addition, the *Design Standards for New Apartments* (Department of Housing, Local Government and Heritage, 2020) outline that if an applicant cannot fully meet all the requirements of the daylight provisions from the BRE Guidelines and BS 8206, compensatory design solutions must be set out. Even though certain windows are falling slightly short of compliance with the APSH due to their location and / or the projection of balconies, the proposed Project has been designed to provide excellent views of high-quality green spaces as well as the provision of high-quality balconies within all apartments.

Amenity Spaces within the Proposed Project

The analysis undertaken for the communal open spaces is illustrated in Figure 15.36. Please note that while adjacent properties have been included in the analyses, they have been excluded from this image for the sake of clarity.

The red squares illustrated represent the areas that will receive two or more hours of sunlight on the 21st March. Table 15.31 outlines the percentage of each amenity area that will receive at least two hours of sunlight on March 21st. All communal amenity spaces will receive the recommended values, with more than 50% of the areas achieving adequate sunlight. Therefore, compliance with BRE Guidelines is achieved in this respect.

Table 15.31: Sunlight Results – Amenity Spaces within the Proposed Project

Garden	Percentage of Area Receiving ≥ 2hours Sunlight on March 21st	Compliant with BRE Guidelines?
Blocks E1/E2/E3/E4 Communal	94%	Y
Block F1 Courtyard	53%	Y
Block F2 Courtyard	50%	Y
Blocks F1/F2 Communal	96%	Y
Blocks G1/G2/G3	78%	Y
Blocks G4/G5	88%	Y

Figure 15.36: Amenity Spaces – Hours of Sunlight on March 21st

BRE Guidelines state that *"if a space is used all year round, the equinox (March 21st) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (September 21st) will be the same as those for March 21st, so a separate set of plots for September is not required. However, clock times for September will be one hour later, because British Summer Times (BST)".*

Based on the recommendations within the BRE Guidelines, March 21st has been used to create the overshadowing images. In addition, overshadowing images for June and December 21st have also been created to give an indication of the sunlight levels that will be received during the summer and winter months.

Figure 15.37: Overshadowing Image on March 21st at 8 a.m. and 9 a.m.

Figure 15.38: Overshadowing Image on March 21st at 10 a.m. and 11 a.m.

Figure 15.39: Overshadowing Image on March 21st at 12 p.m. and 1 p.m.

Figure 15.40: Overshadowing Image on March 21st at 2 p.m. and 3 p.m.

Figure 15.41: Overshadowing Image on March 21st at 4 p.m. and 5 p.m.

Figure 15.42: Overshadowing Image on June 21st at 8 a.m. and 9 a.m.

Figure 15.43: Overshadowing Image on June 21st at 10 a.m. and 11 a.m.

Figure 15.44: Overshadowing Image on June 21st at 12 p.m. and 1 p.m.

Figure 15.45: Overshadowing Image on June 21st at 2 p.m. and 3 p.m.

Figure 15.46: Overshadowing Image on June 21st at 4 p.m. and 5 p.m.

Figure 15.47: Overshadowing Image on June 21st at 6 p.m. and 7 p.m.

Figure 15.48: Overshadowing Image on December 21st at 10 a.m. and 11 a.m.

Figure 15.49: Overshadowing Image on December 21st at 12 p.m. and 1 p.m.

Figure 15.50: Overshadowing Image on December 21st at 2 p.m. and 3 p.m.

In addition to the sunlight analysis on March 21st and the overshadowing images, a monthly assessment has been carried out for the communal open spaces in response to the ABP request, as follows:

> *"A month-by-month assessment of average daylight hours within the public open space should be provided within the daylight and sunlight analysis document to allow for a full understanding of the year round level of overshadowing of the primary outdoor recreation areas for the development should be submitted."*

As previously stated, the communal amenity areas are in compliance with BRE Guidelines criteria, achieving 2 hours or more of sunlight on March 21st on at least 50% of the proposed open spaces. The additional assessment has also shown that excellent levels of sunlight will be achieved across all communal open spaces during the whole year. January, February, October, November and December show some open spaces which do not achieve the 2 hours on sunlight on at least 50% of the area. This is normal due to the lower position of the sun during the winter months. It should be noted that BRE Guidelines only set out recommendations for March 21st since this day gives an average level of shadowing for the year; therefore, the values for the other months should be regarded as additional information.

Figure 15.51: Sunlight Analysis January 21st

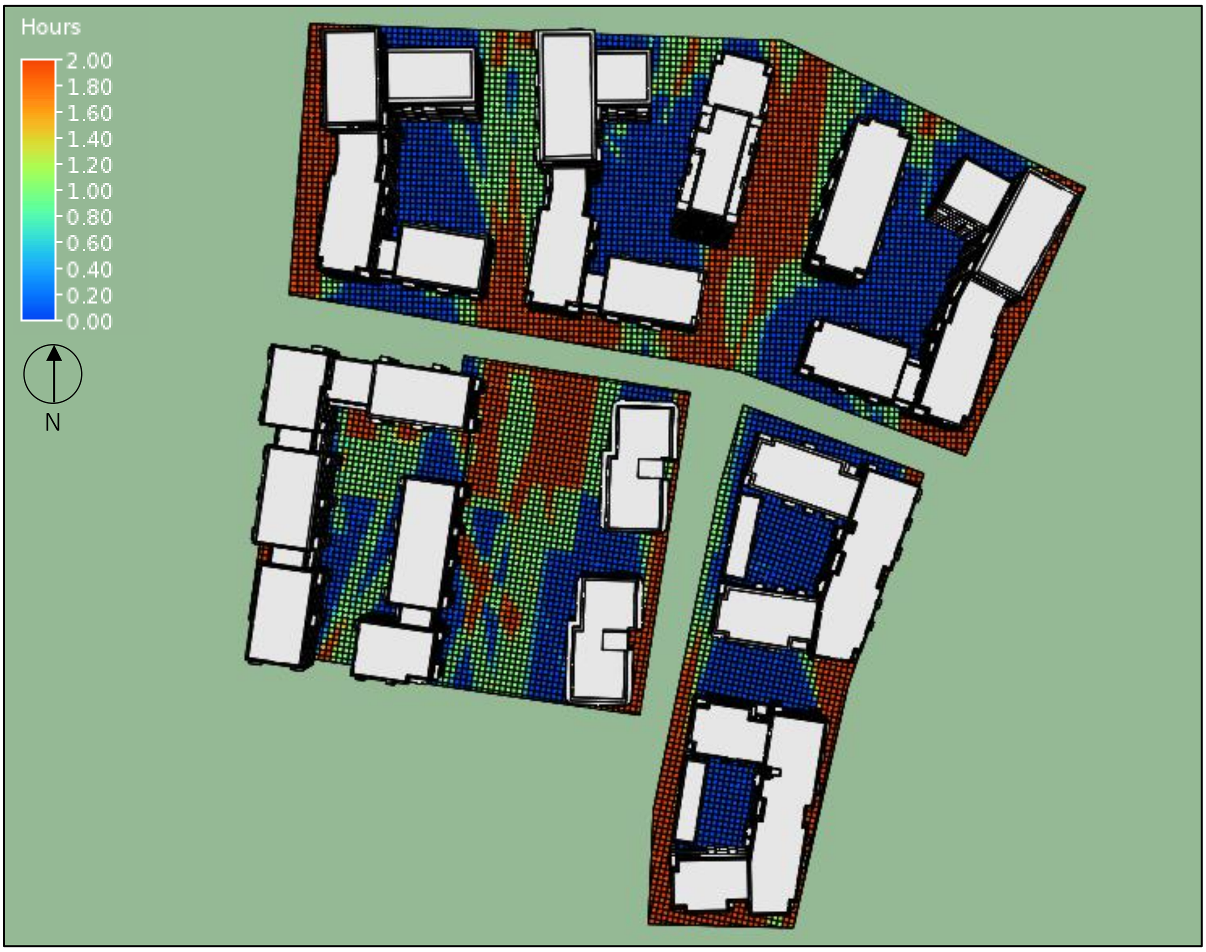


Figure 15.52: Sunlight Analysis February 21st

Figure 15.53: Sunlight Analysis March 21st

Figure 15.54: Sunlight Analysis April 21st

Figure 15.55: Sunlight Analysis May 21st

Figure 15.56: Sunlight Analysis June 21st

Figure 15.57: Sunlight Analysis July 21st

Figure 15.58: Sunlight Analysis August 21st

Figure 15.59: Sunlight Analysis September 21st

Figure 15.60: Sunlight Analysis October 21st

Figure 15.61: Sunlight Analysis November 21st

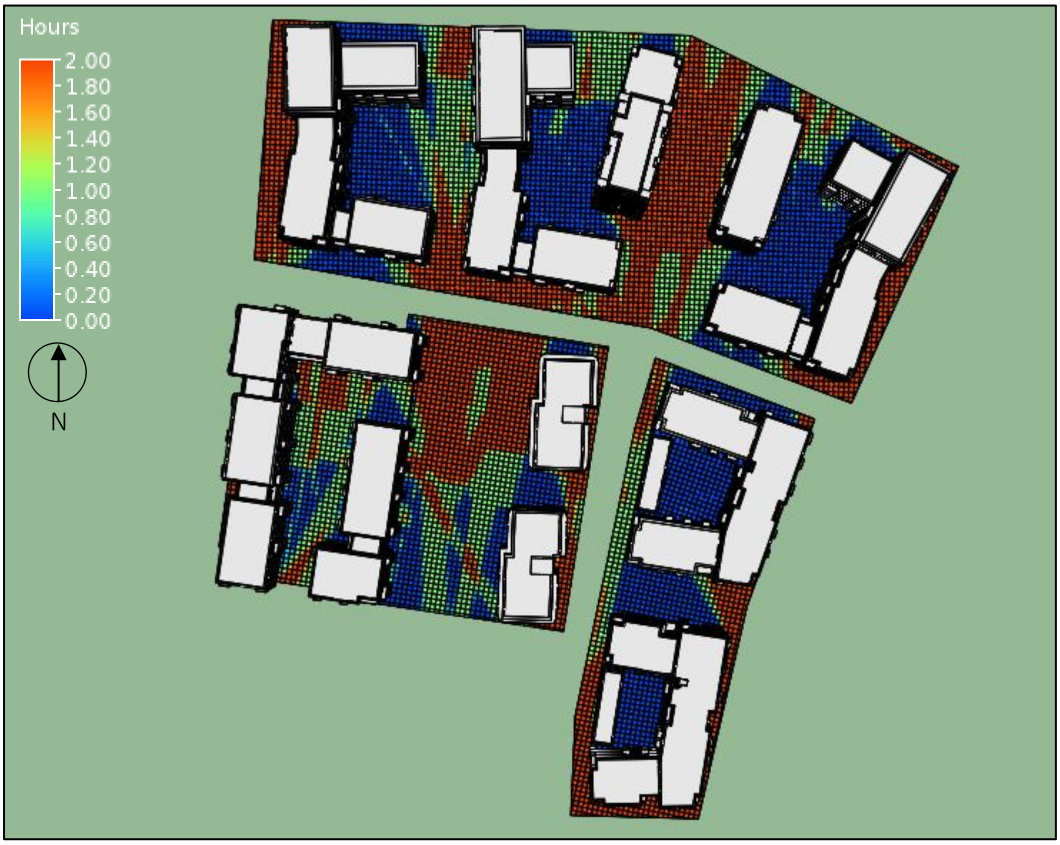
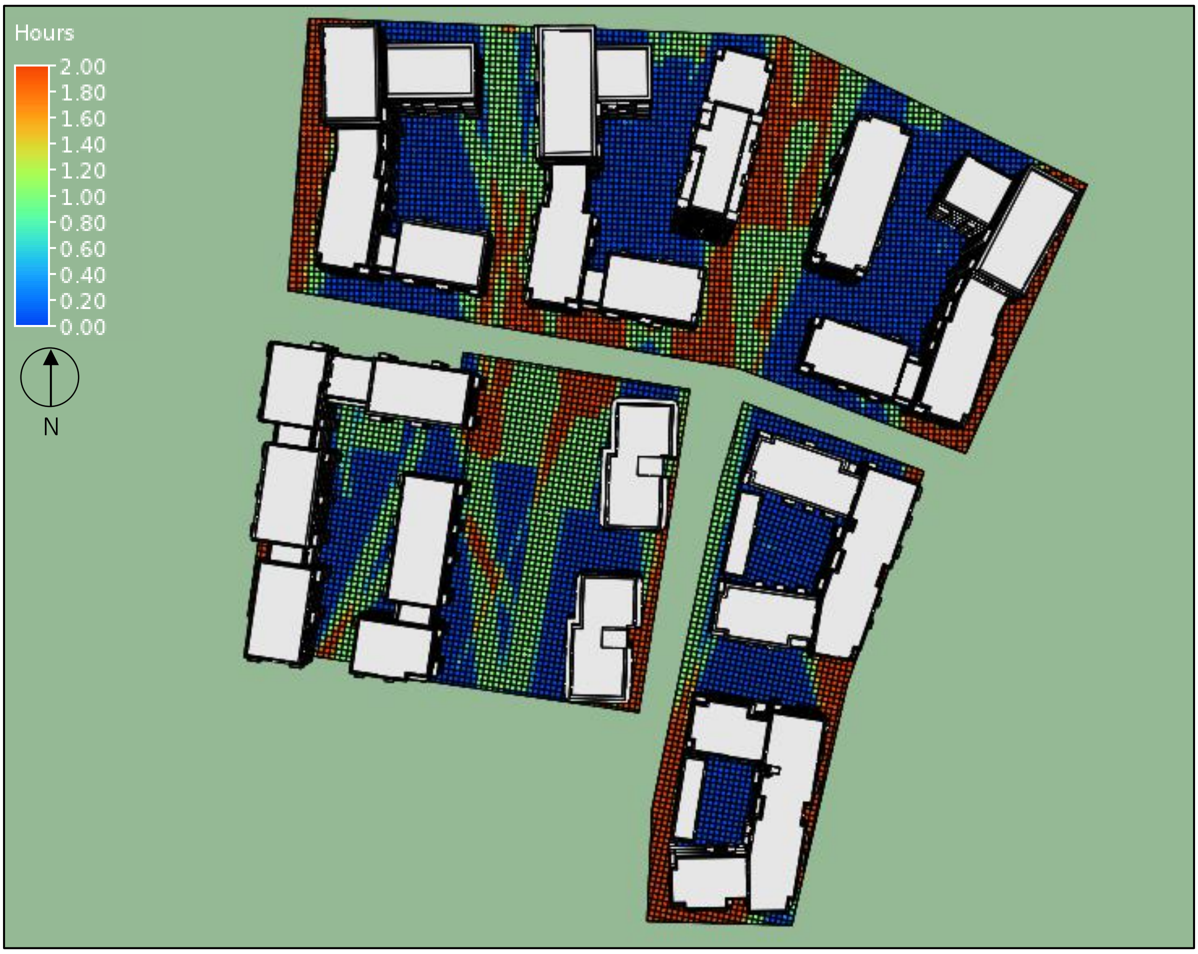


Figure 15.62: Sunlight Analysis December 21st



Adjacent Properties from the Proposed Project (APSH Assessment)

As previously outlined, the adjacent properties within sensitive receptor Ref. 1 are outside the 25° line criteria; therefore, they are at a substantial distance from the proposed Project and the impact will be ***imperceptible***. Sensitive receptor Ref. 3 is subject to a separate planning application (GA2). Further assessment was not required for sensitive receptor Ref. 3 since a daylight and sunlight EIAR chapter has been carried out for the separate application, where the impact of the proposed Project (GA3) has been taken into account within the calculations.

The following table outlines the results achieved for sensitive receptor Ref. 2.

Figure 15.63: Sensitive Receptor Ref.2 – Window References

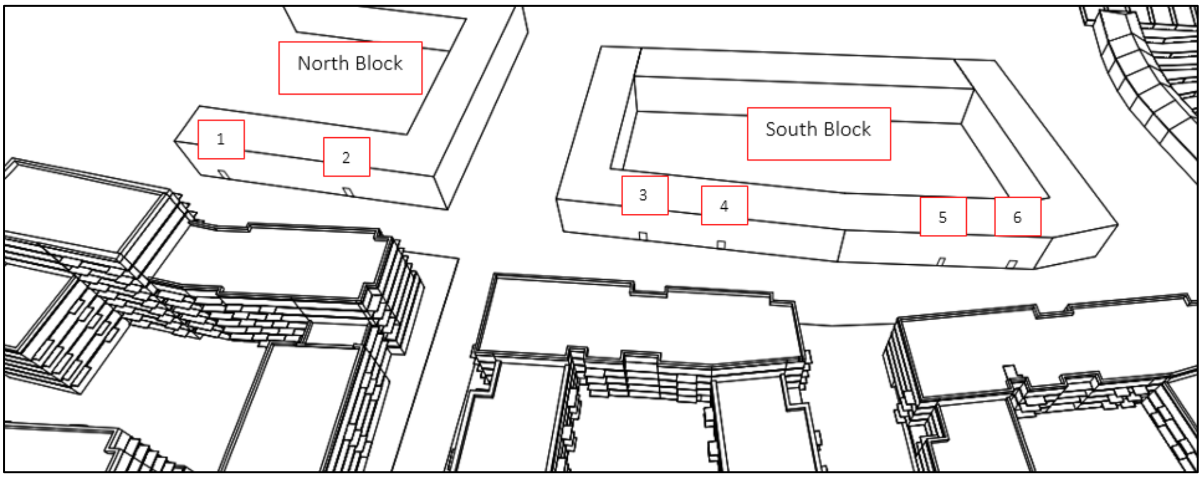


Table 15.32: APSH Results

Window Ref.	APSH received Baldoyle-Stapolin LAP (%)		APSH received once the proposed Project is built (%)		Percentage of its former value (%)	
	Annual	Winter (Sep 21st – Mar 21st)	Annual	Winter (Sep 21st – Mar 21st)	Annual	Winter (Sep 21st – Mar 21st)
1	19.8	NA [4]	17.0	5.5	86	NA [68]
2	20.4	NA [4]	17.1	5.6	84	NA [4]
3	21.9	NA [4]	19.6	7.0	89	NA [4]
4	21.4	NA [4]	17.3	5.6	81	NA [4]
5	18.1	NA [4]	17.7	6.2	98	NA [4]
6	18.5	NA [4]	18.1	5.7	98	NA [4]

Since the APSH for the annual period with the proposed Project in place is less than 25%, the APSH levels achieved have been compared to a baseline scenario to assess if the reduction of sunlight is in accordance with BRE Guideline recommendations and continues to achieve at least 80% of its former value (baseline) once the proposed Project is in place.

When analysing the APSH of the proposed scenario to the existing scenario (empty greenfield) a sunlight impact is expected for sensitive receptor Ref. 2. This is normal due to the comparison between an empty site and the construction of any new development. However, as previously outlined, the Baldoyle-Stapolin LAP presents a development plan for the site, where it allows

[68] Achieves the minimum recommended value with the proposed project in place, therefore, it is not required to calculate the reduction from its former value.

for 4 to 4.5 storey buildings within the area. Therefore, the comparison to an empty site would not be a fair approach.

The analysis has shown that there will be an ***imperceptible*** impact on sensitive receptor Ref. 2 when compared to the Baldoyle-Stapolin LAP.

15.3.3.3 Cumulative Impacts

In the context of sunlight, the long-term cumulative impacts are considered ***not significant*** as the sunlight assessment has shown that acceptable sunlight levels within windows are achieved and that ***imperceptible*** impact will be received by adjoining properties. Open spaces provided as part of the proposed Project and open spaces to adjacent properties comply with the BRE Guidelines for sunlight.

15.3.3.4 Do-Nothing Impact

In a Do-Nothing scenario, the existing level of sunlight access to the buildings will remain unchanged, i.e. the impact would be ***neutral***.

As discussed in Chapter 4 (Consideration of Alternatives), there is also the possibility that, in the event of the proposed Project not being progressed at this Site, that a different development (likely residential) would be progressed at the Site under the scope of a new proposal and application. Since the nature, scale and design of such a hypothetical future development are not known, the associated impacts in terms of daylight and sunlight cannot be assessed.

15.3.4 Mitigation Measures

15.3.4.1 Construction Phase

Since no impacts are predicted in relation to daylight during the construction phase, mitigation measures are not required for this phase.

15.3.4.2 Operational Phase

Imperceptible impacts are expected in relation to the sunlight levels experienced by the future inhabitants of the proposed Project. ***Imperceptible*** or ***not significant*** impacts are expected to the existing inhabitants of the adjoining sites, therefore no remedial or reductive measures are required.

15.3.4.3 Worst-case Scenario

All windows within the apartments have been assessed in respect to sunlight and, therefore, all scenarios (including worst-case) have been presented. In relation to sunlight to open spaces, all common open spaces have been analysed; therefore, all scenarios (including worst-case) have been presented.

15.3.5 Residual Impact

The residual impact will be the same as the impact predicted above, since no mitigation measures are proposed in respect of daylight.

15.3.6 Monitoring

No ongoing monitoring is required in relation to sunlight during the construction or operational phase.

15.3.7 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered in relation to the daylight or sunlight assessment. OCSC has confidence the three-dimensional model used in the assessment of the impact of the proposed Project on daylight access and sunlight access achieves a high degree of accuracy.

15.4 Interactions

No noteworthy interactions were identified where daylight or sunlight is the receptor. Refer to Chapter 20 (Interactions) for an overview of the interactions between environmental topics addressed in this EIAR.

15.5 References

- Building Research Establishment (BRE). *Guidelines on Site Layout Planning for Daylight and Sunlight.*
- British Standard BS 8206: Part 2: (BS8206-02). *Lighting for Buildings. Code of practice for Daylight.*
- Department of Environment, Heritage and Local Government (2009). *Sustainable Residential Development in Urban Areas*.
- Department of Housing, Planning and Local Government (DHPLG) (2020). *Sustainable Urban Housing: Design Standards for New Apartments.*

- Environmental Protection Agency (EPA) (2017). *Draft Guidelines on the Information to be Contained in EIARs.*
- Fingal County Council (2017). *Fingal County Development Plan (2017 – 2023)*.
- Government of Ireland (2018). *Urban Development and Building Heights – Guidelines for Planning Authorities*

16 Microclimate – Wind

16.1 Introduction

This Chapter of the EIAR has been prepared by Dr. Cristina Paduano, Dr. Patrick Okolo and Dr. Arman Safdari of B-Fluid (Buildings Fluid-Dynamics) Ltd.

Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics (CFD) applications for urban environment and the construction industry with over 15 years of experience. She holds a PhD in Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering.

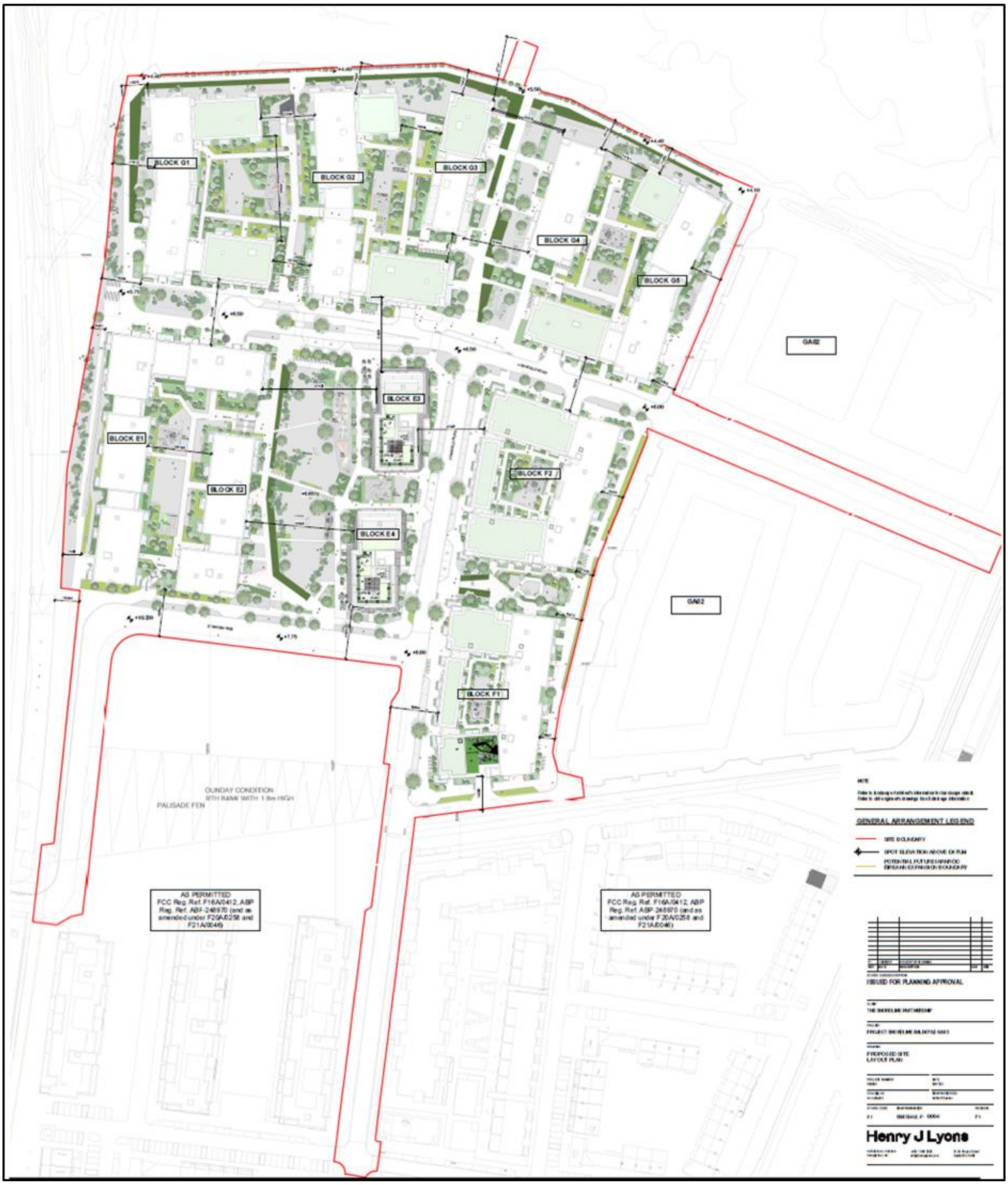
Dr. Patrick Okolo is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in CFD applications and in wind tunnel measurements for the urban environment, aerospace and automotive industry. He holds a PhD in Aeroacoustics from Trinity College Dublin, a M.Sc. and B.Sc. in Mechanical Engineering.

Dr. Arman Safdari is a CFD Modelling Engineer who specialises in CFD applications. He is an expert in airflow modelling, heat and mass transfer and multi-phase flow simulations. He holds a PhD in Mechanical Engineering from Pusan National University, a M.Sc. and B.Sc. in Mechanical Engineering.

This Chapter assesses the impact of the proposed Project on the wind conditions and microclimate affecting activities in areas within and surrounding the Site.

The wind and microclimate study comprises lands referred to as Growth Area 3 (GA3) within the Baldoyle-Stapolin Local Area Plan. The lands are bound by the Dublin-Belfast / DART train line to the west existing and proposed residential areas to the south and east, and future Racecouse Park to the north. Figure 16.1 shows a view of the proposed Project.

Figure 16.1: The Proposed Project



Wind and Micro-climate study identifies the possible wind patterns in the existing environment and the Site of the proposed Project, under mean and peak wind conditions typically occurring in Dublin. In this case, the wind assessment has considered the proposed Project in the context of existing and permitted development, including the adjacent permitted GA1 development with blocks under construction (FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and F21A/0046), the adjacent permitted GA2 development (FCC Reg.F11A/0290/E1), and Clongriffin Strategic Housing Developments (existing and permitted; refer to Section 3.6 of Chapter 3 – Planning & Development Context), as shown in Figure 16.2 (the 'existing scenario', for the purposes of this assessment); furthermore, the proposed Project in the context of proposed development (the ' cumulative scenario', for the purposes of this assessment) where development at GA1 is delivered as proposed (i.e. with amendments proposed as per ABP GA1 TA06F.310418), as shown in Figure 16.3. The Figures 16.4 and 16.5 show isometric views of blocks of proposed Project at GA3.

Figure 16.2: Proposed Project in Existing and Permitted Scenario

Figure 16.3: Proposed Project in Existing, Permitted & Proposed (Cumulative) Scenario

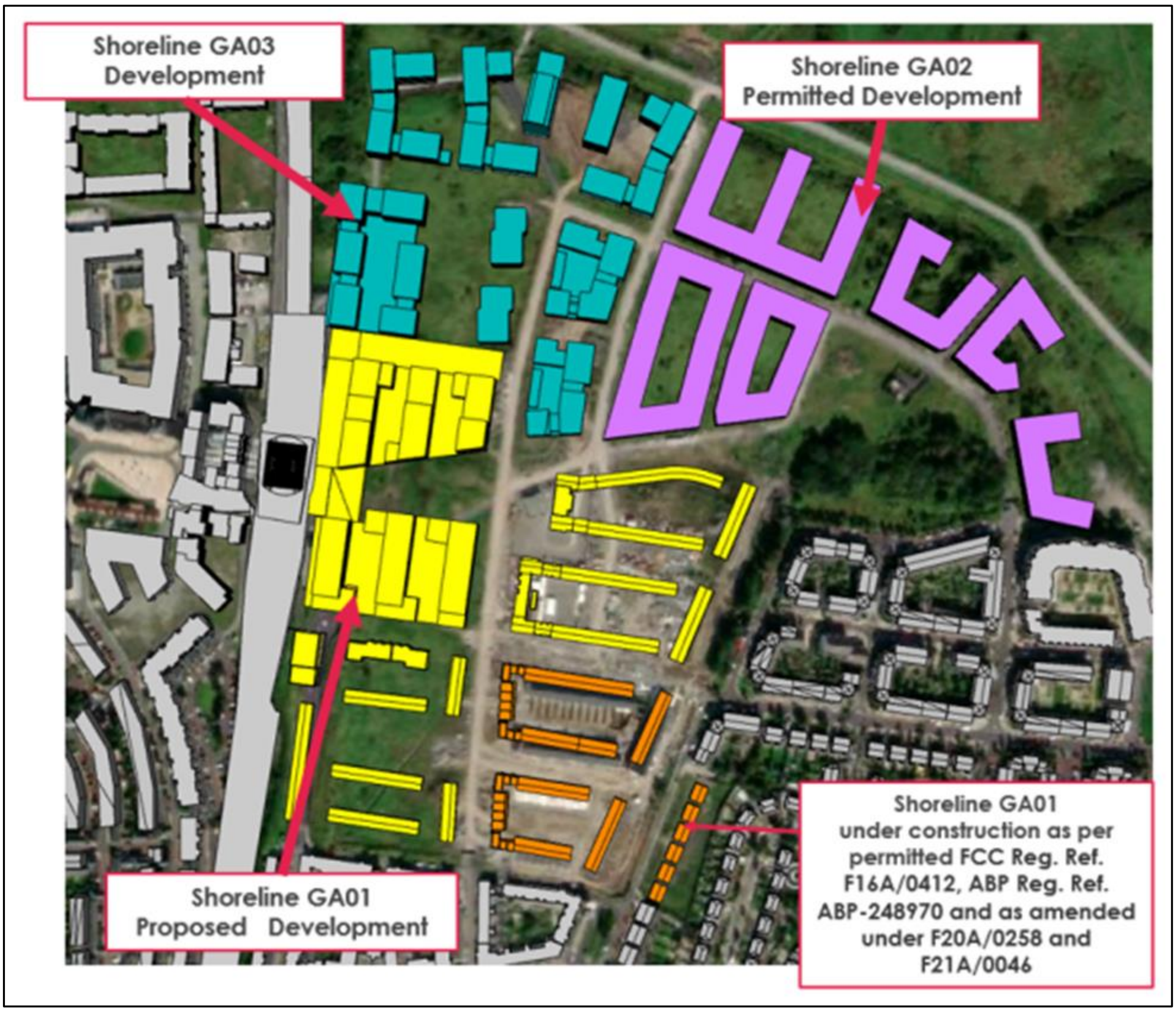


Figure 16.4: Proposed Project – Blocks as Modelled[69]

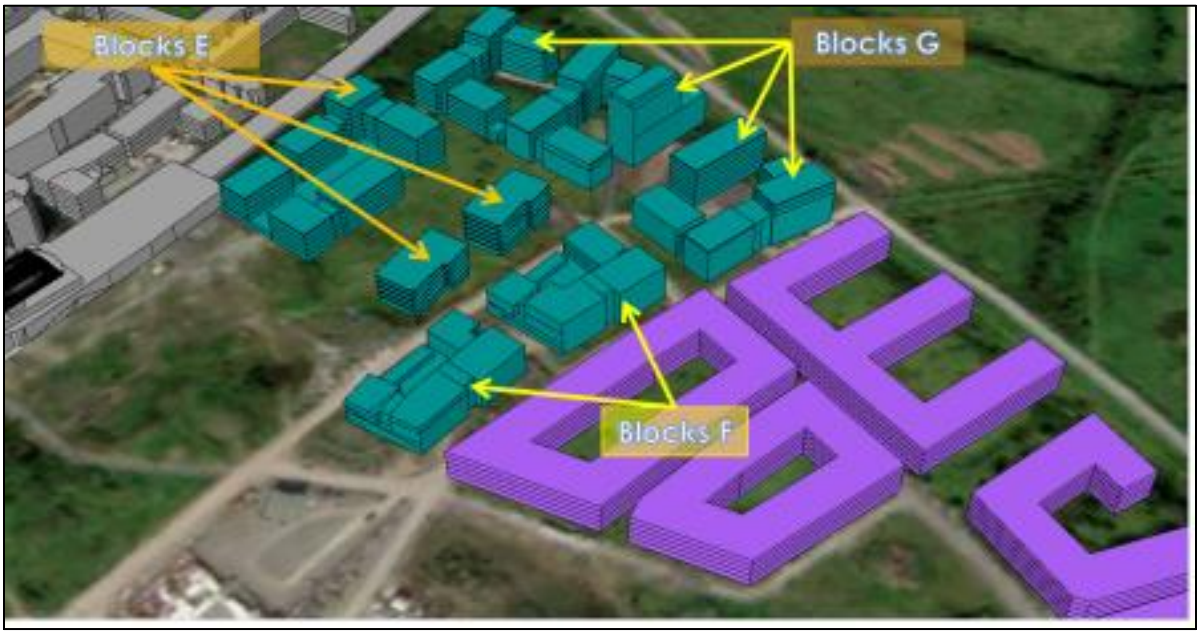
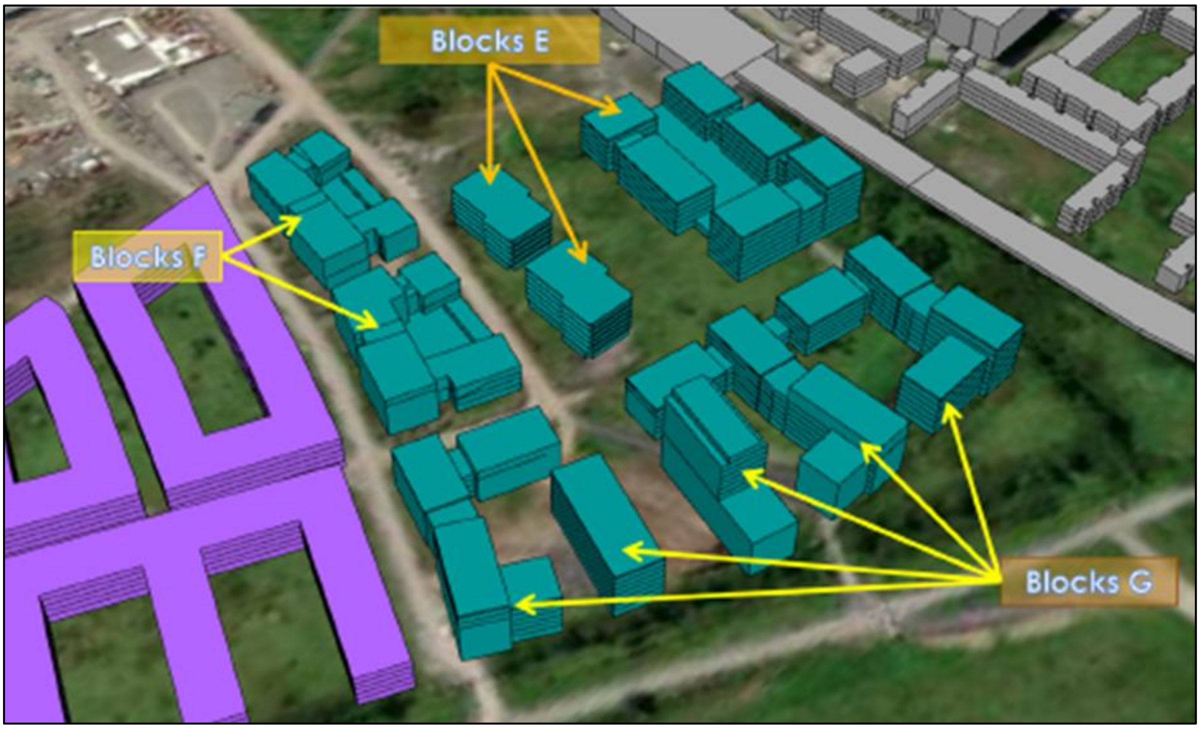


Figure 16.5: Proposed Project – Blocks as Modelled[69]



[69] Note that blocks of existing / permitted development at GA2 and Clongriffin are also shown.

This assessment has been performed using Advanced CFD Modelling, a numerical method used to simulate wind conditions and their impact on the proposed Project, and to identify areas of concern in terms of downwash / funnelling / downdraft / critical flow accelerations that may likely occur. The Advanced CFD numerical algorithms applied here are solved using high speed supercomputing computer clusters.

These results have been used by the design team to configure the optimal layout for the proposed Project, with the aim of achieving a high-quality environment for the scope of use intended for each area / building (i.e. comfortable and pleasant for pedestrian use), and to avoid introducing any critical wind impact on the surrounding areas or existing buildings.

The next sections describe in detail the wind and microclimate modelling performed, the methodology and assumptions that B-Fluid Ltd has adopted for this study, together with the impacts of the proposed Project on the existing environment in terms of wind.

16.1.1 Objective of Wind and Microclimate Modelling

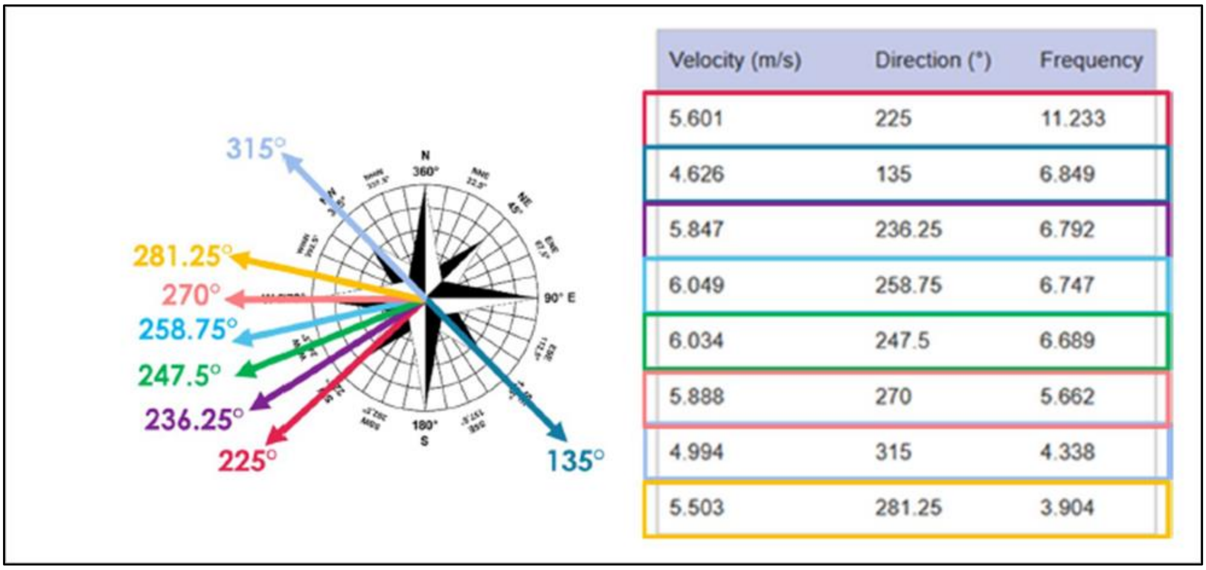
CFD wind modelling is adopted to identify areas of concern in terms of critical flows and areas where pedestrian safety and comfort could be compromised. Pedestrian wind comfort and safety studies are conducted to predict, assess, and (where necessary) mitigate the impact of residential development on pedestrian level wind conditions. The objective is to maintain comfortable and safe pedestrian level wind conditions that are appropriate for the season and the intended use of pedestrian areas. Pedestrian areas include side-walks, street frontages, pathways, building entrance areas, open spaces, amenity areas, outdoor seating areas, and accessible rooftop areas, among others.

For this purpose, 18 no. different wind scenarios and directions have been modelled, as shown in Table 16.1, in order to take into consideration all the different relevant wind directions. A total of 18 no. compass directions on the wind rose have been selected. For each direction, the reference wind speed has been set to the 5% exceedance wind speed for that direction, i.e. the wind speed that is exceeded for over 5% of the time whenever that wind direction occurs. This modelling study has focused on reporting the eight worst case and most relevant wind speeds, which are the speeds and directions showing the most critical wind speeds relevant to the proposed Project. The modelled scenarios reported in this study are presented in Figure 16.6.

Table 16.1: Summary of the 18 No. Wind Scenarios Modelled for the Proposed Project

Velocity (m/s)	Direction (degrees)	Frequency
5.601	225	11.233
4.626	135	6.849
5.847	236.25	6.792
6.049	258.75	6.747
6.034	247.5	6.689
5.888	270	5.662
4.994	315	4.338
5.503	281.25	3.904
4.974	292.5	3.436
5.357	213.75	3.288
4.736	123.75	3.105
4.406	146.25	2.751
5.101	303.75	2.648
5.246	112.5	2.500
4.121	157.5	2.386
4.581	101.25	2.340
4.169	45	2.180
3.558	90	2.135

Figure 16.6: Summary of Eight Wind Scenarios Reported



Velocity (m/s)	Direction (°)	Frequency
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6.049	258.75	6.747
6.034	247.5	6.689
5.888	270	5.662
4.994	315	4.338
5.503	281.25	3.904

16.1.2 National Policy

Good wind microclimate conditions are necessary for creating outstanding public spaces. Adverse wind effects can reduce the quality and usability of outdoor areas, and lead to safety concerns in extreme cases.

According to *Urban Development and Building Heights – Guidelines for Planning Authorities* (Government of Ireland, 2020), specific impact assessment of the microclimatic effects should be performed for *"buildings taller than prevailing building heights in urban areas"* (p. 13), where standard building height is considered to be 6 – 8 storeys. Above this height, buildings are considered 'taller', by Dublin standards. Usually, the recommended approach to wind microclimate studies is based on building height, as prescribed by the *Wind Microclimate Guidelines for Developments in the City of London* (City of London, 2019) (Figure 16.7).

Figure 16.7: Recommended Approach to Wind Microclimate Studies based on Building Height (City of London, 2019)

Building Height	Recommended Approach to Wind Microclimate Studies
Similar or lower than the average height of surrounding buildings **Up to 25m**	Wind studies are not required, unless sensitive pedestrian activities are intended (e.g. around hospitals, transport hubs, etc.) or the project is located on an exposed location
Up to double the average height of surrounding buildings **25m to 50m**	Computational (CFD) Simulations **OR** Wind Tunnel Testing
Up to 4 times the average height of surrounding buildings **50m to 100m**	Computational (CFD) Simulations **AND** Wind Tunnel Testing
High Rise **Above 100m**	**Early Stage Massing Optimization:** Wind Tunnel Testing OR Computational (CFD) Simulations **Detailed Design:** Wind Tunnel Testing **AND** Computational (CFD) Simulations to demonstrate the performance of the final building design

16.2 Methodology

16.2.1 Study Methodology

16.2.1.1 Acceptance Criteria

Pedestrian wind comfort is measured as a function of the frequency of wind speed threshold exceeded based on the pedestrian activity. The assessment of pedestrian level wind conditions requires a standard against which measured or expected wind velocities can be compared.

Only gust winds are considered in the safety criterion. These are usually rare events but deserve special attention in city planning and building design due to their potential impact on pedestrian safety. Gusts cause the majority of cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 to obtain the 'gust equivalent mean' (GEM) speeds that are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

The following criteria are widely accepted by municipal authorities as well as the international building design and city planning community:

- *Discomfort Criteria:*

  Relates to the activity of the individual. Onset of discomfort: depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM), which is exceeded for 5% of the time.

- *Distress Criteria:*

  Relates to the physical well-being of the individual. Onset of distress:

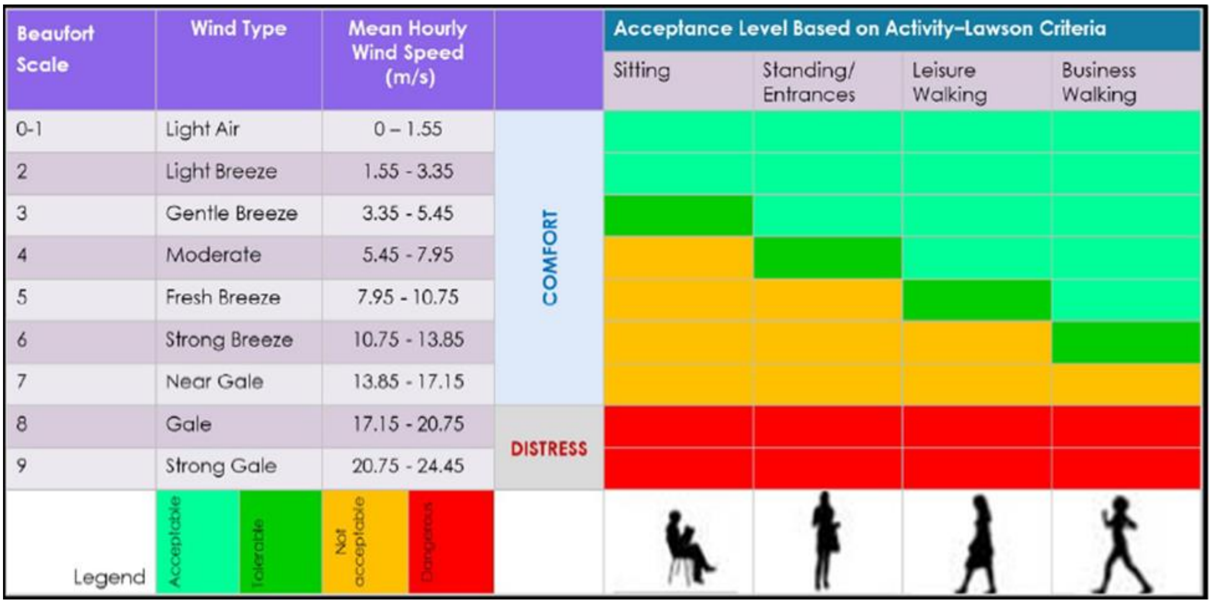
  - 'Frail Person Or Cyclist': equivalent to an hourly mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. This is intended to identify wind conditions that less able individuals or cyclists may find physically difficult. Conditions in excess of this limit may be acceptable for optional routes and routes that less physically able individuals are unlikely to use.
  - 'General Public': A mean speed of 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed, aerodynamic forces approach body weight and it rapidly becomes impossible for anyone to

remain standing. Where wind speeds exceed these values, pedestrian access should be discouraged.

The above criteria set out six pedestrian activities and note that calm activity requires calm wind conditions, which are summarised by the Lawson scale, shown in Figure 16.8. The Lawson scale assesses pedestrian wind comfort in absolute terms and defines the reaction of an average person to wind. Each wind type is associated with a number, corresponding to the Beaufort scale, represented in Figure 16.9. The Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. A 20% exceedance is used in these criteria to determine the comfort category, which suggests that wind speeds would be comfortable for the corresponding activity at least 80% of the time or four out of five days.

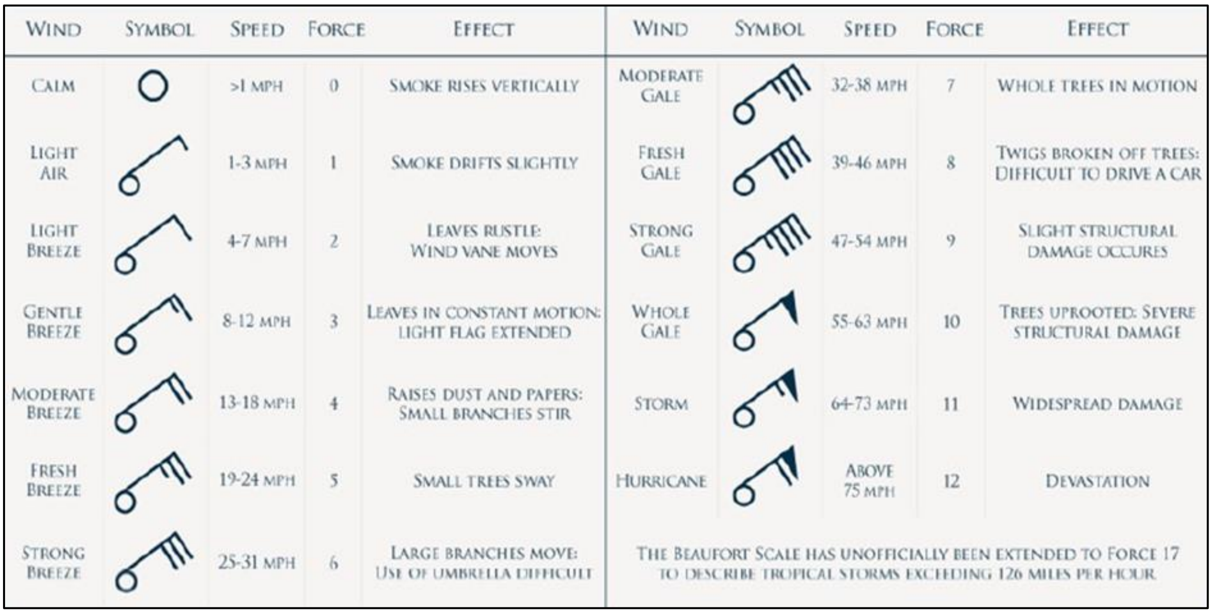
These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, etc., which can all affect a person's perception of a local microclimate. Moreover, pedestrian activity alters between winter and summer months. The criteria assume that people will be suitably dressed for the time of year and individual activity. It is reasonable to assume, for instance, that areas designated for outdoor seating will not be used on the windiest days of the year. Weather data measured are used to calculate how often a given wind speed will occur each year over a specified area. Pedestrian comfort criteria are assessed at 1.5 m above ground level. Unless in extremely unusual circumstances, velocities at pedestrian level increase with height above ground level.

Figure 16.8: Lawson Scale



Beaufort Scale	Wind Type	Mean Hourly Wind Speed (m/s)		Acceptance Level Based on Activity-Lawson Criteria			
				Sitting	Standing/ Entrances	Leisure Walking	Business Walking
0-1	Light Air	0 – 1.55	COMFORT				
2	Light Breeze	1.55 - 3.35					
3	Gentle Breeze	3.35 - 5.45					
4	Moderate	5.45 - 7.95					
5	Fresh Breeze	7.95 - 10.75					
6	Strong Breeze	10.75 - 13.85					
7	Near Gale	13.85 - 17.15					
8	Gale	17.15 - 20.75	DISTRESS				
9	Strong Gale	20.75 - 24.45					
Legend	Acceptable / Tolerable	Not acceptable / Dangerous					

Figure 16.9: Beaufort Scale



Wind	Symbol	Speed	Force	Effect	Wind	Symbol	Speed	Force	Effect
Calm		>1 mph	0	Smoke rises vertically	Moderate Gale		32-38 mph	7	Whole trees in motion
Light Air		1-3 mph	1	Smoke drifts slightly	Fresh Gale		39-46 mph	8	Twigs broken off trees: Difficult to drive a car
Light Breeze		4-7 mph	2	Leaves rustle: Wind vane moves	Strong Gale		47-54 mph	9	Slight structural damage occures
Gentle Breeze		8-12 mph	3	Leaves in constant motion: Light flag extended	Whole Gale		55-63 mph	10	Trees uprooted: Severe structural damage
Moderate Breeze		13-18 mph	4	Raises dust and papers: Small branches stir	Storm		64-73 mph	11	Widespread damage
Fresh Breeze		19-24 mph	5	Small trees sway	Hurricane		Above 75 mph	12	Devastation
Strong Breeze		25-31 mph	6	Large branches move: Use of umbrella difficult	The Beaufort scale has unofficially been extended to Force 17 to describe tropical storms exceeding 126 miles per hour				

A breach of the distress criteria requires a consideration of:

- Whether the location is on a major route through the complex; and
- Whether there are suitable alternate routes which are not distressful.

If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity, and mitigation measure should be implemented into the design.

16.2.2 CFD Modelling Method

CFD is a numerical technique used to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. CFD modelling includes three main stages: pre-processing, simulation and post-processing, as described in Figure 16.10. The Navier-Stokes equations, used within CFD analysis, are based entirely on the application of fundamental laws of physics and, therefore, produce extremely accurate results provided that the scenario modelled is a good representation of reality.

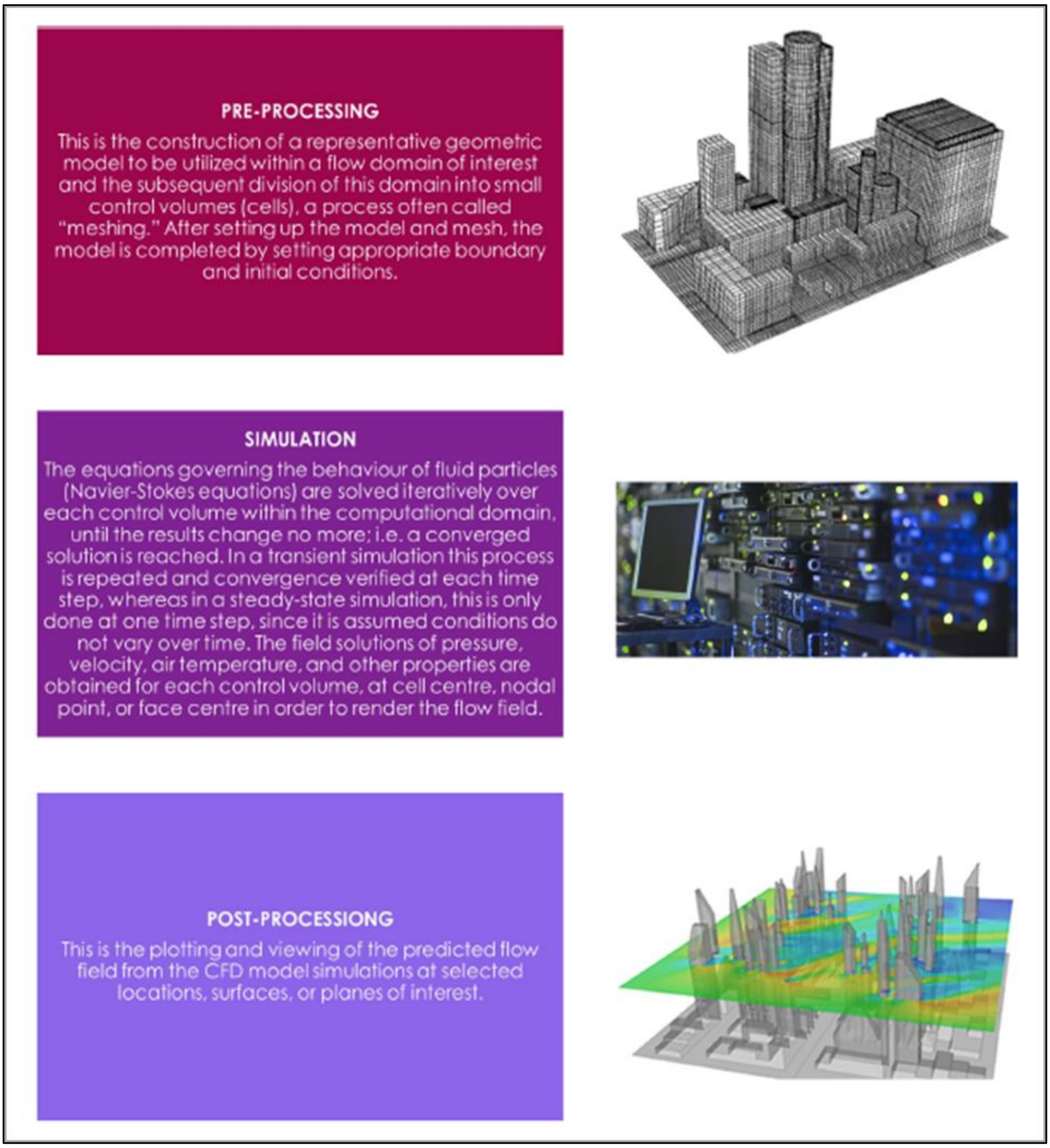
CFD tools can create high quality output that provide a good understanding of fundamental flow features. The CFD models must include a detailed three-dimensional representation of the proposed Project.

Maximum cell sizes used in models near critical locations (e.g. entrances, corners, etc.) must be 0.3 m or smaller. Sufficient cells should be also used between buildings, with a minimum of ten across a street canyon. However, the cell size of buildings away from the target can be larger to allow for modelling efficiency.

The CFD models should represent all surrounding buildings that are within 400 m from the centre of the Site. Other taller buildings outside of this zone that could have an influence on wind conditions within the Site of the proposed Project should be included for wind directions where they are upwind of the Site. The models must contain at least three prism layers below 1.5 m height, to capture near-ground effects.

CFD analysis also reports conditions in areas away from the Site where cumulative effects of a cluster of tall buildings could lead to adverse wind conditions.

Figure 16.10: CFD Modelling Process



16.2.3 OpenFOAM Numerical Solver Details

This report employs OpenFoam Code, which is based on a volume averaging method of discretization and uses the post-processing visualisation toolkit Paraview version 5.5. OpenFoam is a CFD software code released and developed primarily by OpenCFD Ltd, since 2004. It has a large user base across most areas of engineering and science, from both commercial and academic organisations.

OpenFOAM CFD code has capabilities of utilizing a Reynolds Averaged Navier-Stokes (RANS) approach, Unsteady Reynolds Averaged Navier-Stokes (URANS) approach, Detached Eddy Simulation (DES) approach, Large Eddy Simulation (LES) approach or the Direct Numerical Simulation (DNS) approach, which are all used to solve anything from complex fluid flows involving chemical reactions, turbulence, and heat transfer, to acoustics, solid mechanics and electromagnetics. Quality assurance is based on rigorous testing. The process of code evaluation, verification and validation includes several hundred daily unit tests, a medium-sized test battery run on a weekly basis, and large industry-based test battery run prior to new version releases. Tests are designed to assess regression behaviour, memory usage, code performance and scalability.

The OpenFOAM solver algorithm directly solves the mass and momentum equations for the large eddies that comprise most of the fluid's energy. By solving the large eddies directly, no error is introduced into the calculation.

To reduce computational time and associated costs, the small eddies within the flow have been solved using the widely used and recognised Smagorinsky Sub-Grid Scale (SGS) model. The small eddies only comprise a small proportion of the fluid's energy; therefore, the errors introduced through the modelling of this component are minimal.

The error introduced by modelling the small eddies can be considered of an acceptable level. Computational time has been reduced by modelling the small eddies (compared to directly solving).

16.3 Baseline Environment

16.3.1 Baseline Environment Assessment

As described in Section 16.1, the wind assessment has considered the proposed Project in the context of (i) existing and permitted development where development at GA1 is as permitted under FCC Reg. F16A/0412 ('the existing scenario', for the purposes of this Chapter); as well as in the context of (ii) existing, permitted *and* proposed development ('the cumulative scenario' for the purposes of this Chapter) where development at GA1 is delivered as proposed (i.e. with amendments proposed as per ABP TA06F.310418) (Figure 16.2). Under construction blocks at GA1 (as permitted under FCC Reg. F16A/0412) have been included in both scenarios.

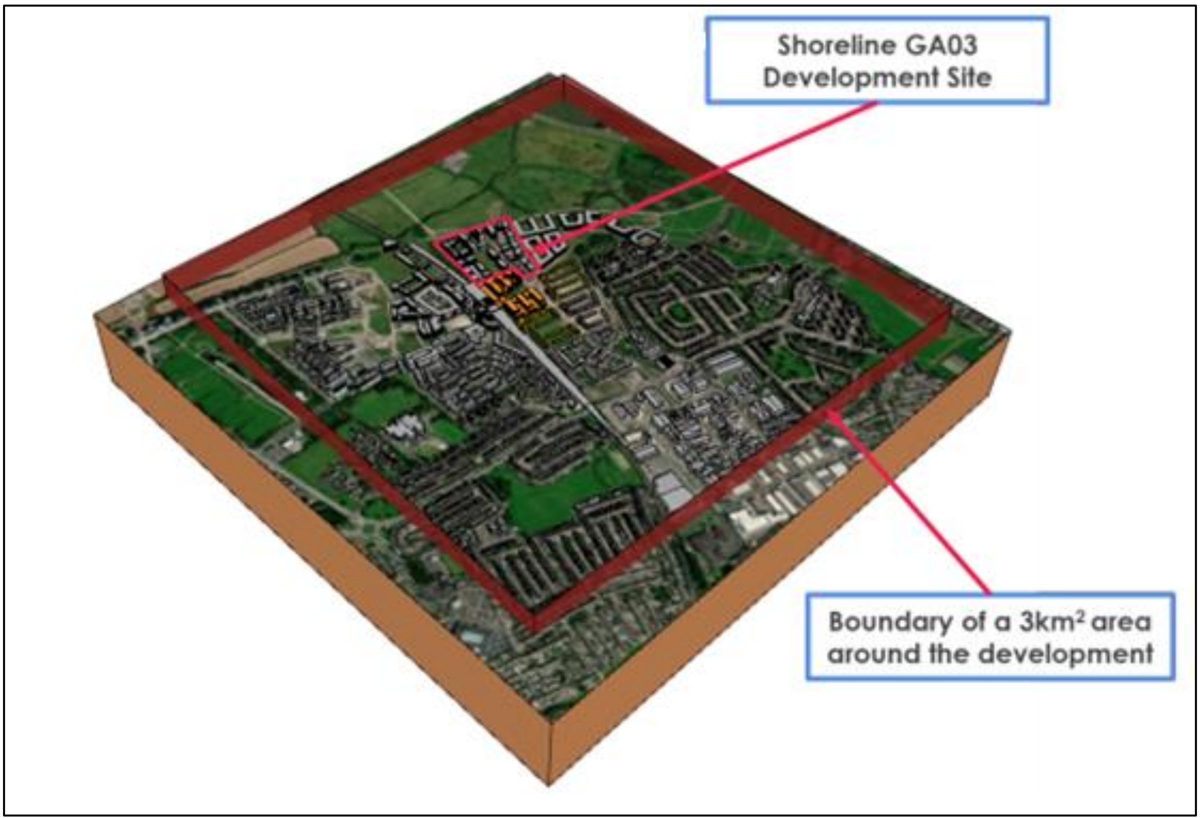
The topography of the Site prior to construction of the proposed Project has also been considered. A statistical analysis of 30 years of historical weather wind data has been carried out to assess the most critical wind speeds, directions and frequencies.

The aim of this assessment has been to identify the wind microclimate of the area that may cause critical conditions for pedestrians comfort criteria.

16.3.1.1 Site Location and Surrounding Area

The Site of the proposed Project is located in Baldoyle-Stapolin Growth Area 3 (GA3), Baldoyle, Dublin 13, c. 10 km north-east of the City centre. While the Site is on the edge of the urban extent of Dublin City, it is within the administrative area of Fingal County Council (FCC). The area forms part of the Northern Fringe lands, which span Dublin City Council and FCC administrative areas. Chapter 5 (Description of the Proposed Project) provides a detailed description of the proposed Project and its environs. The area considered for this assessment comprises a 3 km² area around the proposed Project Site, as represented in Figure 16.11.

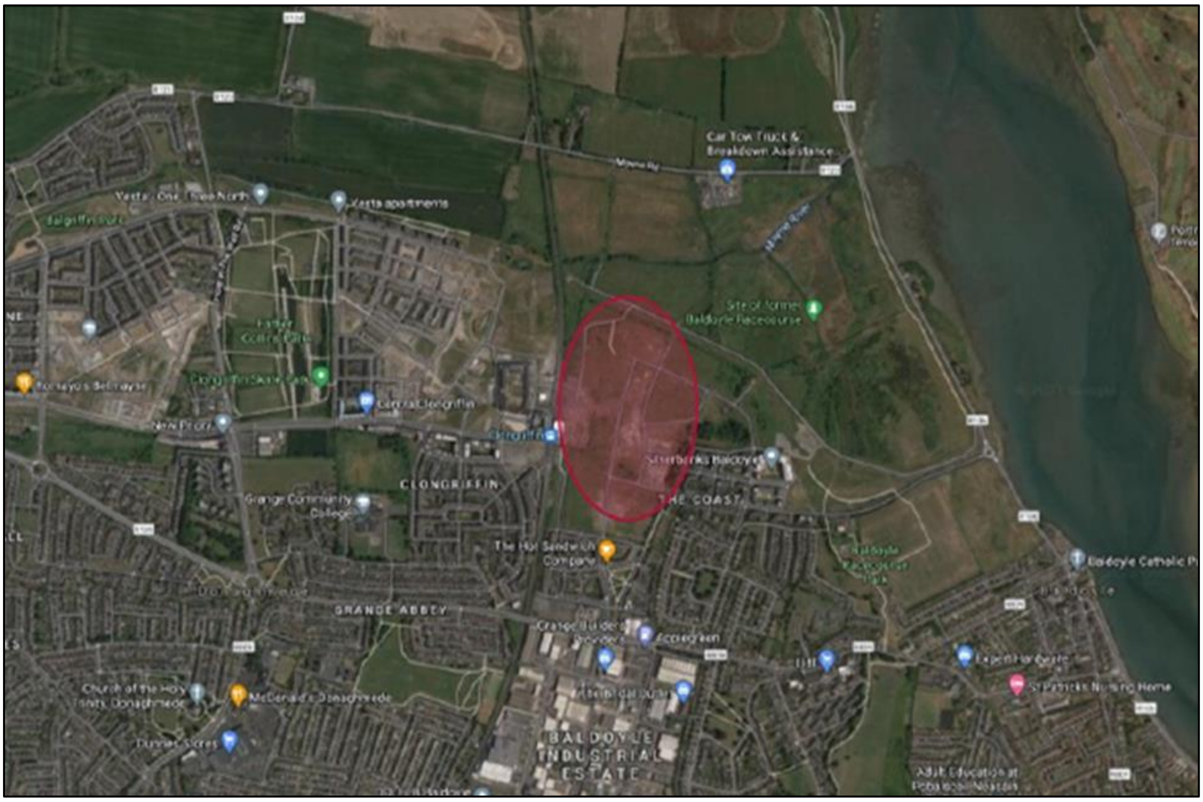
Figure 16.11: Study Area



16.3.2 Topography and Built Environment

Figure 16.12 shows an aerial photograph of the terrain surrounding the Site of the proposed Project. The area surrounding the Site can be characterised as urban environment. Some shelter effect can be expected for wind approaching from directions within this sector. All the wind directions considered for this study are regarded as 'urban winds' and no distinction will be made between them.

Figure 16.12: Site of Proposed Project and Surrounds – Aerial Image



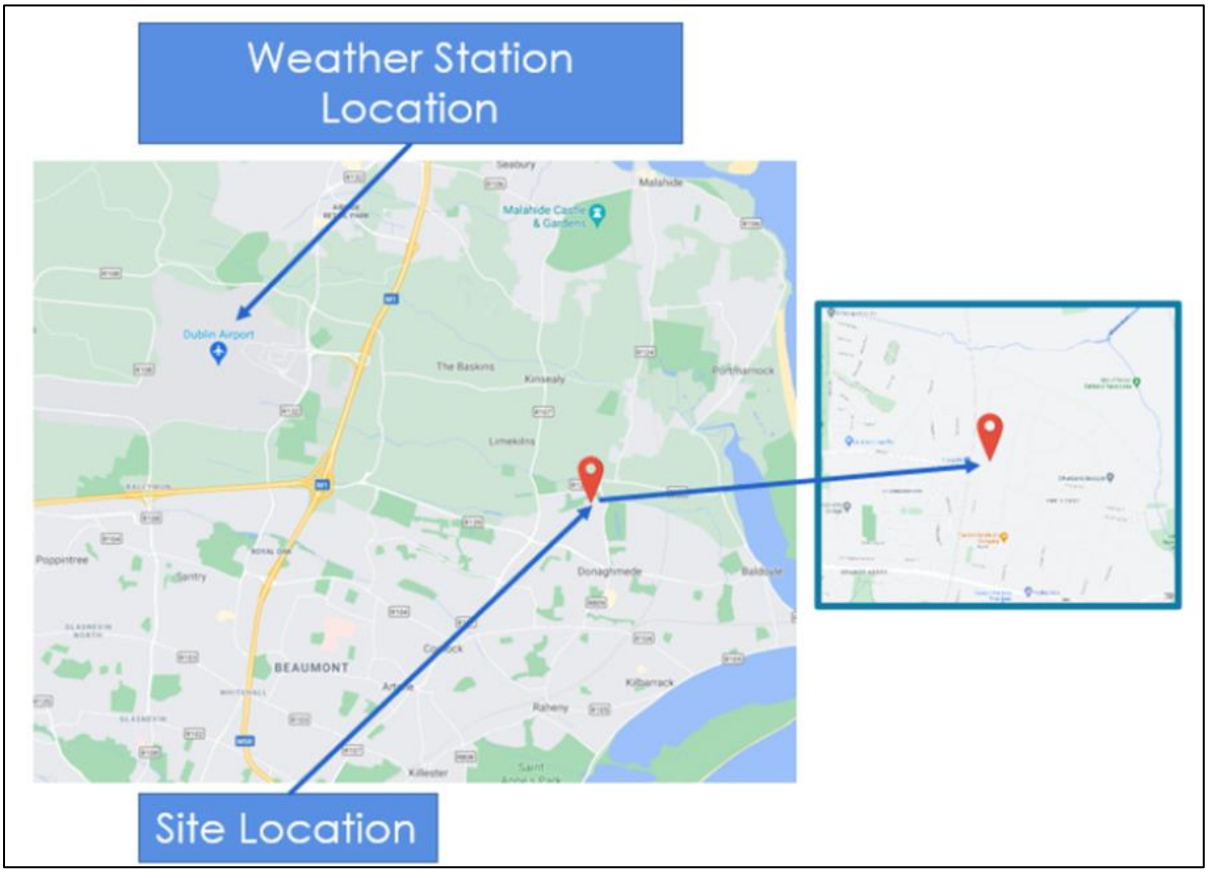
16.3.3 Wind and Microclimate Conditions

This analysis has considered the existing environment being exposed to typical wind conditions of the Site. The buildings have been oriented as shown Figures 16.2 – 16.5. The wind profile was built using the annual average of meteorological data collected at Dublin Airport Weather Station. Figure 16.13 shows the position of the proposed Project relative to Dublin Airport.

Regarding the transferability of the available wind climate data, the following considerations have been made:

- *Terrain*: The meteorological station is located in the flat open terrain of the airport, whereas the Site is located in an urban area with dense built-in structure with buildings of at least 15 m height on average.
- *Mean Wind Speeds*: Due to the different terrain environment, the ground-near wind speeds (at pedestrian level) will be lower at the Site that the meteorological station.
- *Wind Directions*: The landscape around the Site can, in principle, be characterized as flat terrain. Isolated elevations in the near area of the Site should have no influence on wind speed and direction. With respect to the general wind climate, no significant influence is expected. Based on the above considerations, it can be concluded that the data from the meteorological station at Dublin Airport are applicable for the desktop assessment of wind comfort at the Site.

Figure 16.13: Location of Proposed Project and Dublin Airport Weather Station



The assessment of the wind comfort conditions at the proposed Project Site will be based on the dominating wind directions throughout a year (annual wind statistic).

As stated above, the local wind climate is determined from historical meteorological data recorded at Dublin Airport. Two different data sets are analyzed for this assessment as follows:

- The meteorological data associated with the maximum daily wind speeds recorded over a 30 year period between 1985 and 2020; and
- The mean hourly wind speeds recorded over a 10 year period between 2005 and 2020. The weather station is located 10 m above ground or 71 mOD.

Figure 16.14: Local Wind Speed (10m): 1985 – 2020

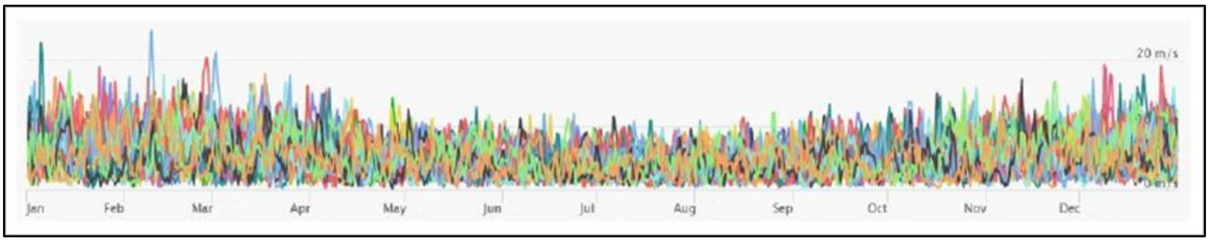


Figure 16.15: Local Wind Gust (10m): 1985 – 2020

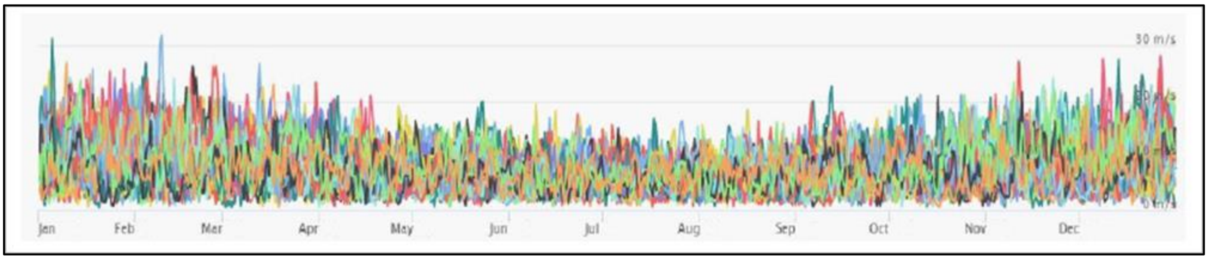


Figure 16.16, presenting the wind speed diagram for Dublin, shows the days per month during which the wind reaches a certain speed. Figure 16.17, the wind rose for Dublin, shows how many hours per year the wind blows from the indicated direction, confirming that the predominant directions are WSW, W, and SW.

Based on the criterion of occurrence frequency, the main wind directions are presented in Table 16.1 (above) and listed below in descending order of dominance:

1. South-west with most frequent wind speeds around 6 m/s (all year).
2. South-east.
3. West-south-west.

The analysis has mainly focused on the large sector of prevailing wind directions of winds, as above. Other wind directions will be discussed if deemed necessary for the study.

Figure 16.16: Dublin Airport Wether Station Wind Speed Diagram

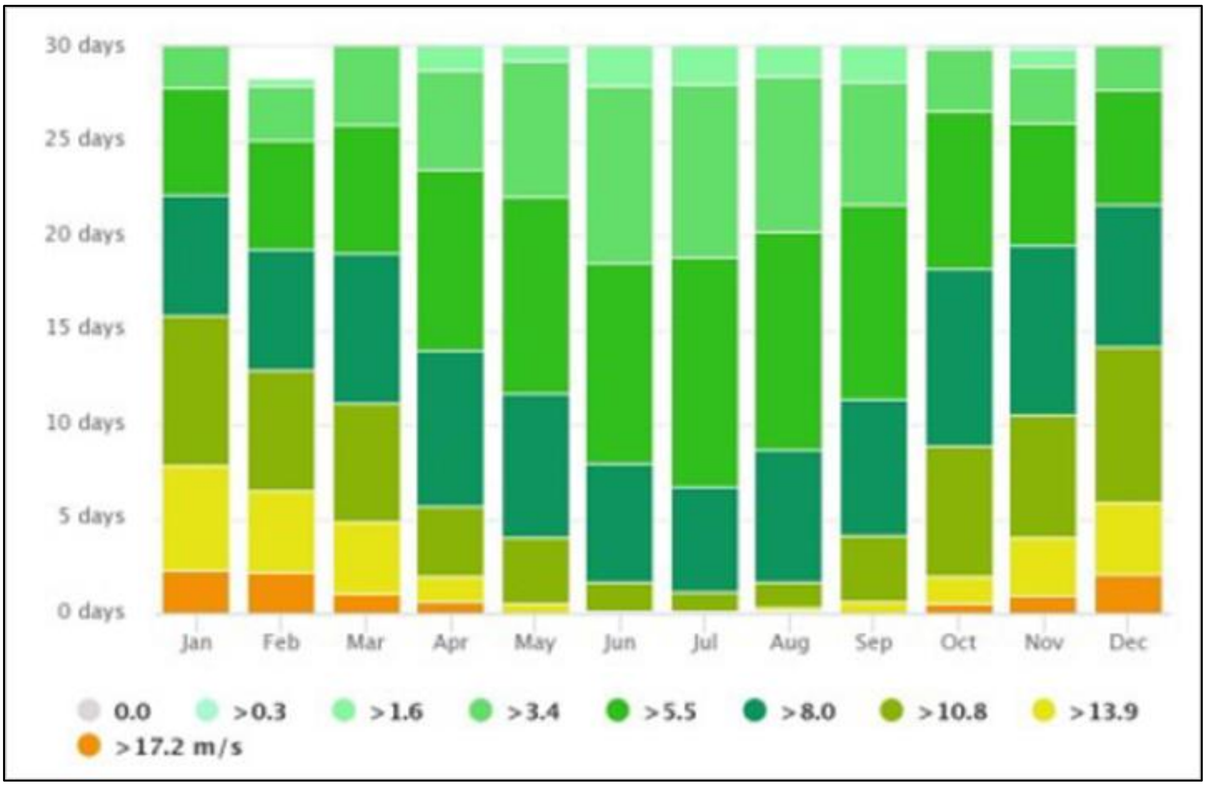
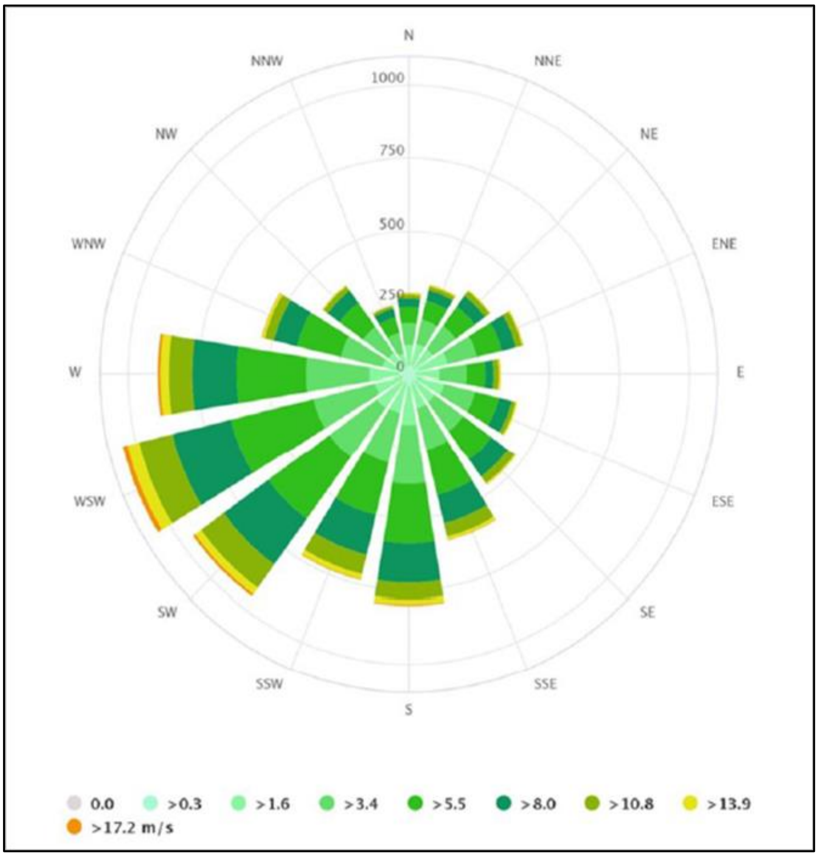


Figure 16.17: Dublin Airport Wind Rose



16.3.3.1 Mean and Maximum Wind Conditions

Examination of the daily wind data reveals that the wind predominantly blows from west and south-west directions; however, there is a secondary wind from the south-east. It is apparent that winds from other directions are rare. Maximum daily wind speeds of nearly 30 m/s were recorded in the past 30 years. However, the maximum daily winds are commonly between 6 m/s and 15 m/s. the strongest winds arise from the west and south-west.

Figure 16.18: Maximum Wind Conditions

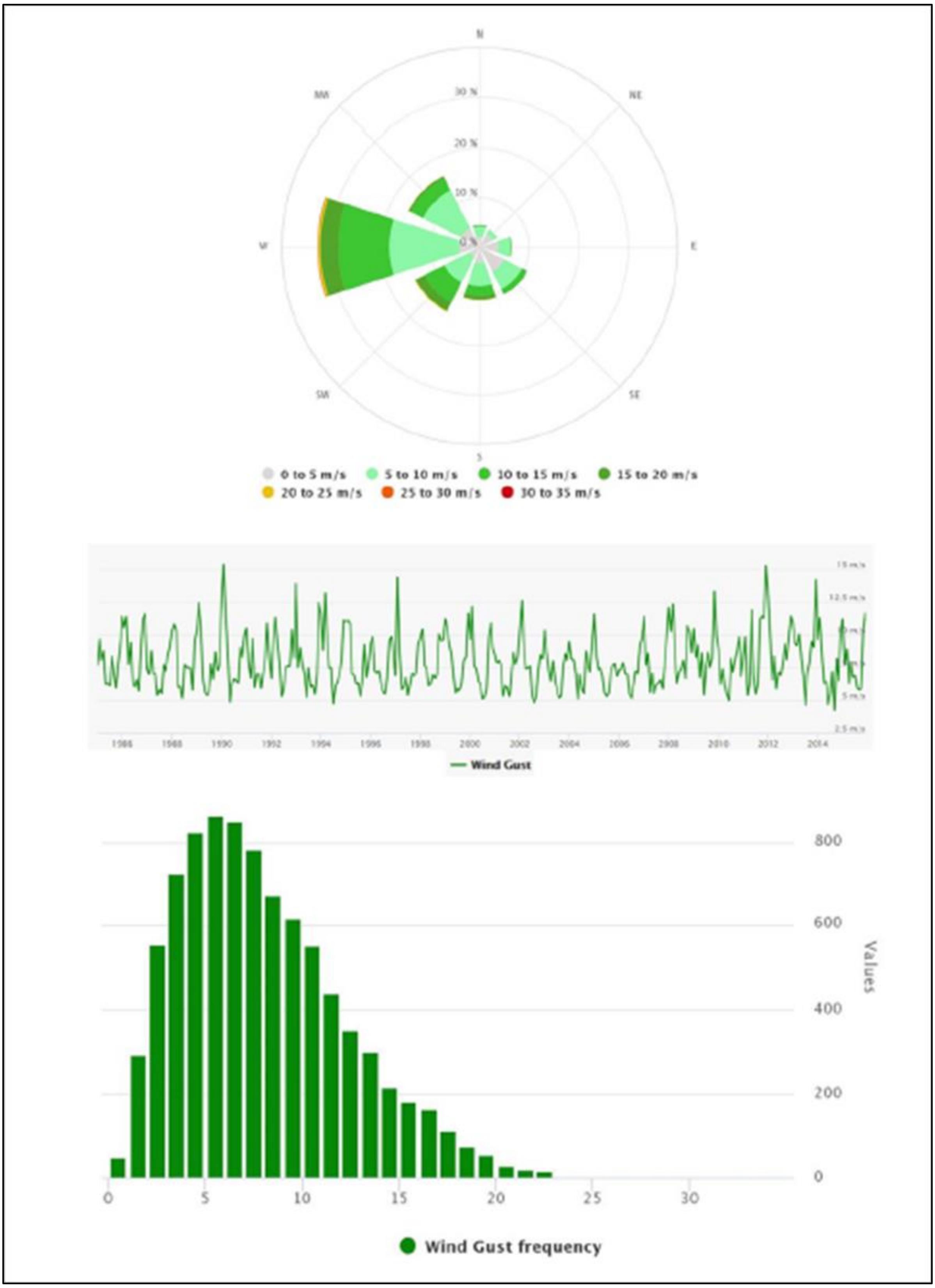
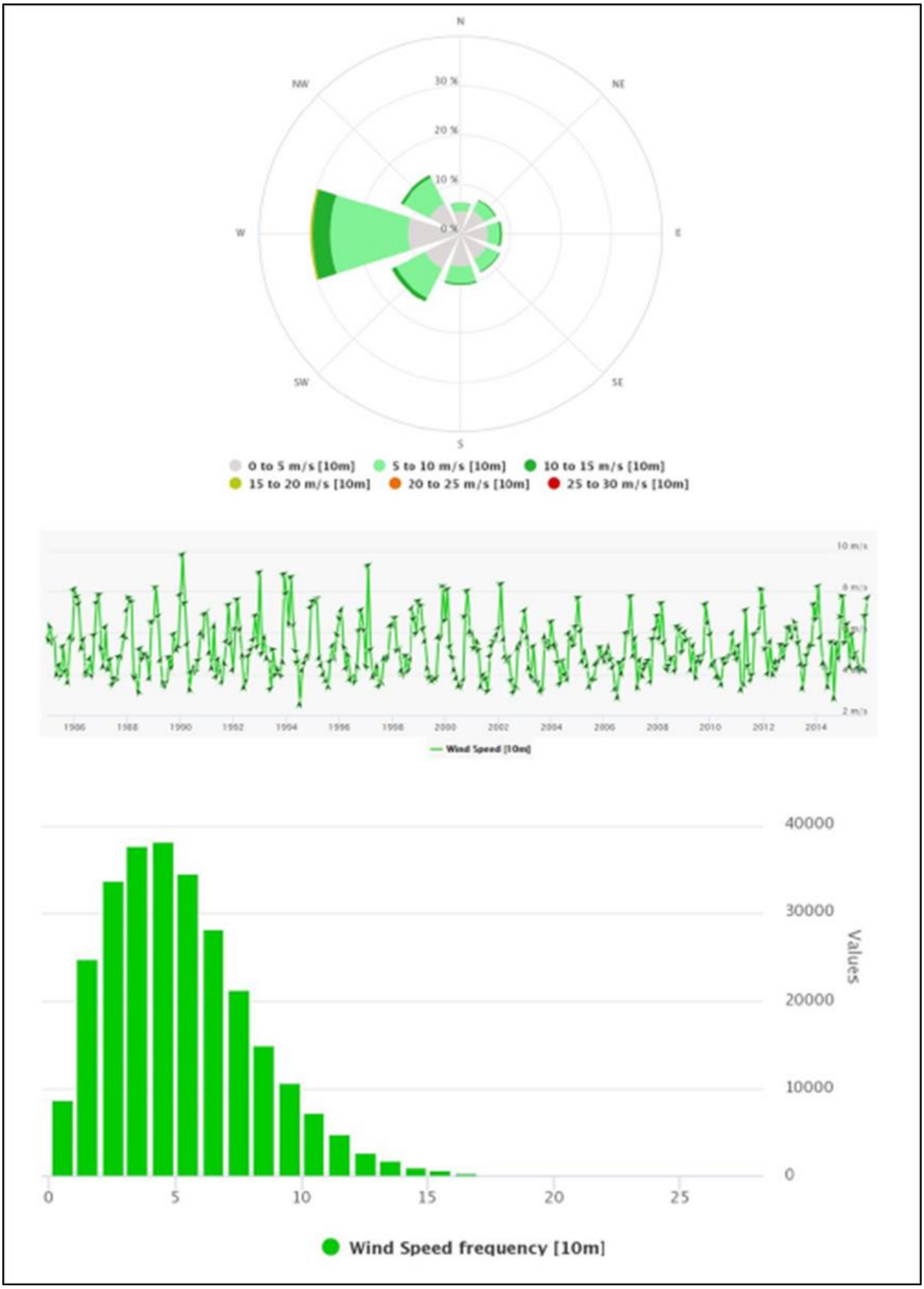


Figure 16.19: Mean Wind Conditions



16.3.3.2 Comparison with On-Site Weather Station

The wind profile built using the data from Dublin Airport has also been compared with the data collected on-Site over the 28-day period from 14 Dec 2018 – 10 Jan 2019. Figures 16.21 and 16.22, respectively, show wind speed / gust and wind direction recorded by the on-Site weather station.

Figure 16.20: B-Fluid On-Site Weather Station

Figure 16.21: Wind Speed and Wind Gust Recorded at On-Site Weather Station

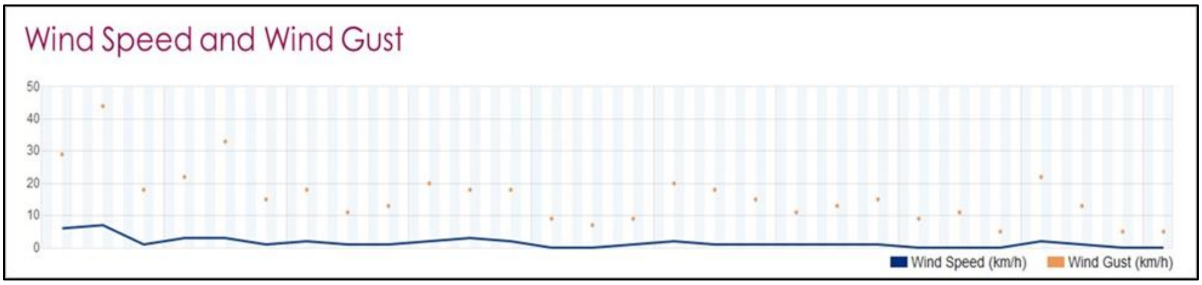
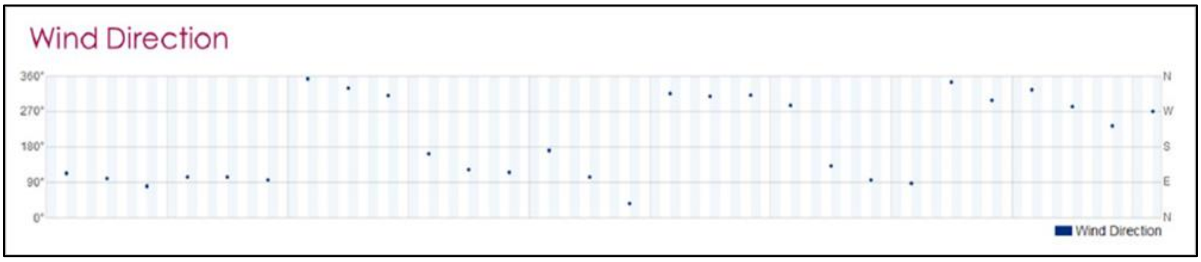


Figure 16.22: Wind Direction Recorded at On-Site Weather Station



As it is possible to assess from the comparison between the on-Site and airport measurements, presented in Figures 16.23 and 16.24, the wind speed daily mean and the wind gust daily mean recorded on-Site follow the same pattern as those recorded at Dublin Airport.

Figure 16.23: Wind Speed Daily Mean Comparison

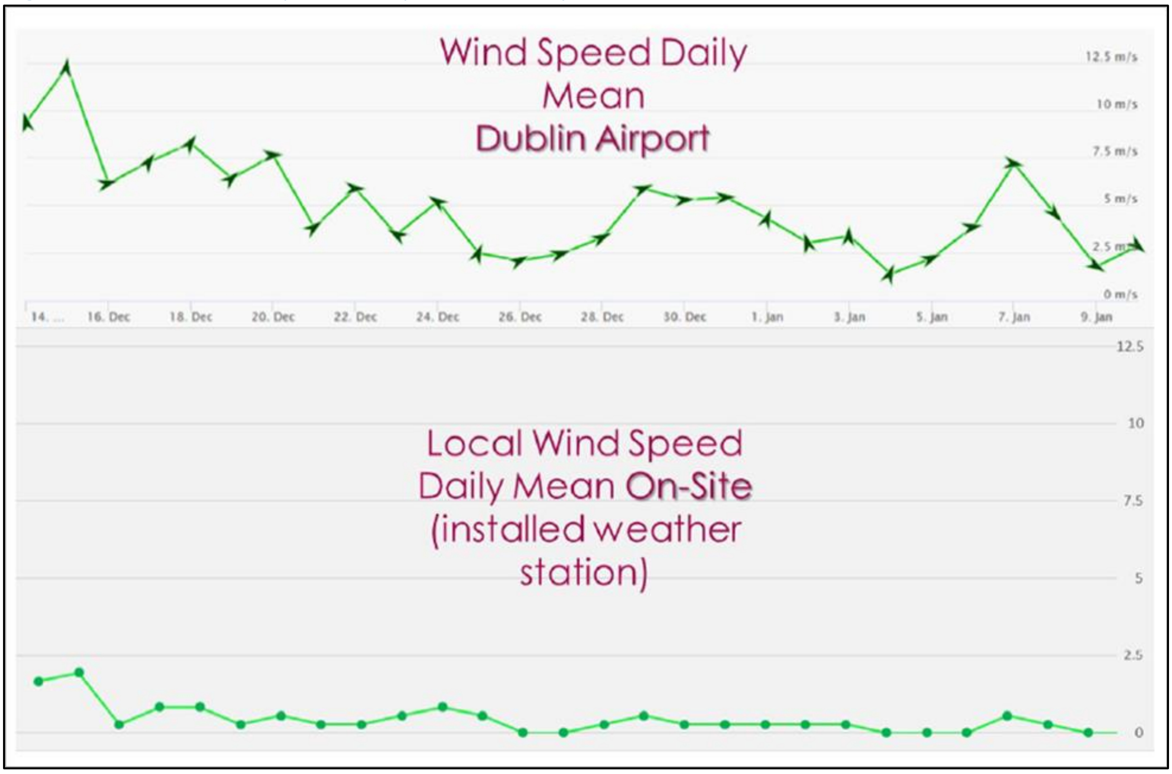
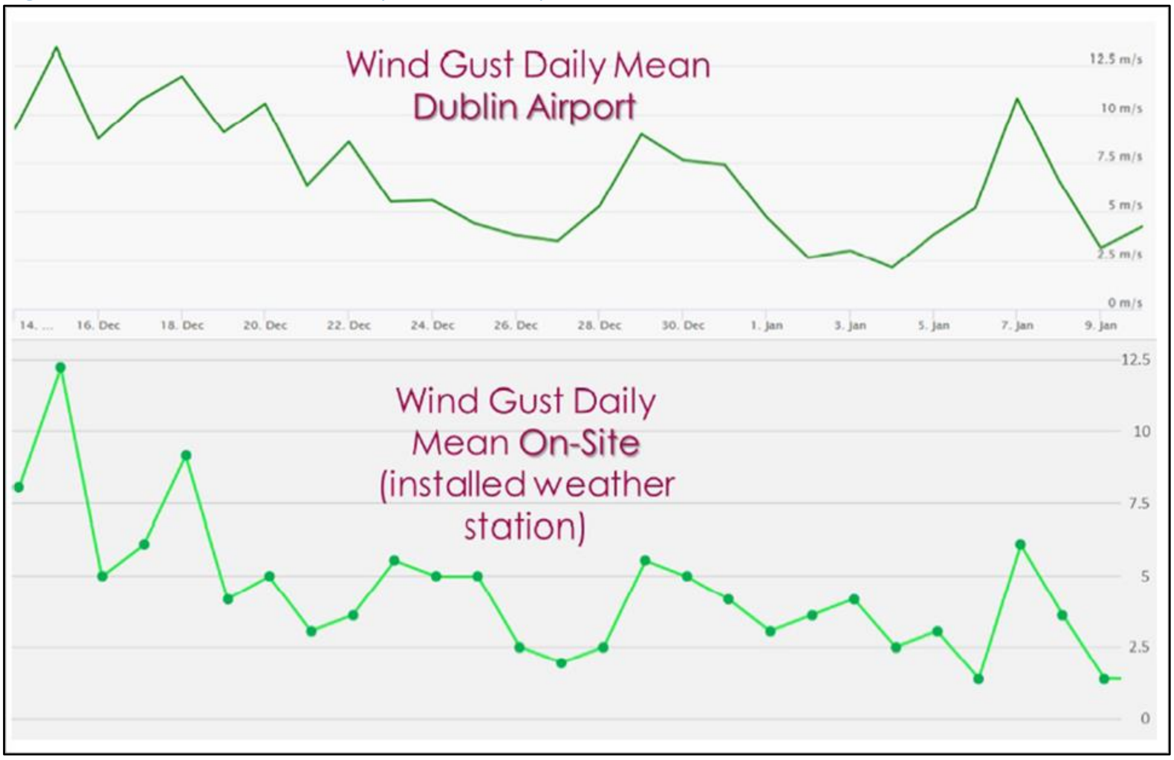


Figure 16.24: Wind Gust Daily Mean Comparison



However, the wind speed levels, and the gust wind speed levels registered on-Site, are quite a bit lower. This is due to the fact that the Site is located in the urban environment and, thus, much more shielded compared with Dublin Airport. This confirms that using wind data from Dublin Airport ensures a conservative analysis of the wind impact on the proposed Project despite its location not far from the coast.

16.3.3.3 Open Area Functions

The assessment of pedestrian wind comfort in urban areas focuses on activities people are likely to perform in the open space between buildings, which are in turn related to a specific function. For example, the activity of sitting for a longer period of time is typically associated with the location of a street café or similar. Such combinations of activity and area can be grouped in four main categories, as shown in Table 16.2.

Table 16.2: Main Categories for Pedestrian Activities

A	Sitting for a long period of time; laying steady position; pedestrian sitting *Terrace; steet café or restaurant; open field theatre; pool*
B	Pedestrian standing; standing / sitting over a short period of time; short steady positions *Public park; playing field; shopping street; mall*
C	Pedestrian walking; leisurely walking; normal walking; ramble; stroll *Walkway; building entrance; shopping street; mall*
D	Objective business walking; brisk or fast walking *Car park; avenue; sidewalk; belvedere*

16.3.3.4 Summary

The wind desktop study of the existing receiving environment showed that:

- The wind profile was built using the annual average of meteorological data collected at Dublin Airport Weather Station. In particular, the local wind climate was determined from historical meteorological data recorded 10 m above ground level at Dublin Airport. Eighteen (18 no.) different scenarios were selected in order to take into consideration all the different relevant wind directions. In particular, a total of 18 no. compass directions on the wind rose have been selected. For each direction, the reference wind speed has been set to the 5% exceedance wind speed for that direction, i.e. the wind speed that is exceeded for over 5% of the time whenever that wind direction occurs.

- The wind profile built using the data from Dublin Airport has been compared with the data collected on-Site. With few exceptions, both the wind speed daily mean and the wind gust daily mean recorded on-Site follow the same patterns as those recorded at Dublin Airport. The speed levels registered on-Site are in a few cases slightly lower. This is due to the fact that, despite its vicinity to the coast, the Site is located close to the urban environment and, thus, much more shielded when compared with Dublin Airport. This confirms the fact that using wind data from Dublin Airport ensures a conservative analysis of the wind impact on the proposed Project.

The prevailing wind directions for the Site are identified as west, west south-west and south-east, with magnitude of approximately 6 m/s.

16.4 Characteristics of the Proposed Project

A detailed description of the proposed Projects and its environs is provided in Chapter 5 (Description of the Proposed Project). Figures 16.25 – 16.28 show the proposed Project as modelled in this assessment.

Figure 16.25: Project (CFD Modelled)

Figure 16.26: Proposed Project (CFD Modelled)

Figure 16.27: Proposed Project – Elevation Layout of G Blocks

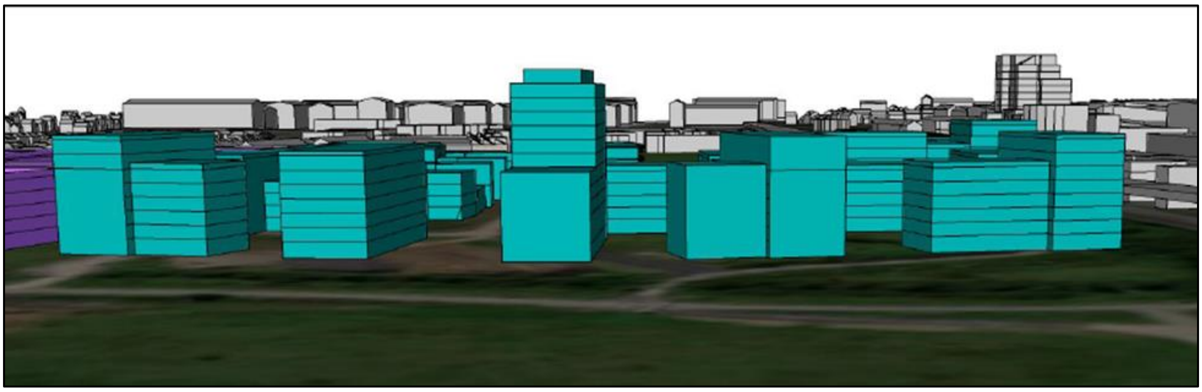
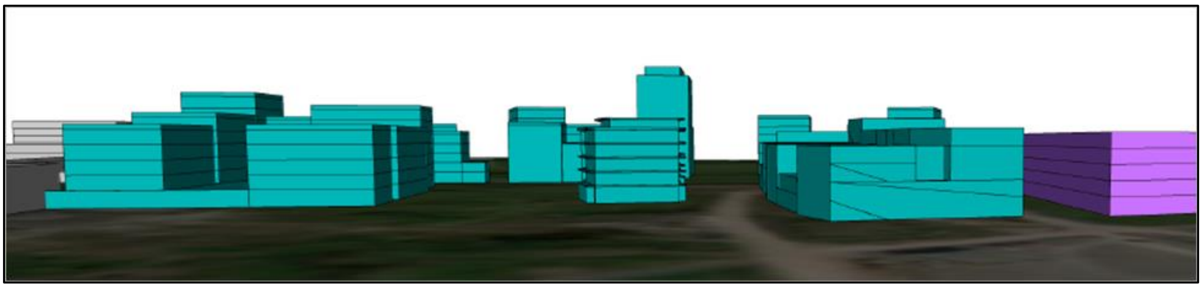


Figure 16.28: Proposed Project – Elevation Layout of E Blocks



16.5 Potential Impacts of the Proposed Project

16.5.1 Construction Phase

The effects on wind microclimate at the Site during the construction phase have been assessed using professional judgement. As construction of the proposed Project progresses, the wind conditions at the Site would gradually transition to those of the completed proposed Project, and mitigation measures would need to be implemented (for the operational phase) before completion and operation.

16.5.2 Operational Phase

The construction of the proposed Project can potentially calm the existing wind condition in the area by providing further urban context to the existing topography. However, some areas can become more critical from a wind acceleration and re-circulation point of view and phenomena such as downwash, funnelling and downdraft can be experienced as well. The proposed Project, in principle, will offer more drag to the incoming wind profile, as detailed below.

Consequently, the wind at lower levels can reduce and modify its flow path directions. However, zones of re-circulation caused by the re-direction of the wind can also be expected, especially in the west-south-west direction, where some funnelling can potentially occur. The potential impacts of the proposed Project on the local wind microclimate have been quantified through the modelling of different wind scenarios, and where areas of criticism have been detected, appropriate mitigation has been implemented and modelled to verify the reduction of the criticism and the suitability of the specific area to the designated pedestrian activity.

16.5.3 Cumulative Qualitative Assessment

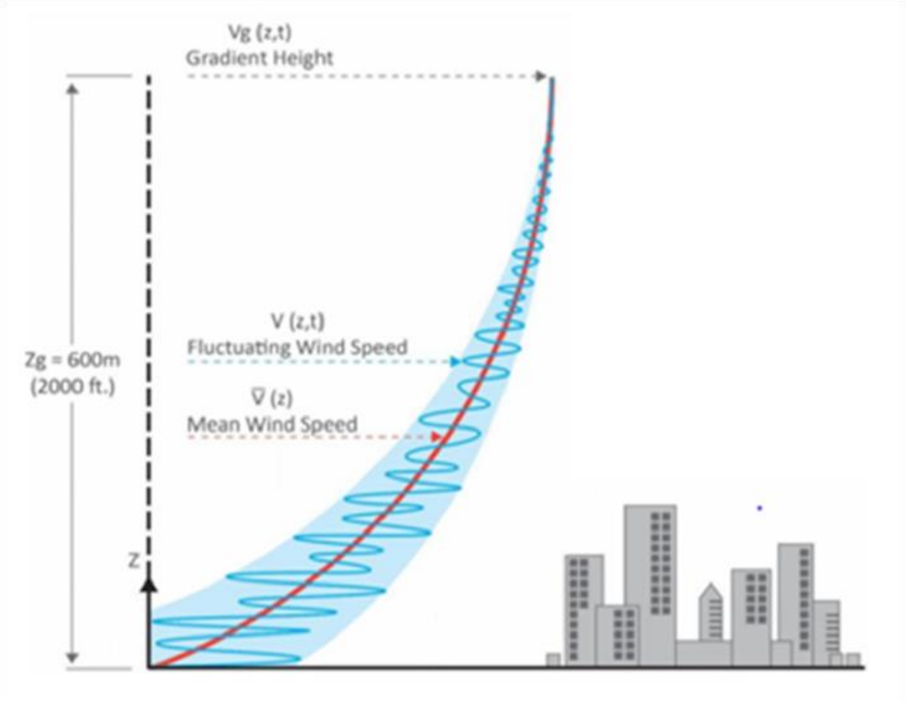
It should be noted that the analysis in this section is indicative and based on experience and fundamental fluid mechanical principles. In general, this qualitative assessment is more conservative than the quantitative assessment resulting from the more detailed CFD analysis, below.As presented above, the Site is receiving a predominant wind from the south-west, which correspond to the dominant wind direction in Dublin. For this reason, the qualitative assessment has been performed for this condition.

- *Potential Downdraft Effect:* The building heights varies across the Site, which can create phenomena of downdraft in some areas. This can be seen when the leeward face of a low building faces the windward face of a tall building, it causes an increase in the downward flow of wind on the windward face of the tall building.
- *Potential Funnelling Effect:* The buildings location appears to converge on the central area of 'Ireland's Eye Avenue'. This distribution is likely to create phenomena of funnelling / wind canyon causing acceleration of wind speeds. The intensity of this acceleration is influenced by the building heights, size of the façades, building separation distance and building orientation.
- *Potential Downwash Effect:* A number of tall buildings are proposed. If the height ratio between the proposed tall buildings and their surroundings is increased significantly, a downwash effect will likely occur. The tall buildings tend to deflect wind downwards, causing accelerated wind speeds at pedestrian level and around the windward corners of buildings.

16.5.4 Planetary Boundary Layer and Terrain Roughness

Due to aerodynamic drag, there is a wind gradient in the wind flow just a few hundred meters above the Earth's surface, referred to as the 'surface layer of the planetary boundary layer'.

Figure 16.29: Wind Velocity Profile

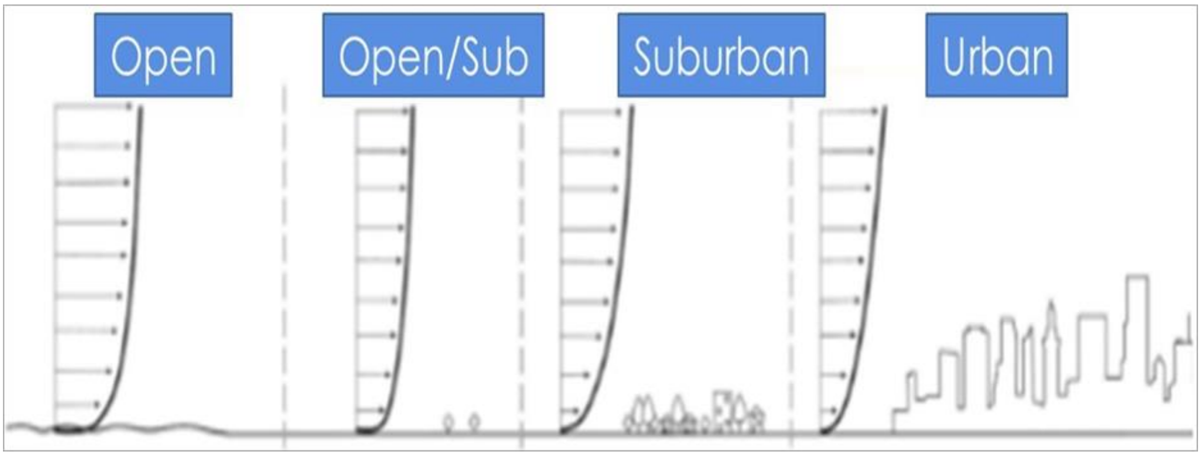


Wind speed increases with increasing height above ground, starting at zero, due to the no-slip condition. In particular, the wind velocity profile is parabolic. Flow near the surface encounters obstacles that reduce the wind speed and introduce random vertical and horizontal velocity components. This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it. For this reason, the velocity profile is given by a fluctuating velocity along a mean velocity value. Figure 16.30 shows the wind velocity profile.

Two effects influence the shape of the wind speed profile:

- Contours of the terrain: a rising terrain such as an escarpment will produce a fuller profile at the top of the slope compared with the profile of the wind approaching the slope.
- Aerodynamic 'roughness' of the upstream terrain: natural roughness in the form of woods or man-made roughness in the form of buildings. Obstructions near the ground create turbulence and friction, lowering the average wind speed. The higher the obstructions, the greater the turbulence and the lower the wind speed. As a general rule, wind speed increases with height.

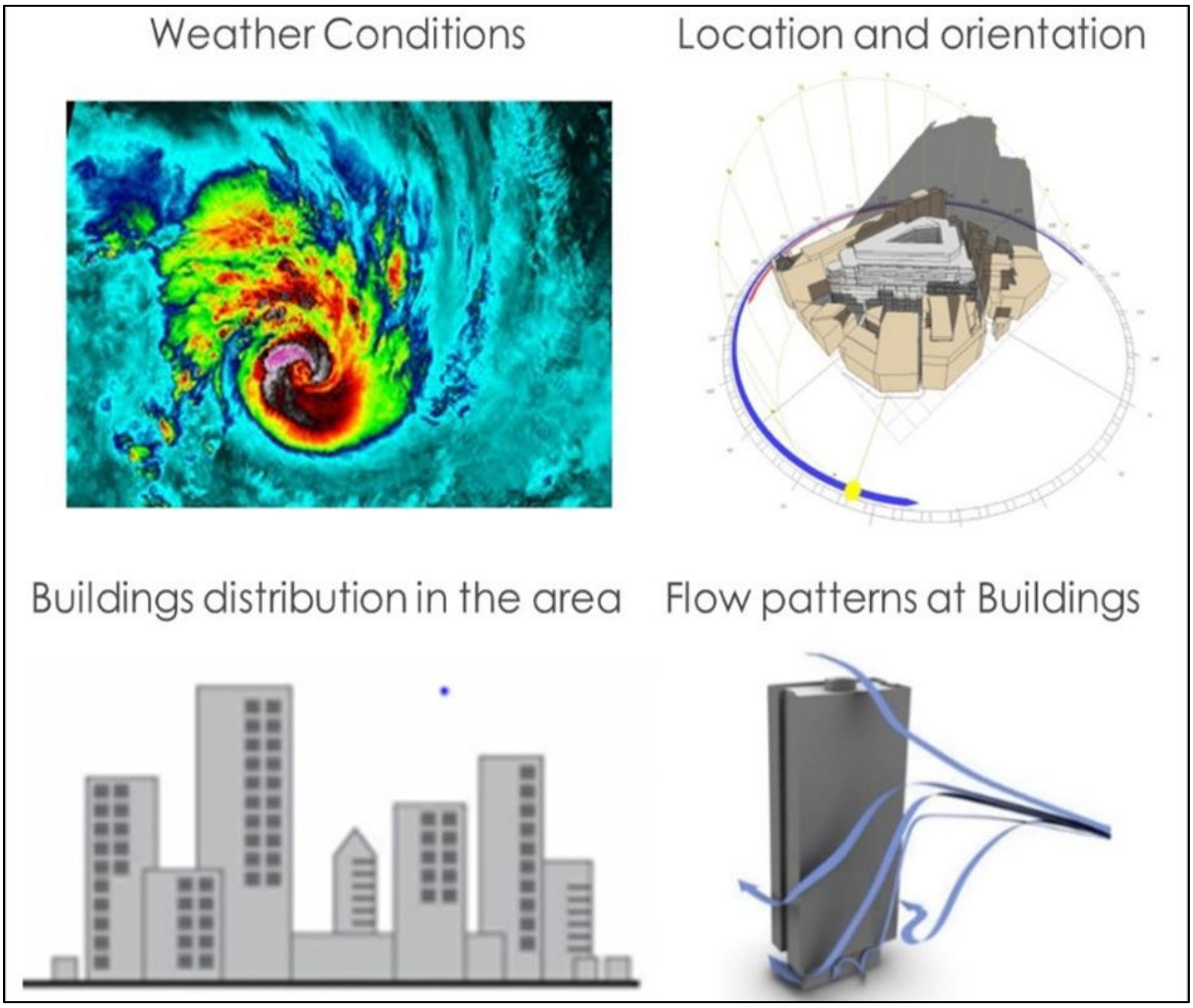
Figure 16.30: Wind Velocity Profile for Different Terrains



In order to assess the wind conditions in a particular area, it is important to establish:

- Weather conditions in the area;
- Location and orientation of the Site;
- Buildings distribution in the area; and
- Flow patterns at the buildings.

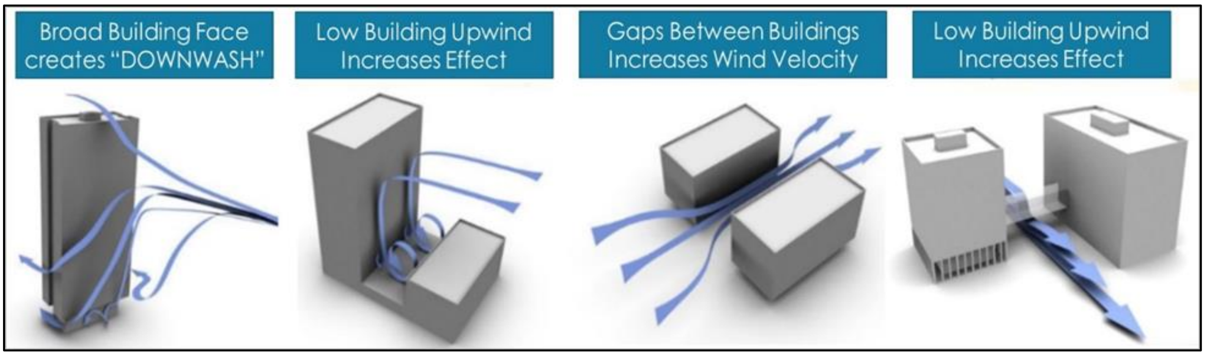
Figure 16.31: Parameters of Relevance to Wind Conditions Assessment



Moreover, it is important to understand key flow features:

- Broad building face creates 'downwash';
- Low building upwind increases wind effects;
- Gaps between buildings increase wind velocity; and
- Low building upwind increases wind effects.

Figure 16.32: Key Flow Features of Relevance to Wind Conditions Assessment



16.6 Mitigation Measures

This section describes the mitigation measures that have been incorporated into the desing of the proposed Project (i.e. 'mitigation by design'), which mitigate wind-related impacts.

16.6.1 Construction Phase

The effects on wind microclimate at the Site during the construction phase have been assessed using professional judgement. As construction of the proposed Project progresses the wind conditions at the Site would gradually transition to those of the completed proposed Project, and mitigation measures (in relation to the operational phase, as detailed in the following section) shall be implemented before completion and operation as part of the proposed works.

16.6.2 Operational Phase

As stated above, if wind conditions exceed the threshold, conditions become unacceptable for favourable pedestrian activities and mitigation measure are needed.

Mitigation measures include:

- ***Landscaping:*** the use vegetation to protect buildings from wind.
- ***Sculptural screening (solid or porous):*** to deflect or bleed wind by removing its energy.
- ***Canopies and wind gutters:*** horizontal canopies to deflect wind and redirect wind around the building and above the canopy.

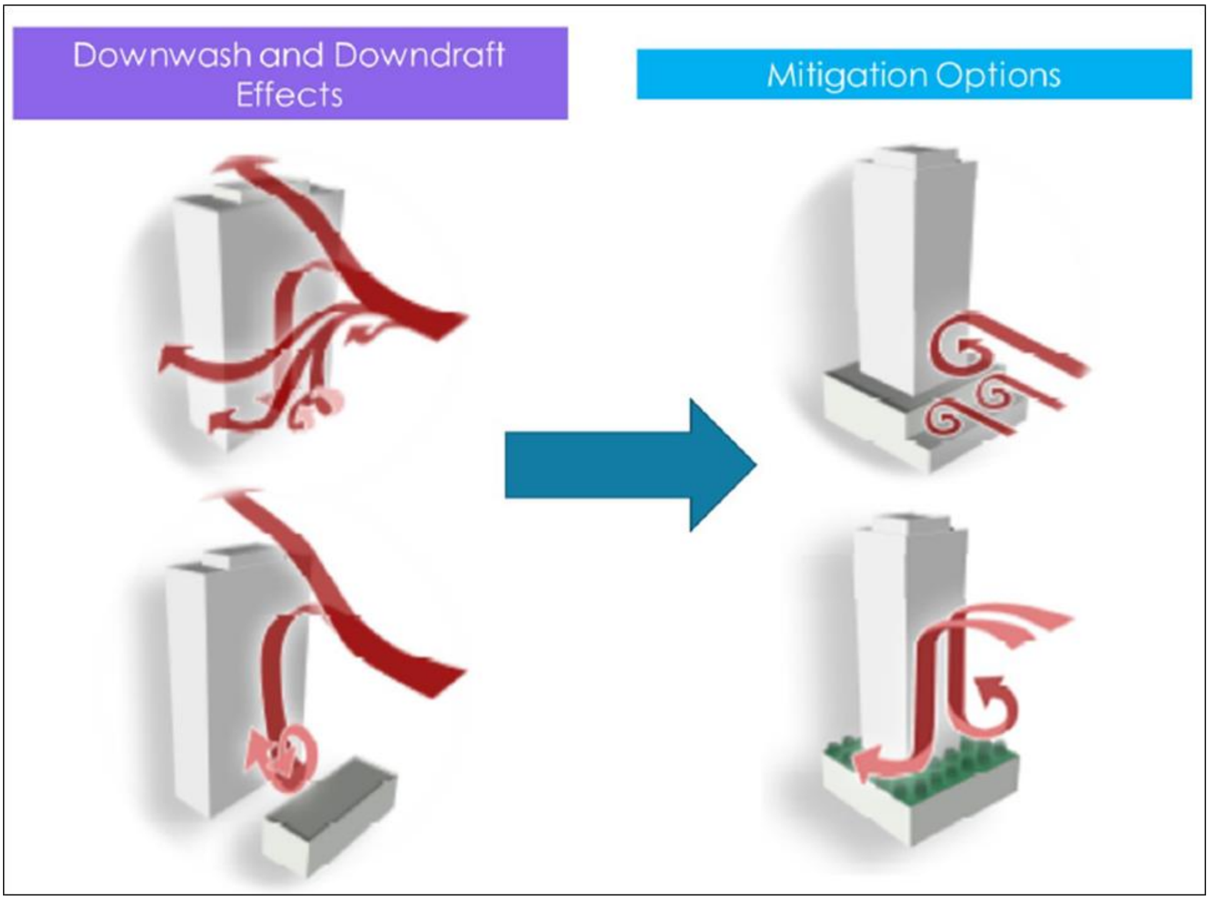
In particular, it is possible to summarise the different flow features and the corresponding mitigation options as follows (Figures 16.33 and 16.34):

- ***Downwash Effects****:* when wind hits the windward face of a tall building, the building tends to deflect the wind downwards, causing accelerated wind speeds at pedestrian level and around the windward corners of the building. This can occur when tall and wide building façades face the prevailing winds.
- ***Downdraft Effects****:* When the leeward face of a low building faces the windward face of a tall building, it causes an increase in the downward flow of wind on the windward face of the tall building. This results in accelerated winds at pedestrian level in the space between the two buildings and around the windward corners of the tall building.

Examples of typical mitigation options to address downwash and downdraft effects include:

- To mitigate unwanted wind effects, it is recommended to introduce a base building or podium with a step back, and setting back a tower relative to the base building, the downward wind flow can be deflected, resulting in reduced wind speed at pedestrian level.
- Landscaping the base building roof and tower step back, wind speeds at grade can be further reduced, and wind conditions on the base building roof can improve.

Figure 16.33: Mitigation Measures for Downwash and Downdraft Effects

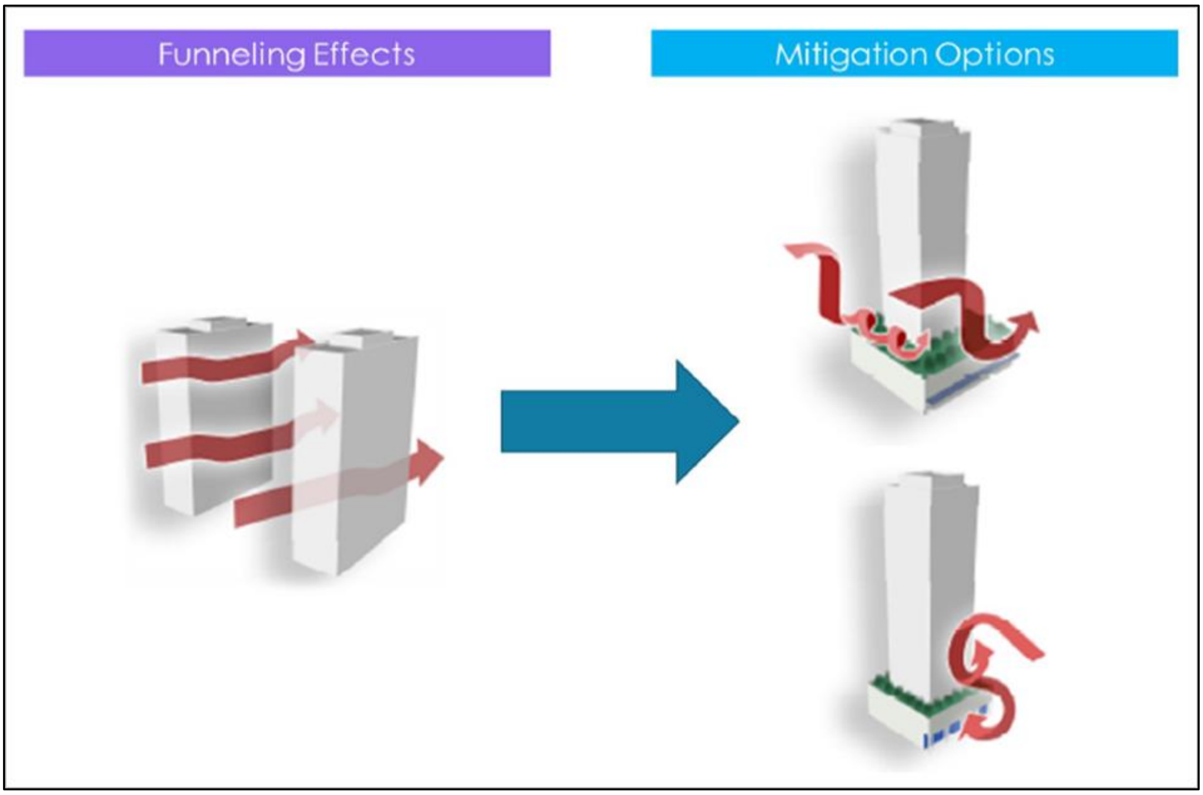


- Funnelling Effects: Wind speed is accelerated when wind is funnelled between two buildings. This is referred to as the 'wind canyon effect'. The intensity of the acceleration is influenced by the building heights, size of the façades, building separation distance and building orientation. Similar effects can be noticed when a bridge is connecting two buildings, and the wind passing below the bridge is accelerated, as a result of which pedestrians can experience high uncomfortable velocities of wind.

Examples of typical mitigation options to address funnelling effects include:

- A horizontal canopy on the windward face of a base building can improve pedestrian level wind conditions. Parapet walls around a canopy can make the canopy more effective.
- Sloped canopies only provide partial deflection of downward wind flow.
- A colonnade on the windward face of the base building provides the pedestrian with a calm area to walk in while being protected or a breeze walking space outside the colonnade zone.

Figure 16.34: Mitigation Measures for Funnelling Effects



The mitigation utilized in the design of the proposed Project is landscaping using tree plantings, which creates a reduced vorticity, making it possible to reduce incoming velocities, thus reducing wind impacts on the buildings, public spaces or pedestrian paths.

Small particles randomly distributed within an area are normally used in numerical modelling to model trees, as shown in Figures 16.35 and 16.36. These introduce a pressure drop in the model and, therefore, cause the wind to reduce its speed when passing through the trees, as expected in reality. The CFD plot shown in Figure 16.37 demonstrates this effect. Trees are introduced into the model as porous media this is to reproduce the velocity modifications and pressure drop that vegetation will create on the incoming air flows. These porous media are illustrated in geometry, as shown in Figure 16.35.

Figure 16.38 shows a plan view of the mitigation by design that will be implemented for the proposed Project, as agreed with BSLArch.

16.6.2.1 Landscape Trees Modelling (Using Porous Media)

Through CFD Modelling, it is possible to assess the effects of landscaping trees on the wind flowing through an urban environment. The landscape trees are simulated as comprising effects of porous zones within the urban environment. This is an essential tool for accurately assessing the actual wind speed and pattern at a pedestrian level, when landscape design is available. Figures 16.35 and Figure 16.36 show the modelling approach of utilizing porous media within the CFD numeric code to implement the effect of landscape within the proposed Project.

Figure 16.35: CFD Modelling of a Tree

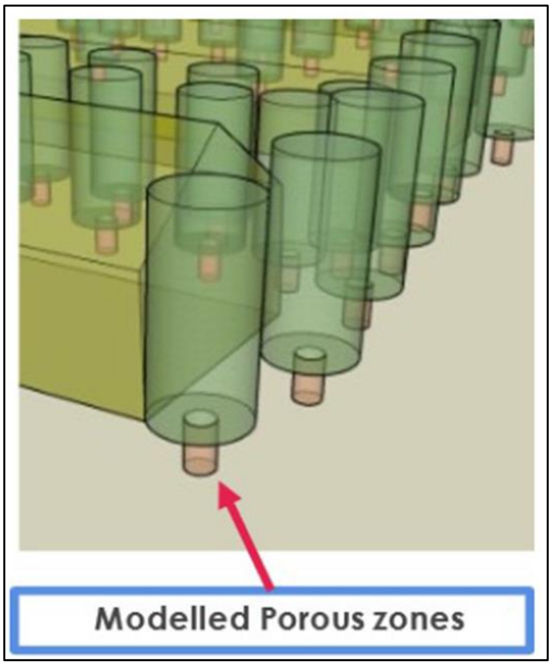


Figure 16.36: CFD Modelling of the Trees

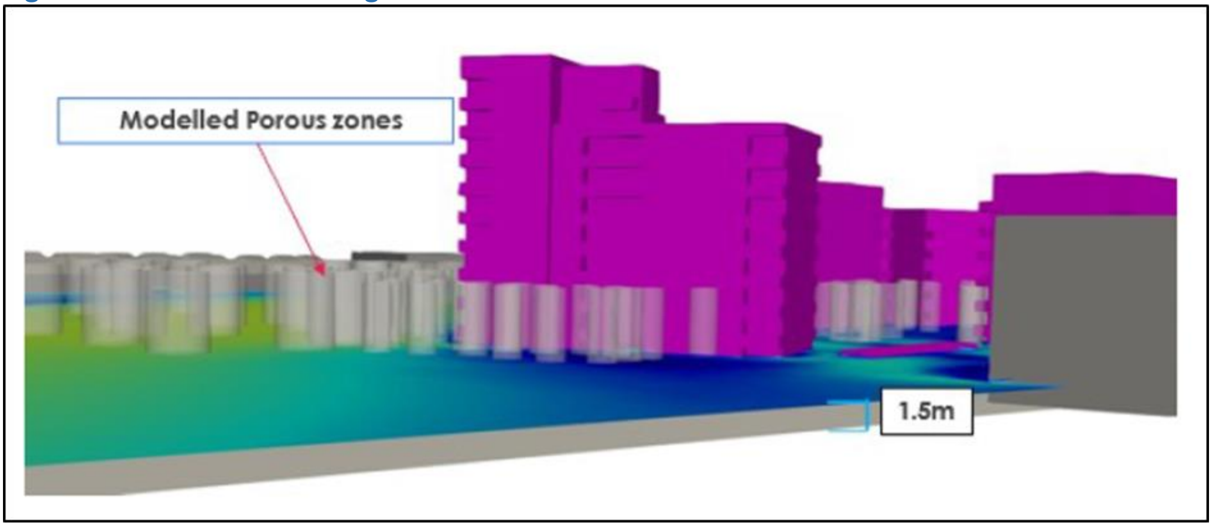


Figure 16.37: Generic Result of Wind Impacting on a Tree

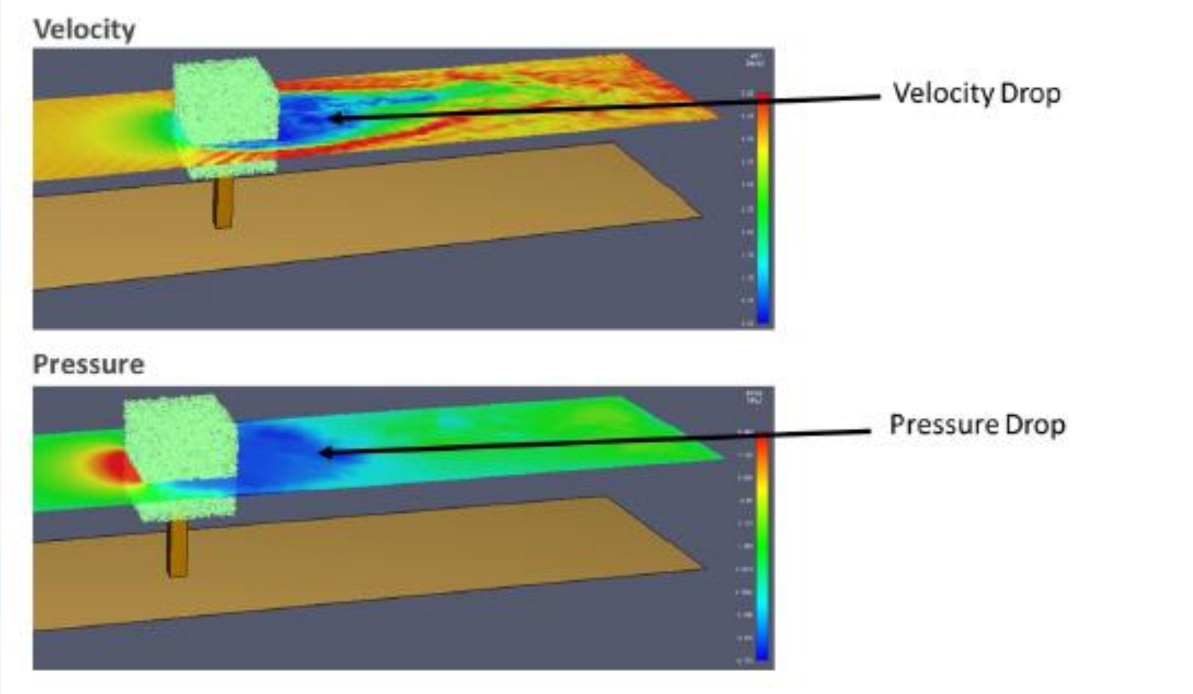


Figure 16.38: Plan View of the Mitigation Measures (Planting) for the Proposed Project

Figure 16.39: CFD Modelling of the Trees

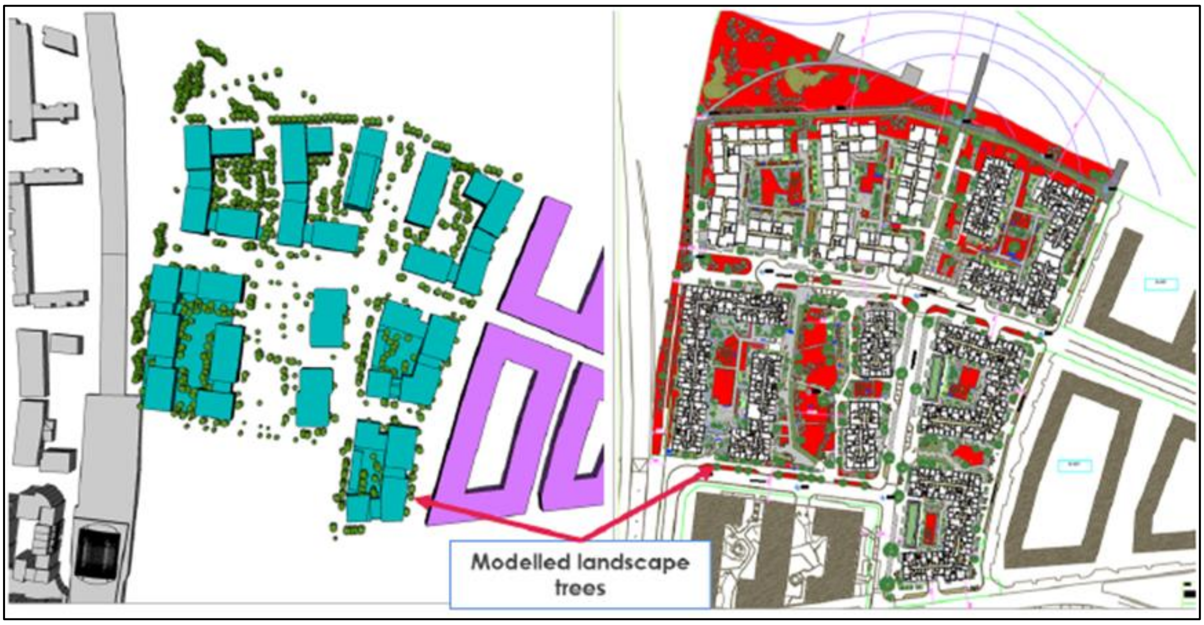
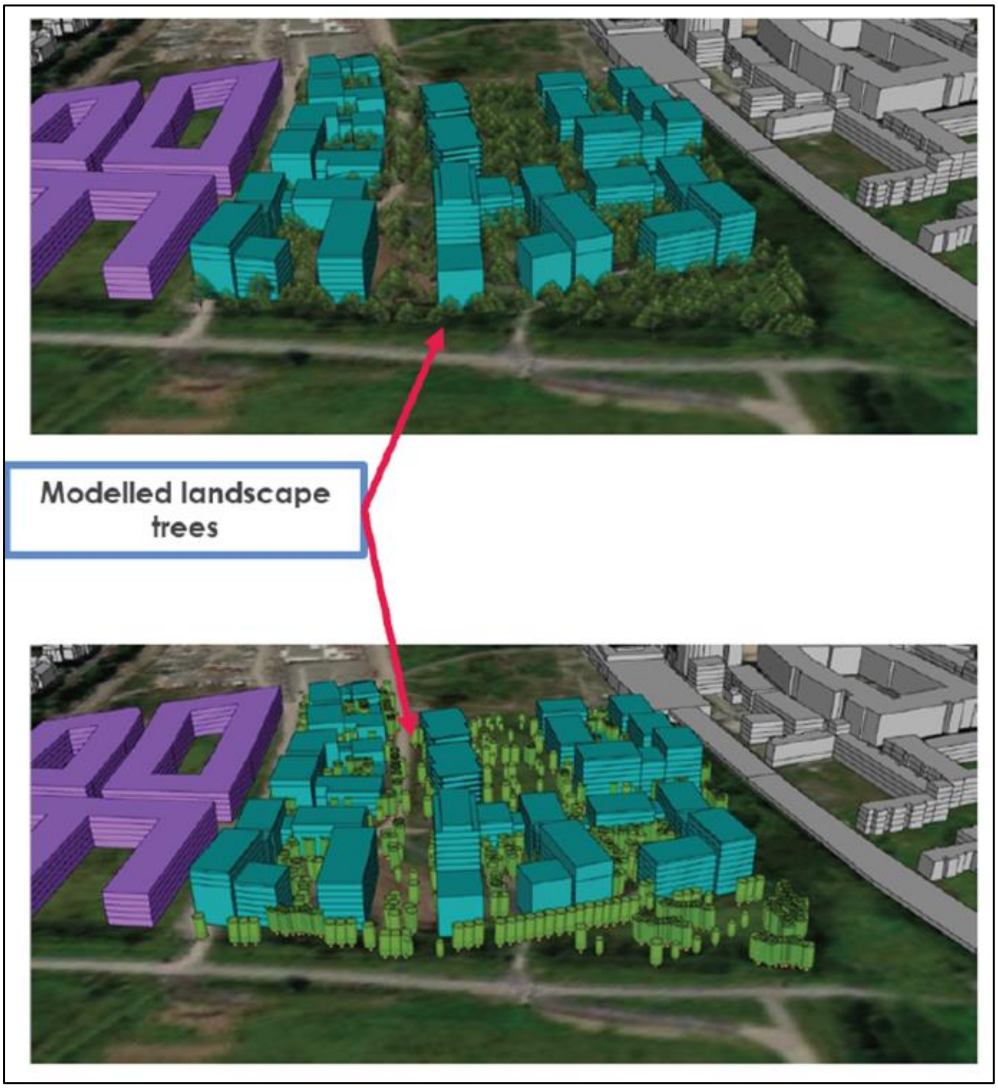


Figure 16.40: CFD Modelling of the Trees



16.7 Predicted Impacts of the Proposed Project

This section assesses the residual impacts of the proposed Project on the existing environment (in terms of wind), and the suitability of the proposed Project to create and maintain a suitable and comfortable environment for different pedestrian activities. The above-stated mitigation by design has been included in the assessment.

16.7.1 CFD Model Details of the Proposed Project

This subsection describes all features included in the geometrical and physical representation of the proposed Project in the CFD model. Any objects that may have a significant impact on wind movement and circulation are represented within the model. To be accurate, the structural layout of the building being modelled should include only the obstacles, blockages, openings and closures which can impact the wind around the building. It is important to remember that a CFD simulation approximates reality, so providing more details of the geometry within the model will not necessarily increase the understanding of the bulk flows in the real environment.

16.7.2 Modelled Geometry

The proposed Project model is shown in Figures 16.41 and 16.42. The modelled layout and dimensions of the surrounding environment are outlined in Table 16.3.

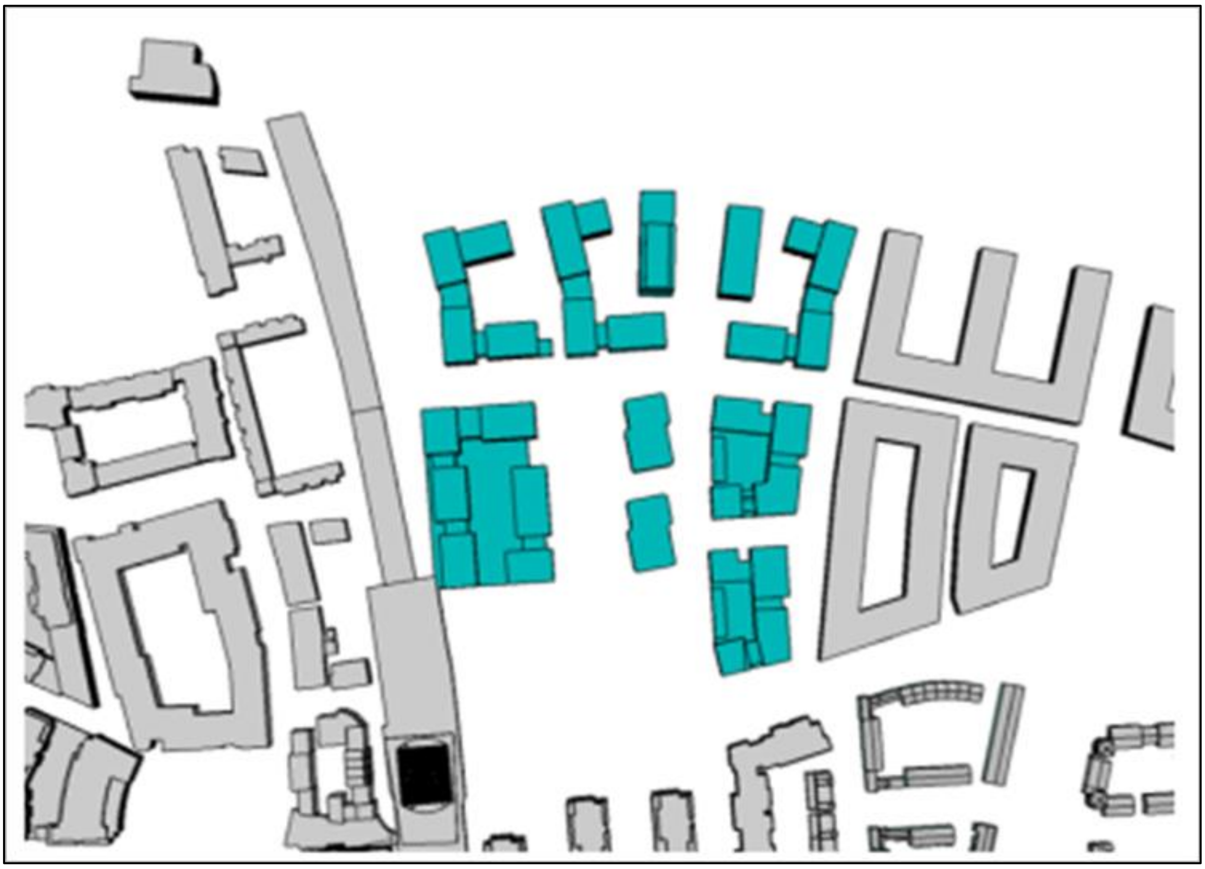
In order to represent reality and consider the actual wind impacting on the Site, the modelled area for the wind modelling study comprises a wider urban area of 3 km^2 around the proposed Project, as shown in Figure 16.11.

Table 16.3: Modelled Environment Dimensions

	Modelled CFD Environment Dimensions		
	Width	Length	Height
CFD Mesh Domain	1500 m approx.	1500 m approx.	200 m approx.

Figure 16.41: Proposed Project – Extents of Modelled Area

Figure 16.42: Proposed Project as Modelled (in Colour)



16.7.3 Boundary Conditions

A rectangular computational domain was used for the analysis. The wind directions were altered without changing the computational mesh. For each simulation scenario, an initial wind velocity was set according to the statistical weather data collected, in order to consider the worst-case scenario. Building surfaces within the model are specified as 'no slip' boundary conditions. This condition ensures that flow moving parallel to a surface is brought to rest at the point where it meets the surface. Air flow inlet boundaries possess the 'inlet' wind profile velocity patch boundary condition, with its appropriate inflow turbulence intensity and dissipation rates. Air exits the domain at the 'pressure outlet' boundary condition.

The wind velocity data provided by the historical data collection and by the local data measuring are used in the formula below for the logarithmic wind profile to specify the wind velocity profile (v_2, wind velocity at different heights) to be applied within the CFD model:

$$v_2 = v_1 \cdot \frac{ln\frac{h_2}{z_0}}{ln\frac{h_1}{z_0}} \tag{7.1}$$

Where:

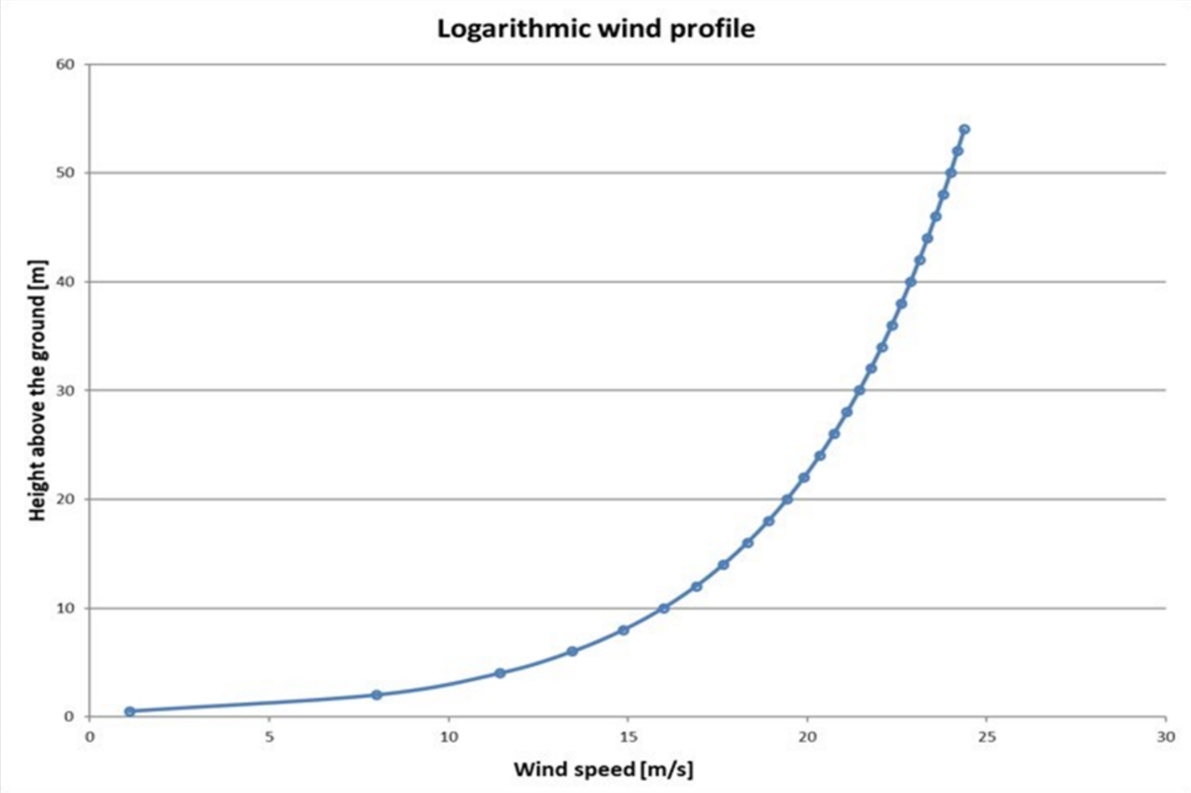
- v_1 = wind speed measured at the reference height h_1.
- h_1 = reference height to measure v_1.
- h_2 = height of the wind speed v_2 calculated for the wind profile.
- z_0 = 0.4 [m] roughness length selected (see Table 16.4, below).

Table 16.4: Roughness Length and Class to be used for the Logarithmic Wind Profile

Roughness Class	Roughness Length, z_0	Land Cover Types
0	0.0002 m	Water surfaces: seas and lakes
0.5	0.0024 m	Open terrain with smooth surface, e.g. concrete, airport runways, mown grass, etc.
1	0.03 m	Open agricultural land without fences and hedges; maybe some far apart buildings and very gentle hills
1.5	0.055 m	Agricultural land with a few buildings and 8 m high hedges separated by more than 1 km
2	0.1 m	Agricultural land with a few buildings and 8 m high hedges separated by approx. 500 m
2.5	0.2 m	Agricultural land with many trees, bushes and plants, or 8 m high hedges separated by approx. 250 m
3	0.4 m	Towns, villages, agricultural land with many or high hedges, forests and very rough and uneven terrain
3.5	0.6 m	Large towns with high buildings
4	1.6 m	Large cities with high buildings and skyscrapers

The wind profile used in the model has been calculated using the formula above and is represented in Figure 16.43.

Figure 16.43: Wind Profile used in the Model



16.7.4 Computational Mesh

The level of accuracy of the CFD results are determined by the level of refinement of the computational mesh. A mesh independent analysis is carried out prior to detailed simulation for final results. Details of parameters utilized for air and the computational mesh are presented in Table 16.5, while an example of the utilized computational mesh grid is as shown in Figures 16.44 – 16.46.

The grid follows the principles of the 'Finite Volume Method', which implies that the solution of the model equation is calculated at discrete points (nodes) on a three-dimensional grid, which includes all the flow volume of interest. The mathematical solution for the flow is calculated at the centre of each of these cells and then an interpolation function is used by the software to provide the results in the entire domain.

Table 16.5: Air and Computational Mesh Parameters

AIR AND COMPUTATIONAL MESH PARAMETERS	
Air Density $_\rho$	1.2 kg/m^3
Ambient Temperature (T)	288 K (approx.15°C)

AIR AND COMPUTATIONAL MESH PARAMETERS	
Min. Mesh Cell Size	0.5 m in the refined volume surroundings 1.5 m at other environment buildings 2 m < elsewhere
Min. Cell Size Ratio	1:1:1 (dx:dy:dz)
Total Mesh Size	Approx. cells number = 15 million

Figure 16.44: Proposed Project Domain – Computational Mesh Utilized

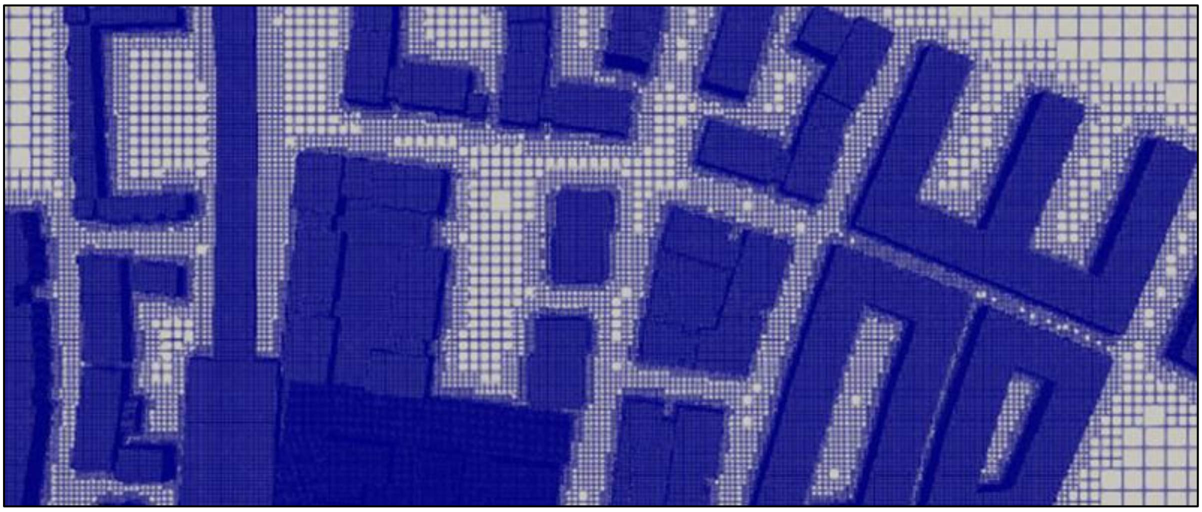


Figure 16.45: Proposed Project – Computational Mesh Utilized

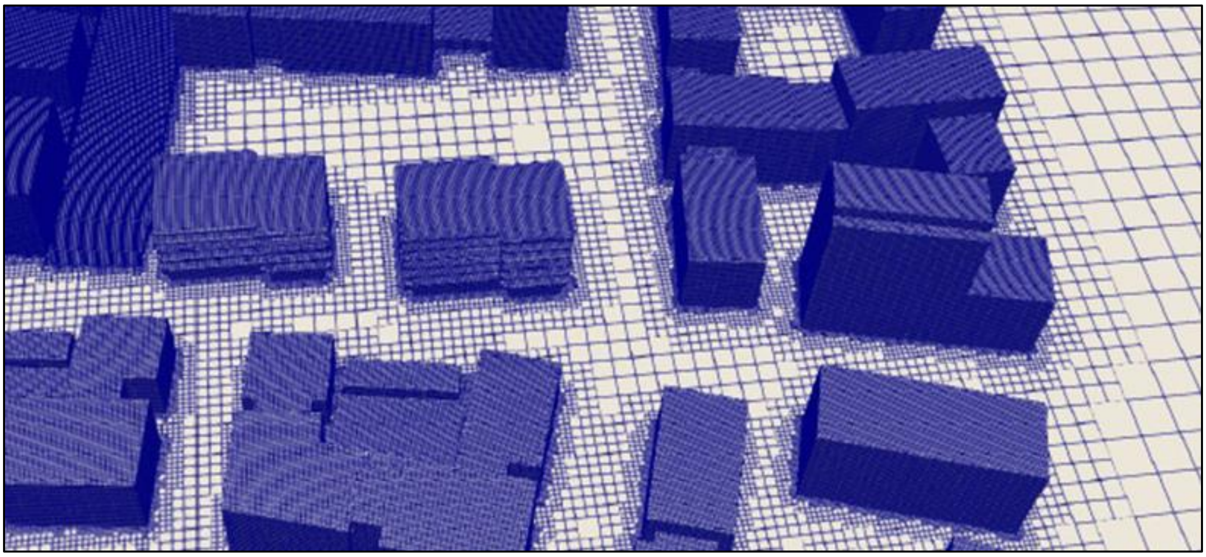
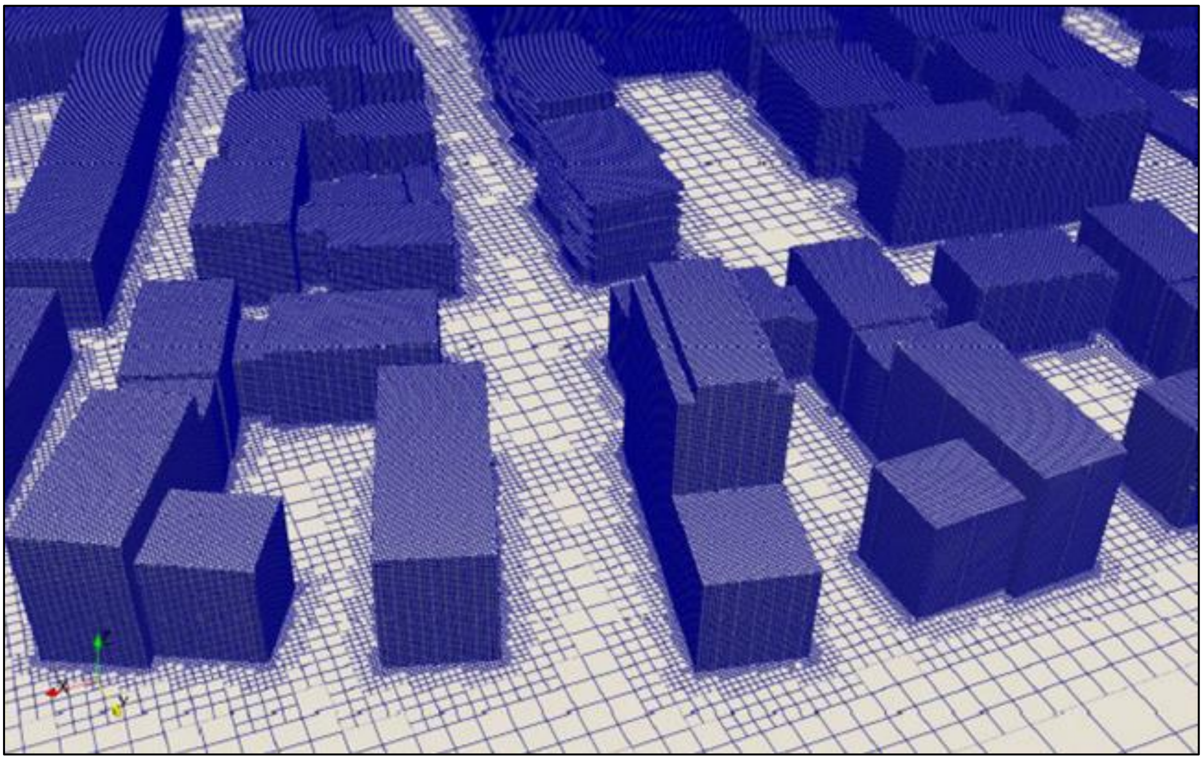


Figure 16.46: Proposed Project – Computational Mesh Utilized



16.7.5 Construction Phase

The effects on wind microclimate at the Site during the construction phase of the proposed Project has not been directly assessed but evaluated based on professional judgement. Statistical Dublin historical wind data have been used to carry out this analysis based on the fact that the dominant wind direction is from south-west.

As the finalization of the proposed Project proceeds, the wind setting at the Site will progressively conform to those of the completed proposed Project. It is possible that in the final stages of construction, implementation of the mitigation measures would be needed in areas that are expected to be windier than others, in case some areas of the Site are expected to be functional before the construction is finalized. It is noted that comprehensive dust management measures have been prescribed in Chapter 11 (Air Quality & Climate) and Appendix 11.3 (Dust Management Plan).

Due to the fact that windier conditions are acceptable within a construction area (not accessible to the public), and the proposed Project would not be the reason for critical wind conditions on-Site (and are expected to be slightly calmer when the proposed Project is in situ), the predicted impacts during the construction phase are identified as being ***not significant*** or ***imperceptible***.

16.7.6 Operational Phase

This section shows CFD results of wind and microclimate assessment carried out in respect of the operational phase of the proposed Project. Wind simulations have been carried out on all the various directions for which the proposed Project could show critical areas in terms of pedestrian comfort and safety. For this, the Lawson and Distress Maps have been presented to identify the suitability of each area to its prescribed level of usage and activity. The results present parameters outlined within the acceptance criteria previously described.

A summary of CFD model input data used for the proposed Project are given in Table 16.6.

Table 16.6: Summary of CFD Model Input Data

Ambient Pressure	101325 Pa
Wind Profile	Logarithmic atmospheric profile
Ambient Temperature	15 °C
Analysis Type	Steady state (LES)
Total Cells Used	> 20,000,000
Mesh Size	< 0.2 m
Turbulence Treatment	K-epsilon turbulence model
Convergence Criteria	$< 10^{-6}$
CFD Domain Inlet	Wind velocity inlet
CFD Domain Outlet	Pressure outlet condition (zero pressure)

It is also of interest at this point to underline once more the objectives of simulations performed. In particular:

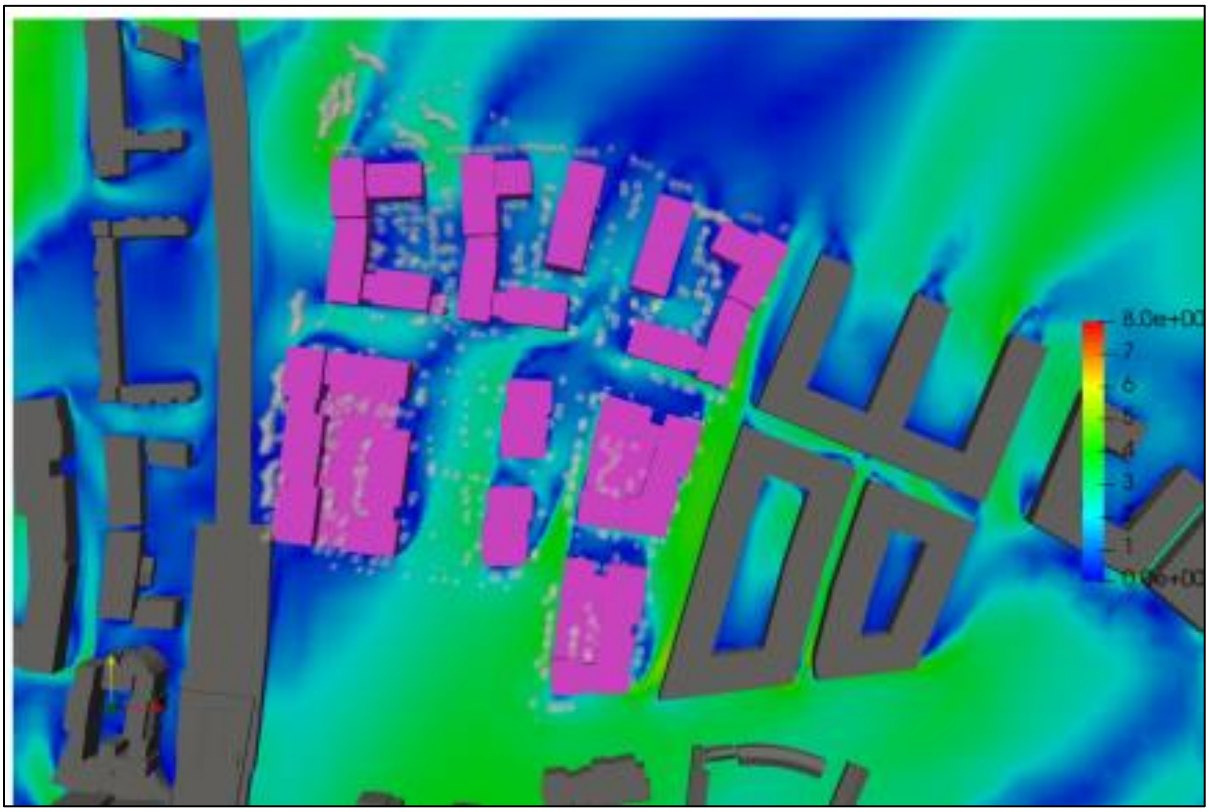
- Pedestrian wind comfort and safety studies are conducted to predict, assess and, where necessary, mitigate, the impact of the proposed Project on pedestrian level wind conditions.

Pedestrian areas include sidewalks and street frontages, pathways, building entrance areas, open spaces, public spaces, amenity areas, outdoor sitting areas, etc.

Results of the simulations carried out are detailed in the following sections. These results present parameters, as outlined in the acceptance criteria section, described previously for the proposed Project. Results of wind flow speeds are collected throughout the simulation and analysed based on the Lawson Discomfort Criteria.

Figure 16.46 shows a 3D example of wind speed results collected at 1.5 m height above ground floor level of the proposed Project. Red colours generally indicate critical values while blue colours indicate tenable conditions.

Figure 16.46: Wind Flow Results Collected At 1.5 m Above Ground Floor Level



16.7.6.1 Proposed Project with Existing & Permitted Development ('Existing Scenario')

This section assessed the potential impact of the proposed Project on the existing environment, also considering future buildings that have been granted planning permission but that are not built yet, and the suitability of the proposed Project to create and maintain a suitable and comfortable environment for different pedestrian activities.

The proposed Project and adjacent buildings model (including permitted GA1 with under construction blocks as per F16A/0412, permitted GA2 and Clongriffin developments) are shown in Figure 16.1.

Results of wind speeds and their circulations around the proposed Project at pedestrian level of 1.5 m above the ground are presented for all the simulated wind directions in the following figures, in order to assess wind flows at ground floor level of the proposed Project.

Higher velocities are experienced around the buildings for certain wind directions. In particular, some recirculation effects are expected near the corners of the units, on the main road on the south and south east side of the proposed Project and on the main road across the proposed Project. Courtyards, parks and squares seems to be well shielded. However, some recirculation effects have been found for certain wind directions.

Figures 16.47 to 16.48 present views of the flow velocity results for the entire domain for the dominant wind direction (225°).

Figure 16.47: Wind Speed Results at 1.5m above Ground - Top View: 225°

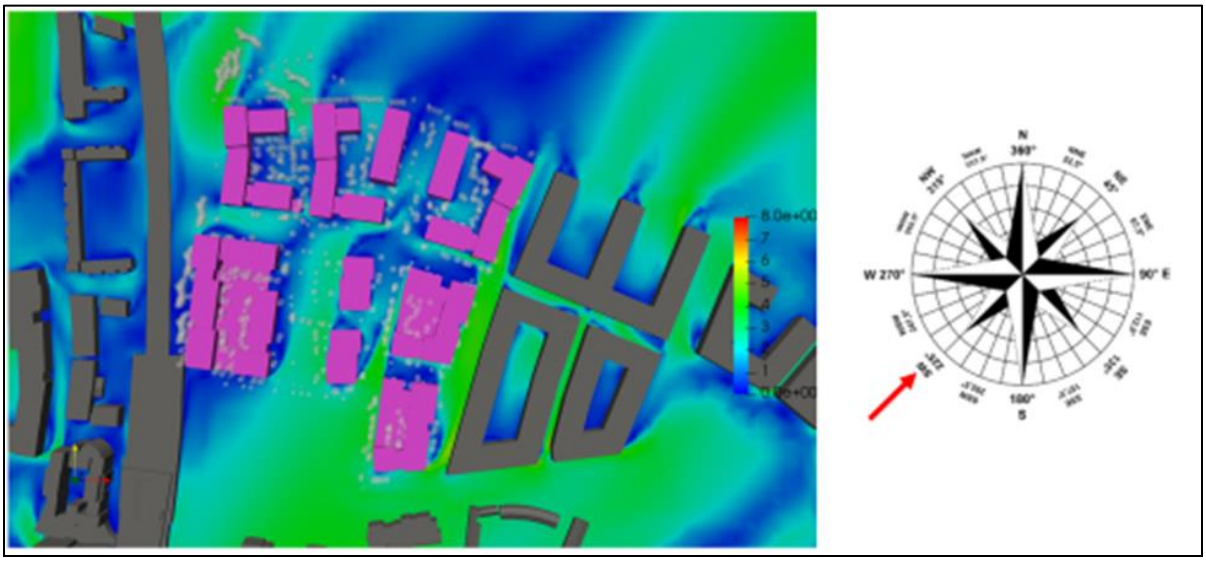
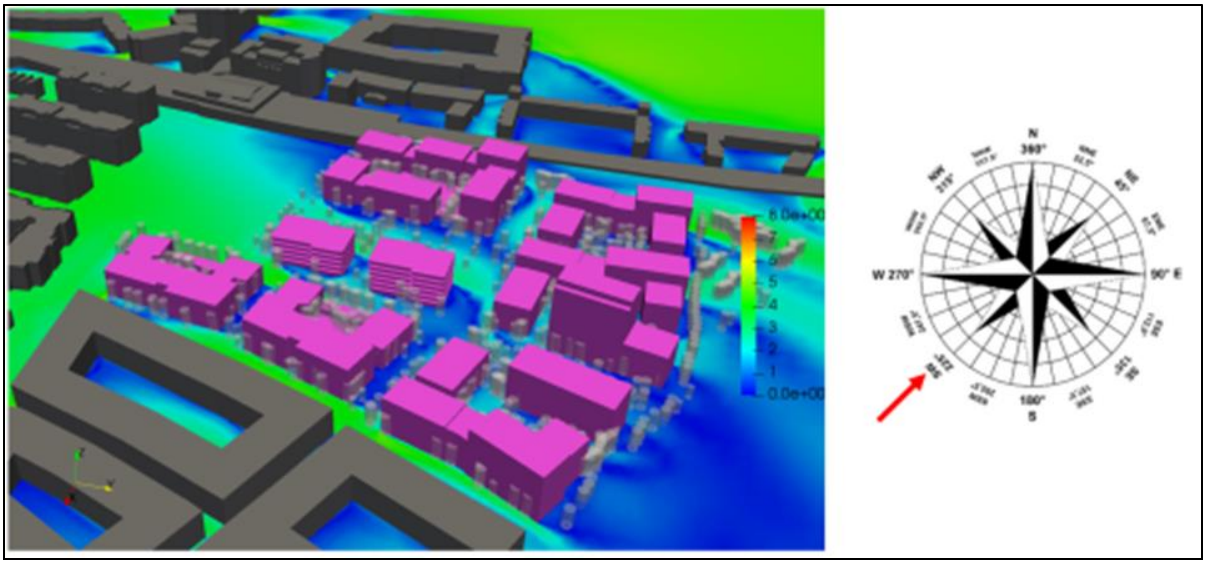


Figure 16.48: Wind Speed Results at 1.5m Above Ground - 3D View: 225°



Figures 16.49 to 16.50 present views of the flow velocity results for the entire domain for the dominant wind direction (135°).

Figure 16.49: Wind Speed Results at 1.5m above Development Ground - Top View: 135°

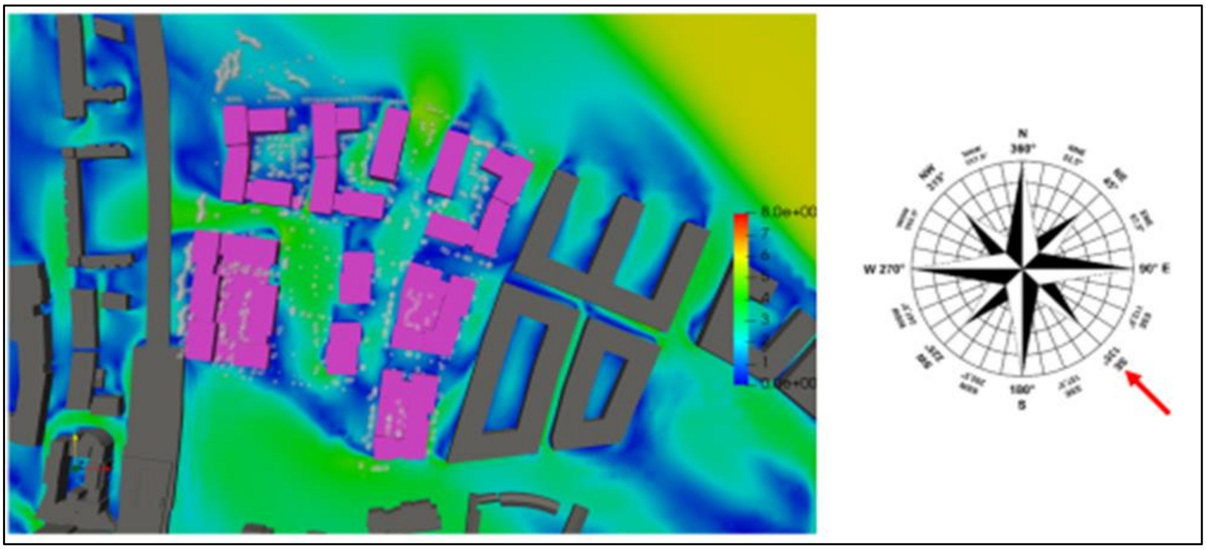
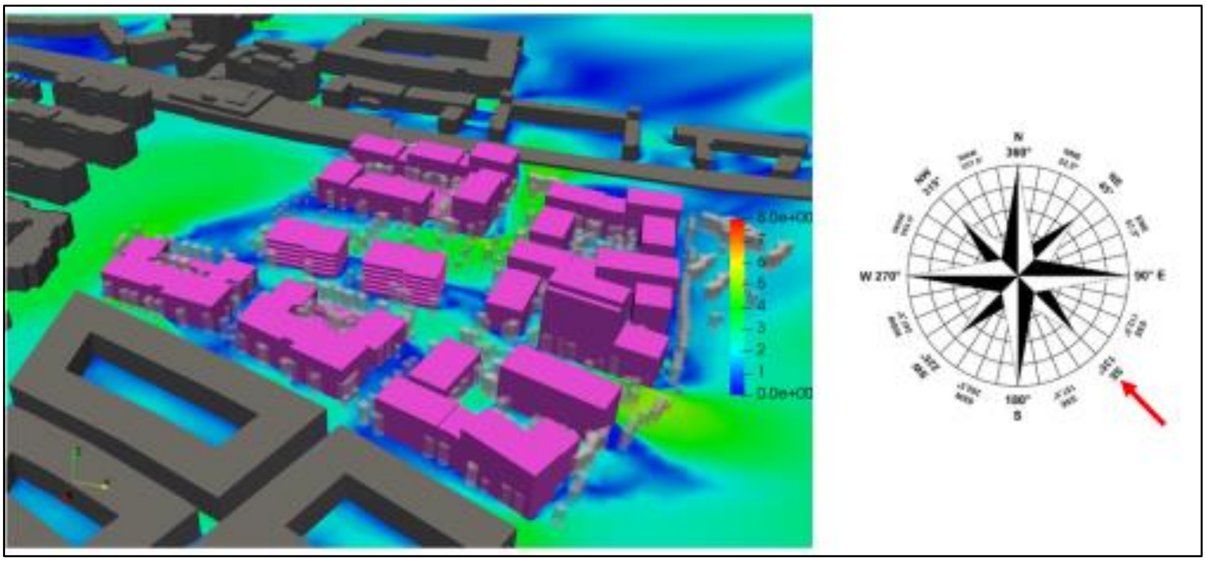


Figure 16.50: Wind Speed Results at 1.5m Above Development Ground - 3D View: 135°



Figures 16.51 to 16.52 present views of the flow velocity results for the entire domain for the dominant wind direction (236°).

Figure 16.51: Wind Speed Results at 1.5m above Development Ground - Top View: 236

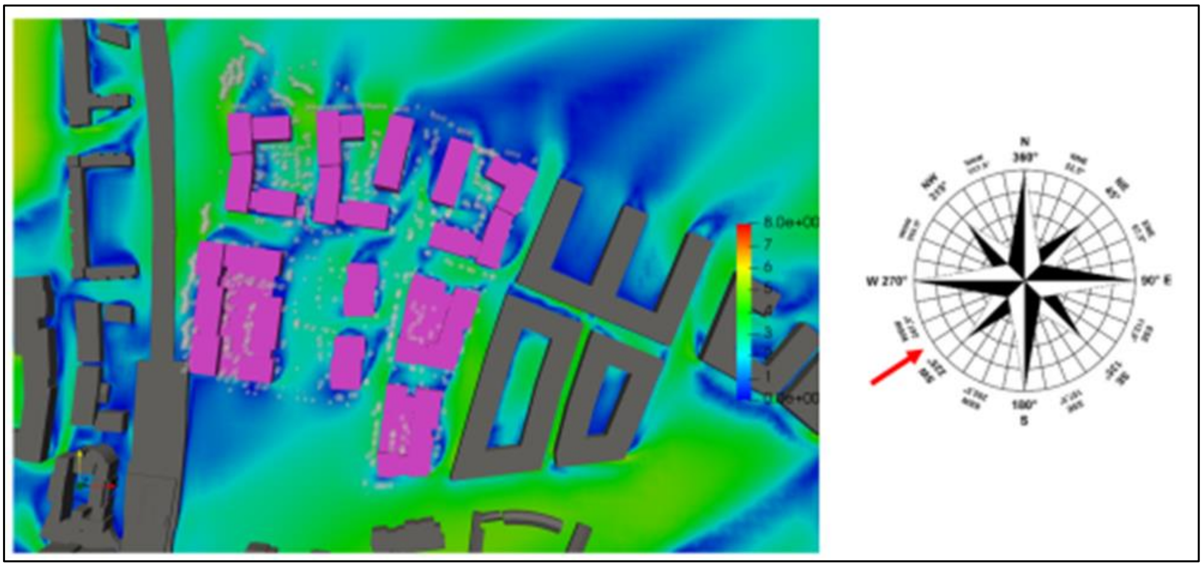
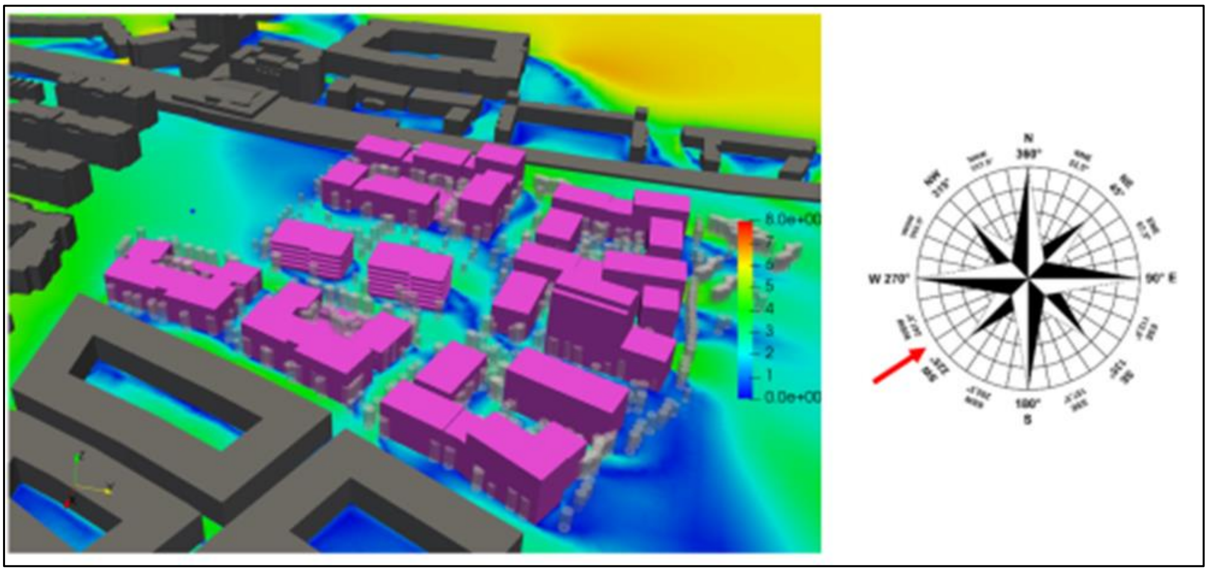


Figure 16.52: Wind Speed Results at 1.5m above Development Ground - 3D View: 236°



Figures 16.53 to 16.54 present views of the flow velocity results for the entire domain for the dominant wind direction (247°).

Figure 16.53: Wind Speed Results at 1.5m above Development Ground - Top View: 247°

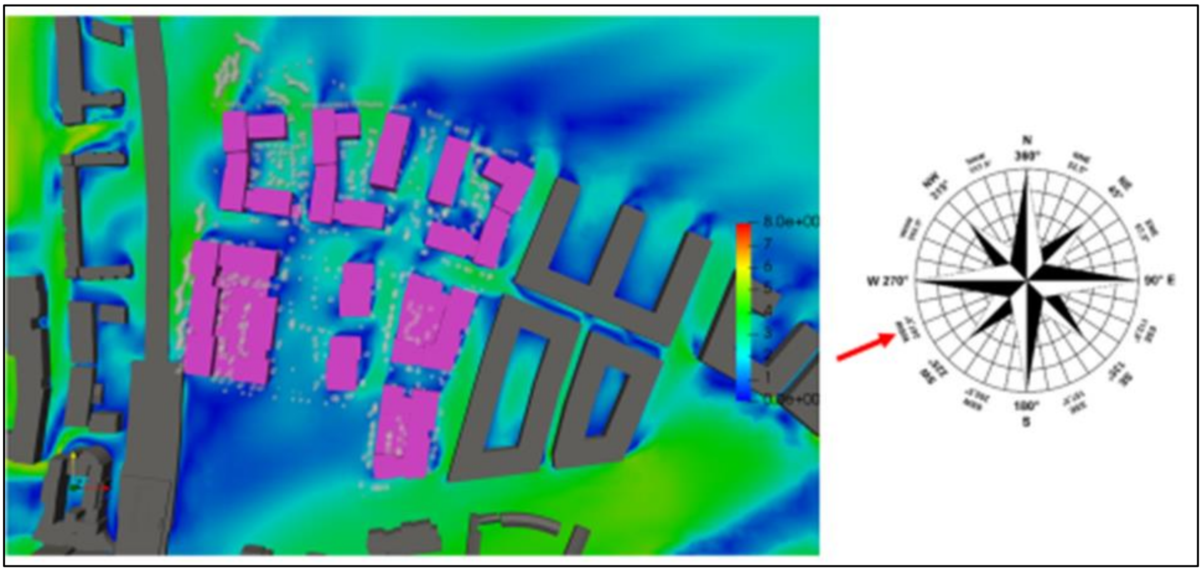
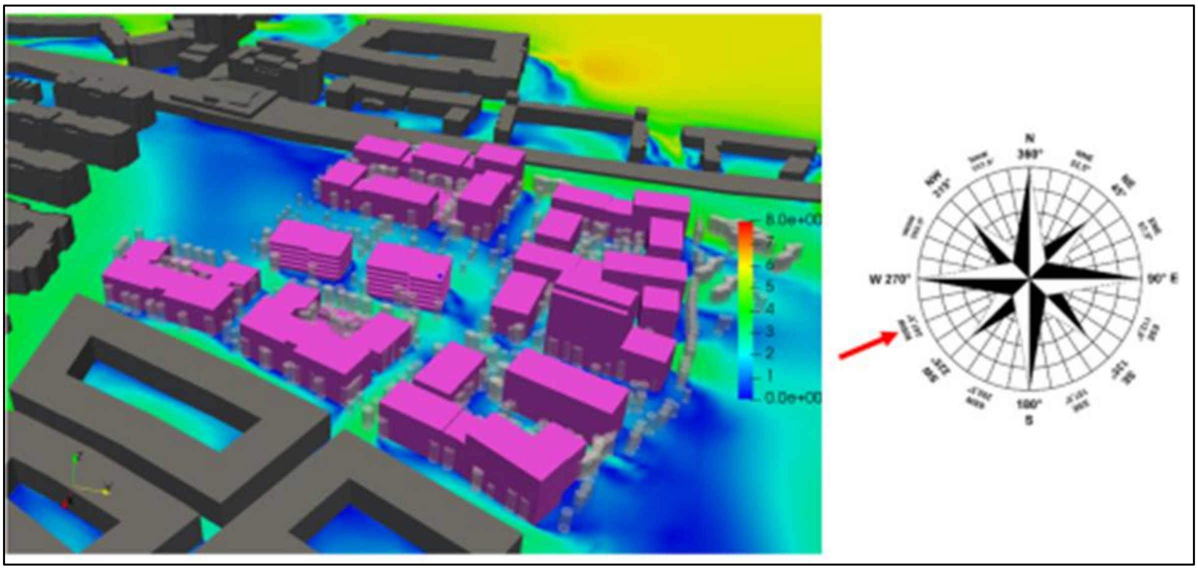


Figure 16.54: Wind Speed Results at 1.5m above Development Ground - 3D View: 247°



Figures 16.55 to 16.56 present views of the flow velocity results for the entire domain for the dominant wind direction (258°) and the results for (270°), (281°) and (315°) are shown in the following pages.

Figure 16.55: Wind Speed Results at 1.5m above Development Ground - Top View: 258°

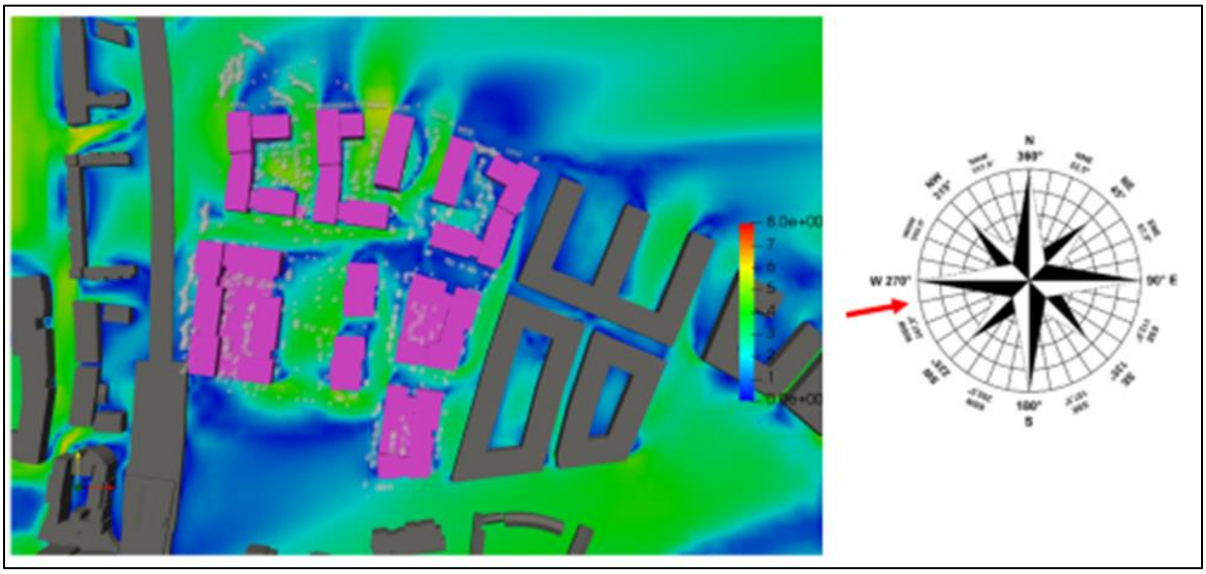


Figure 16.56: Wind Speed Results at 1.5m above Development Ground - 3D View: 258°

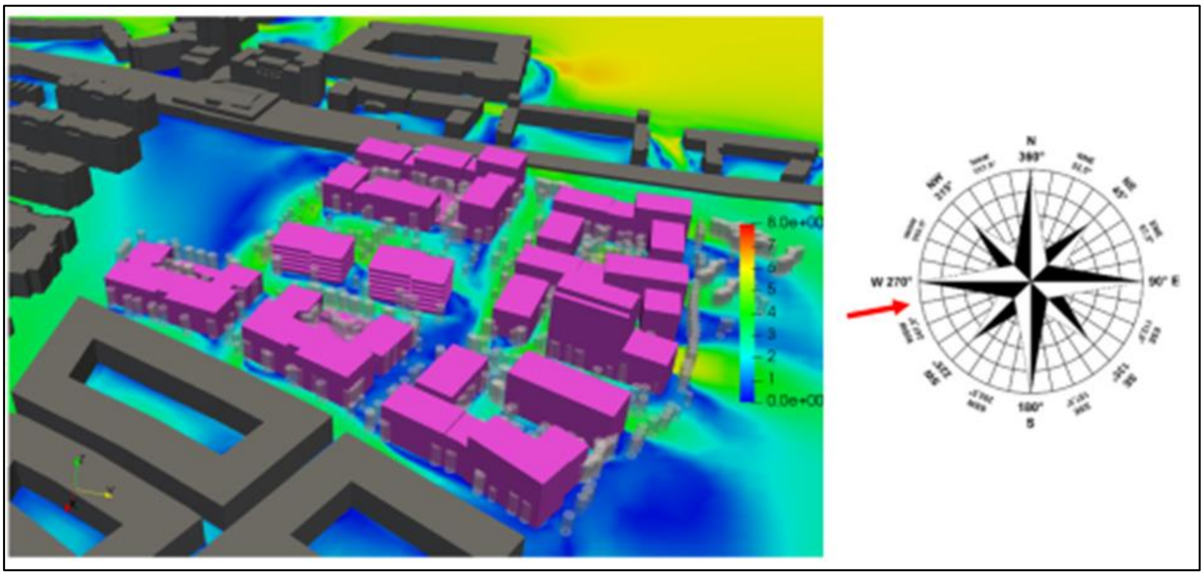


Figure 16.57: Wind Speed Results at 1.5m above Development Ground - Top View: 270°

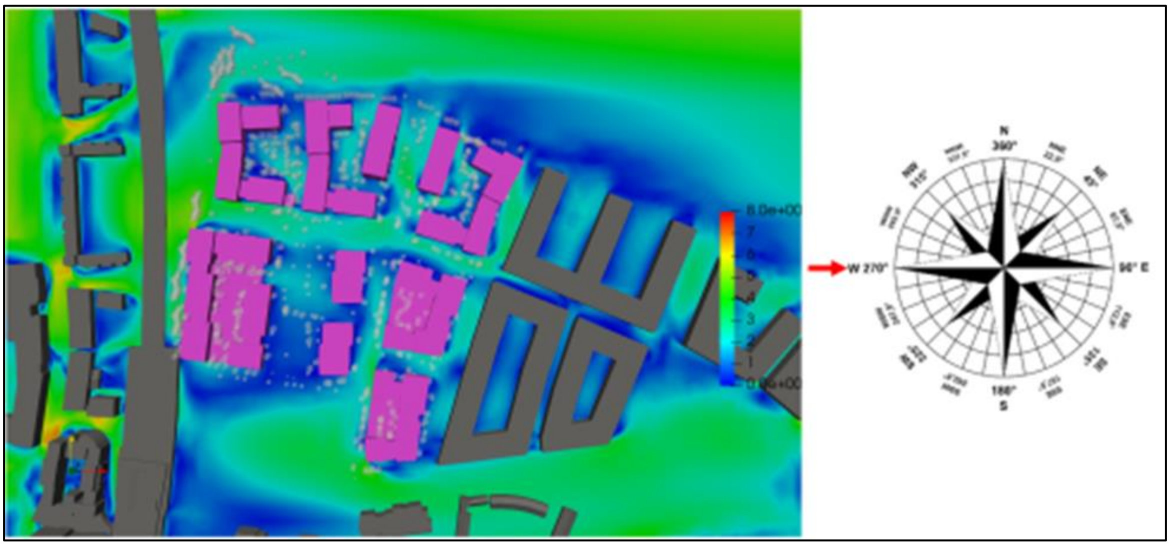


Figure 16.58: Wind Speed Results at 1.5m above Development Ground - 3D View: 270°

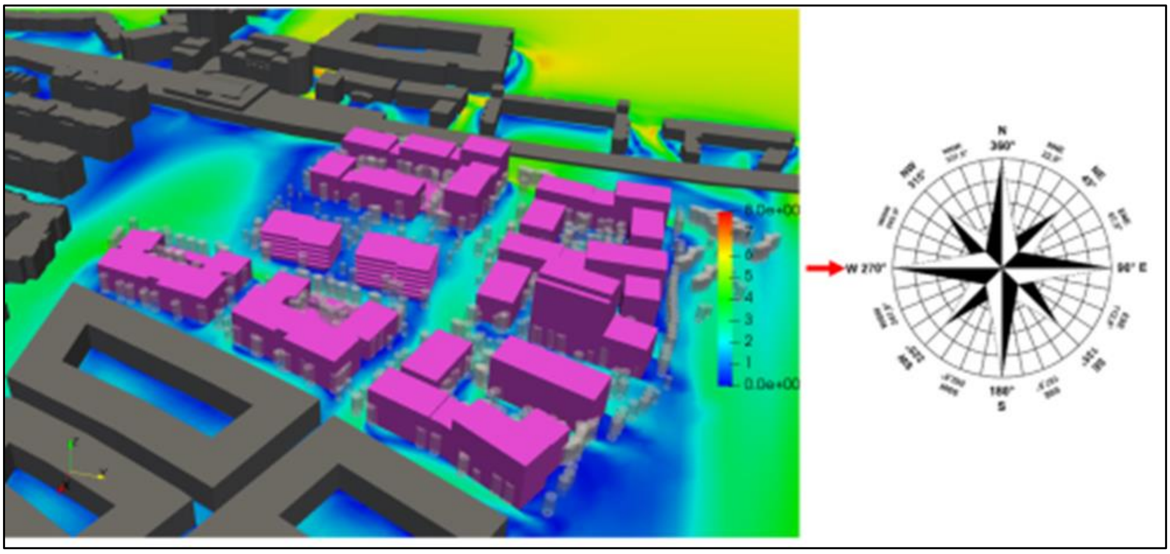


Figure 16.59: Wind Speed Results at 1.5m above Development Ground - Top View: 281°

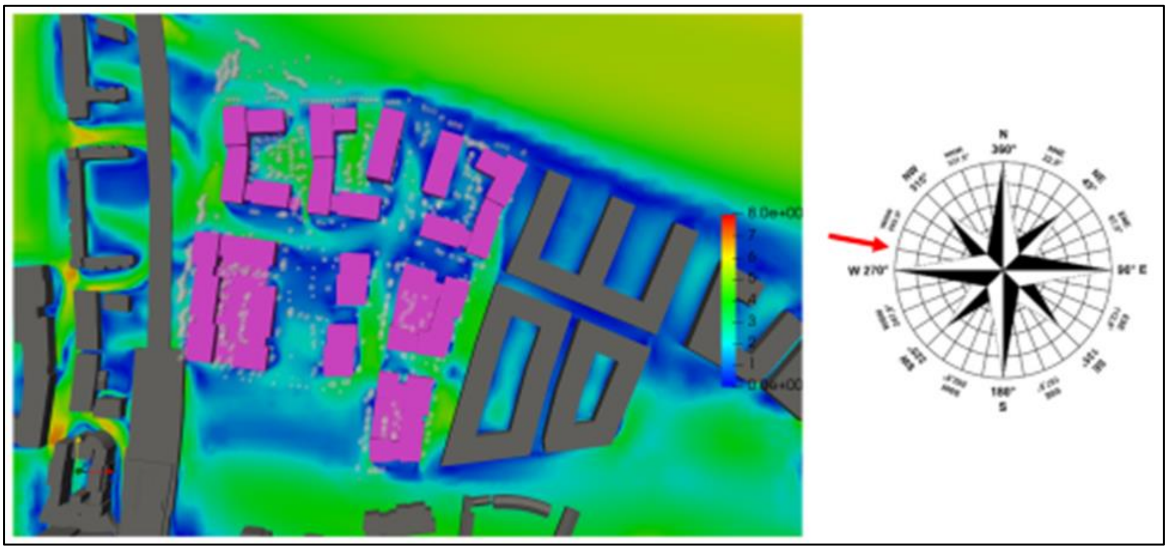


Figure 16.60: Wind Speed Results at 1.5m above Development Ground - 3D View: 281°

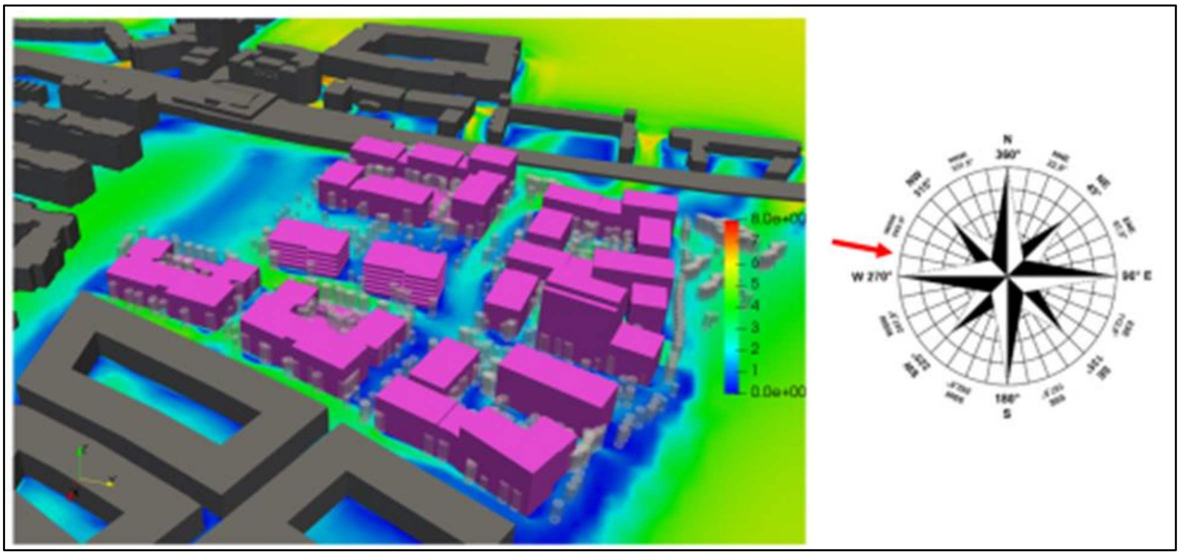


Figure 16.61: Wind Speed Results at 1.5m above Development Ground - Top View: 315°

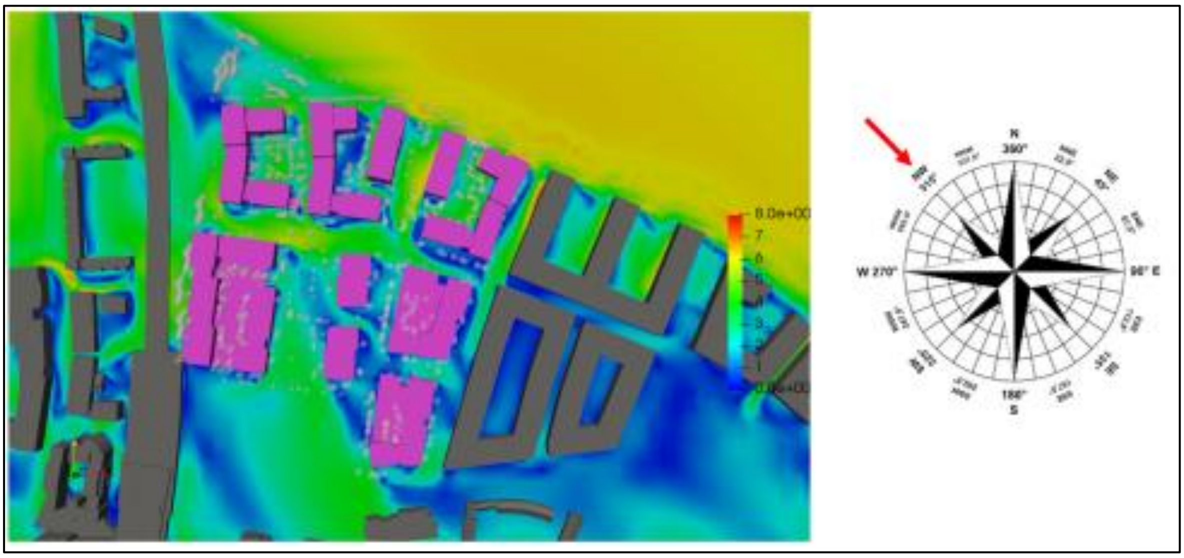


Figure 16.62: Wind Speed Results at 1.5m above Development Ground - 3D View: 315°

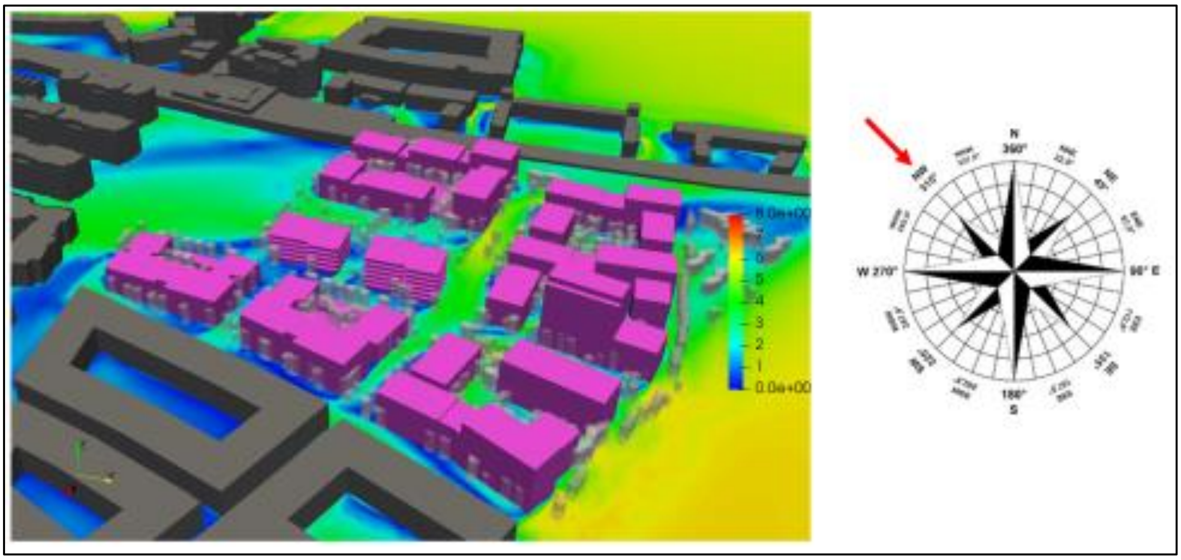


Figure 16.63: Wind Speed Results (Vertical Slice) Existing Scenario - 3D View: 225°

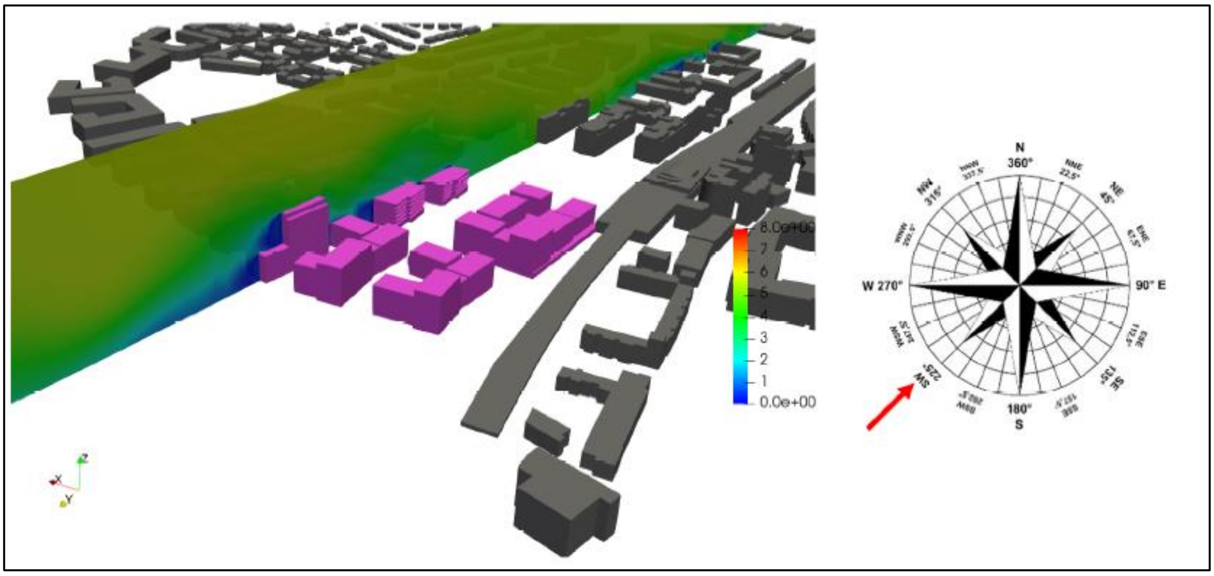


Figure 16.64: Wind Speed Results (Vertical Slice) Existing Scenario - 3D View: 135°

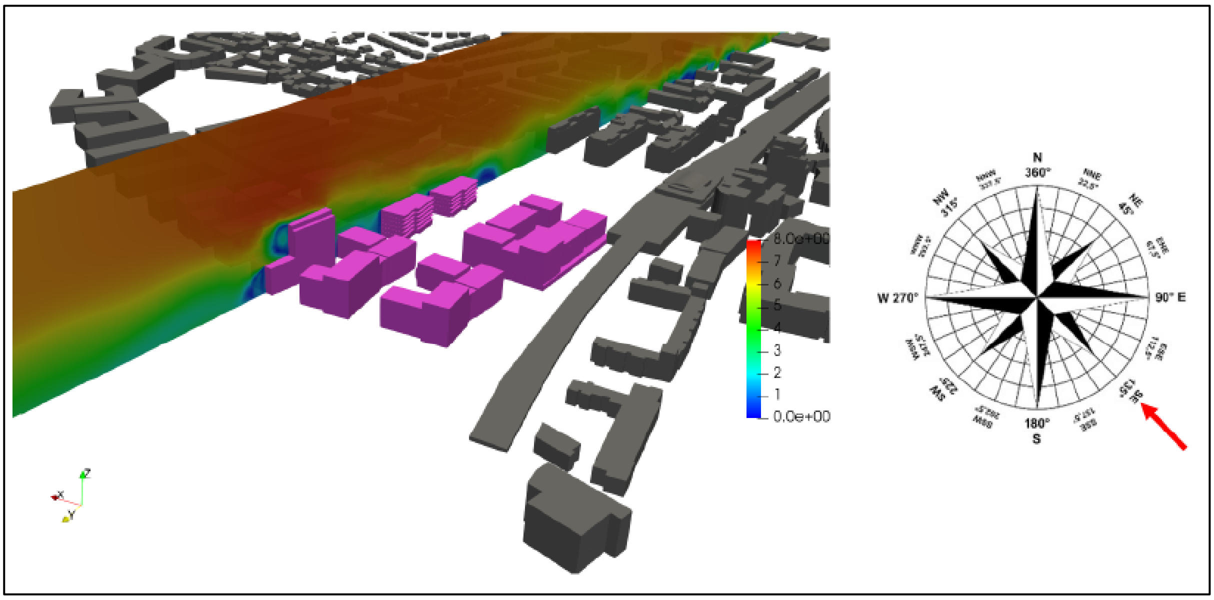


Figure 16.65: Wind Speed Results (Vertical Slice) Existing Scenario - 3D View: 236°

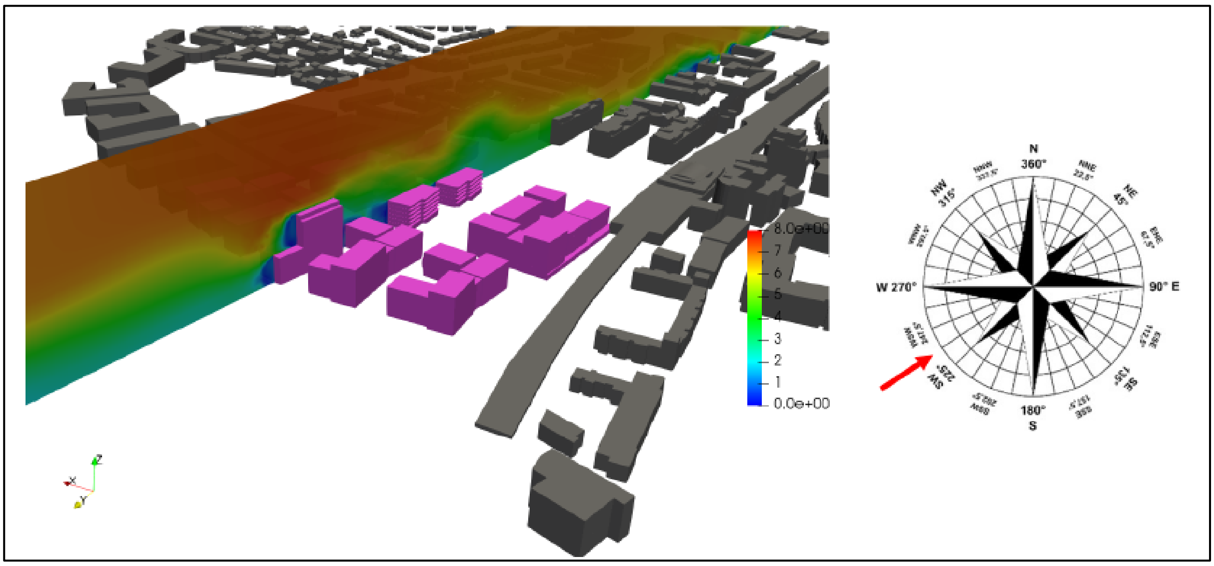


Figure 16.66: Wind Speed Results (Vertical Slice) Existing Scenario - 3D View: 225°

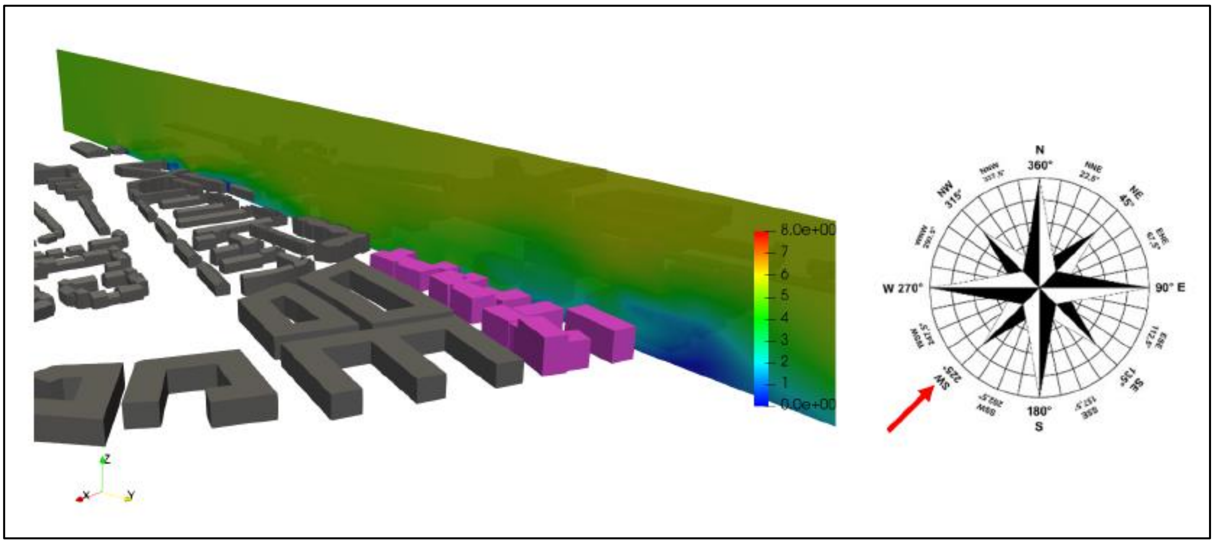


Figure 16.67: Wind Speed Results (Vertical Slice) Existing Scenario - 3D View: 135°

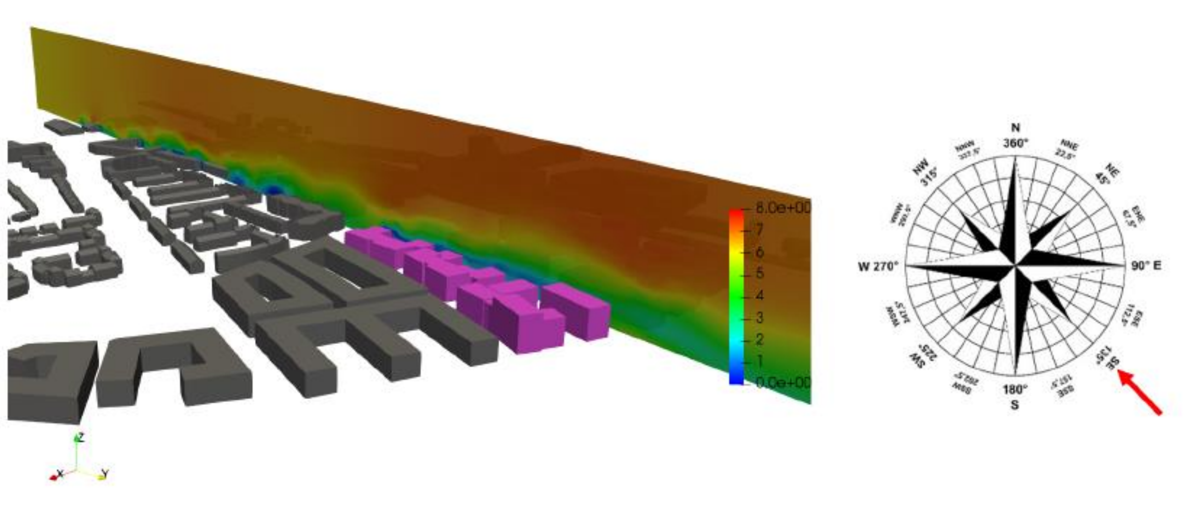
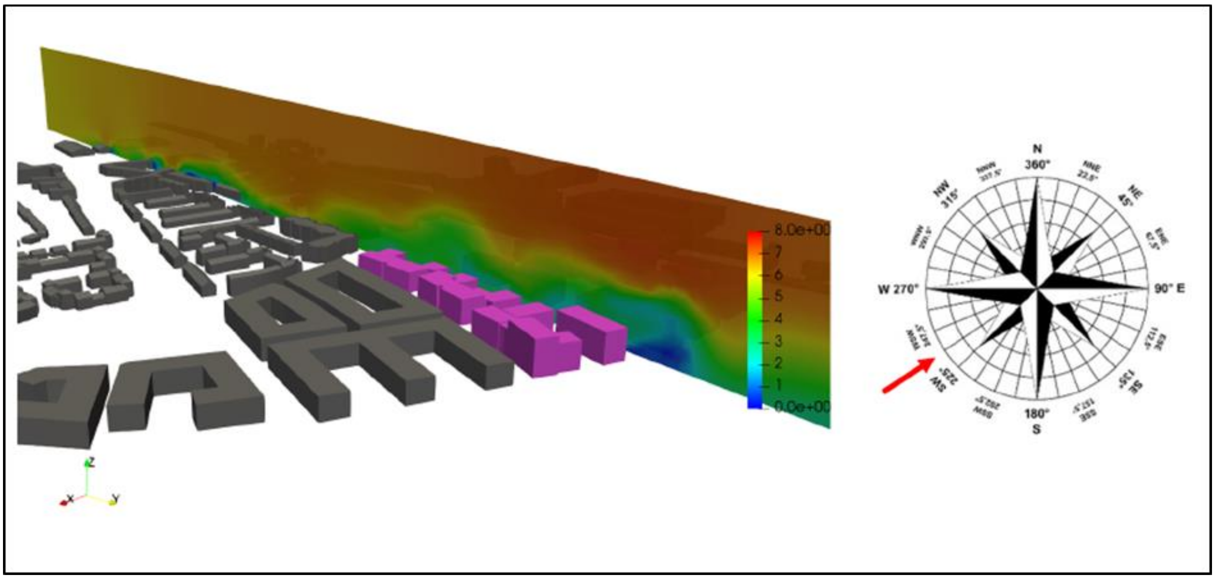


Figure 16.68: Wind Speed Results (Vertical Slice) Existing Scenario - 3D View: 236°



16.7.6.2 Proposed Project with Existing, Permitted & Proposed Development ('Cumulative Scenario')

This section assessed the impacts of the proposed Project on the existing environment, also considering developments that have been granted planning permission (but that are not built yet), and development at GA1 with the proposed amendments (as per ABP TA06F.310418). The model for this scenario is shown in Figure 16.2.

Results of wind speeds and their circulations around the proposed Project at pedestrian level of 1.5 m above the ground are presented for all the simulated wind directions. In general, the introduction of the proposed GA1 development is improving the wind impact on the south side; however, some higher velocities are still experienced around the buildings of the proposed Project due to south-westerly wind directions.

In particular, some recirculation effects are expected near the corners of the blocks, on the main road on the east side of the proposed Project and on the main road across the proposed Project, as well as near the train station, especially when the wind is blowing from south-west and west-south-west.

The implementation of tree landscaping is effective in mitigating the wind, similarly to what was seen in the 'existing scenario' analysed. Courtyards, parks and squares seem to be well shielded. However, some recirculation effect have been still found for certain wind directions, although their impact is negligible.

Figures 16.63 to 16.65 present views of the flow velocity results for the entire domain for the dominant wind direction (225°).

Figure 16.63: Wind Speed Results at 1.5m above Ground: Cumulative Scenario: Top View 225°

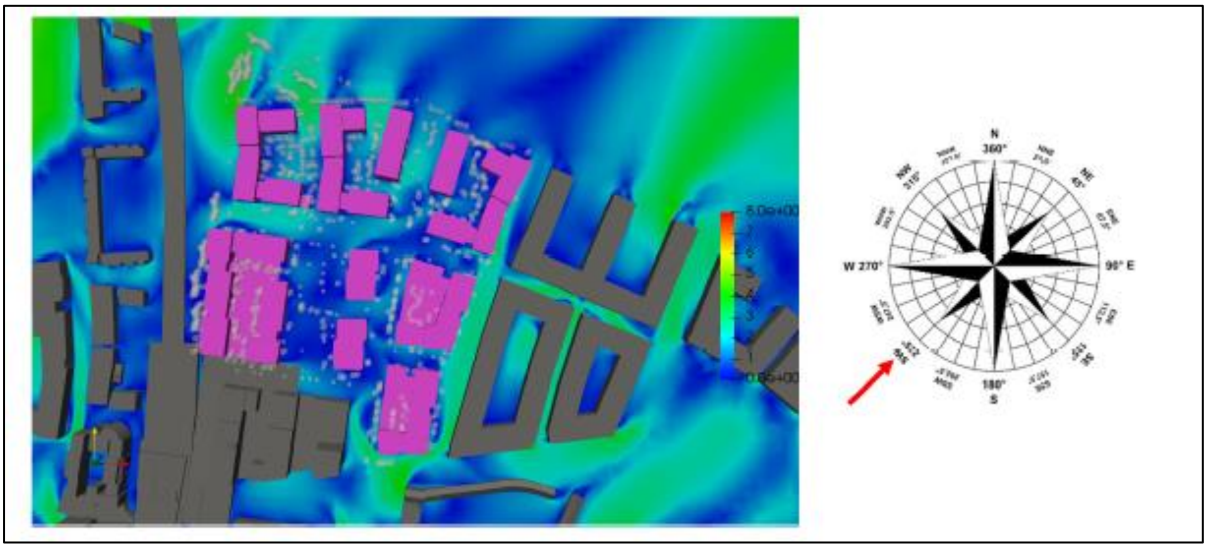


Figure 16.64: Wind Speed Results at 1.5m Above Ground: Cumulative Scenario: 3D View: 225°

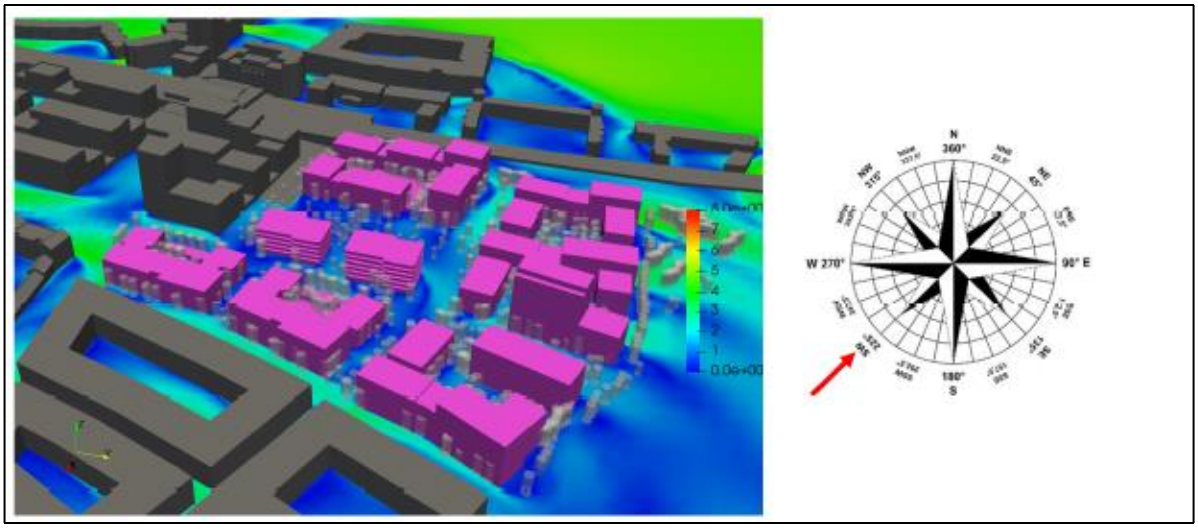


Figure 16.65: Wind Speed Results at 1.5m Above Ground: Cumulative Scenario: 3D View: 225°

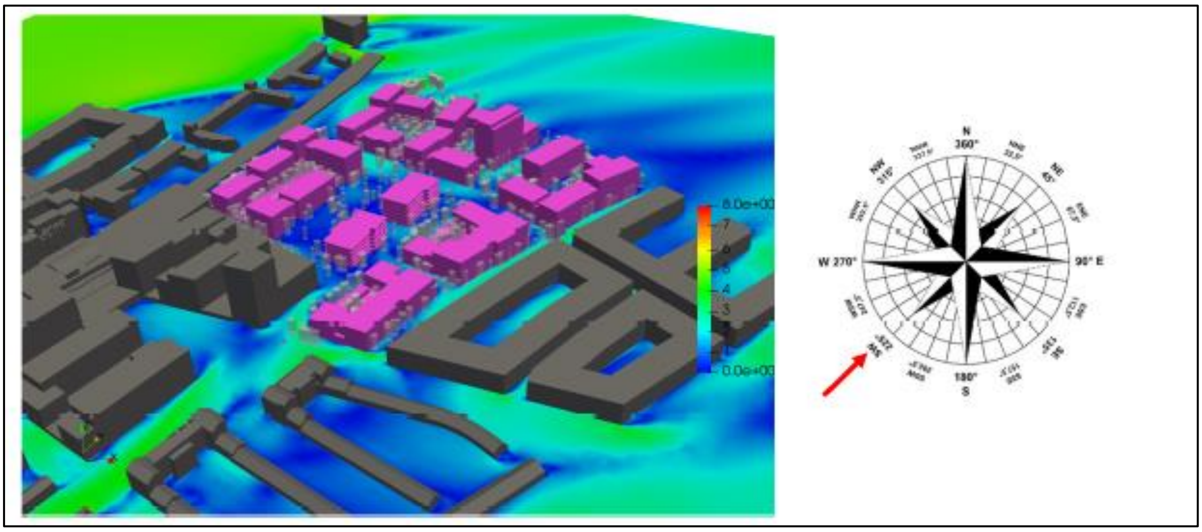


Figure 16.66: Wind Speed Results at 1.5m above Ground: Cumulative Scenario: Top View: 135°

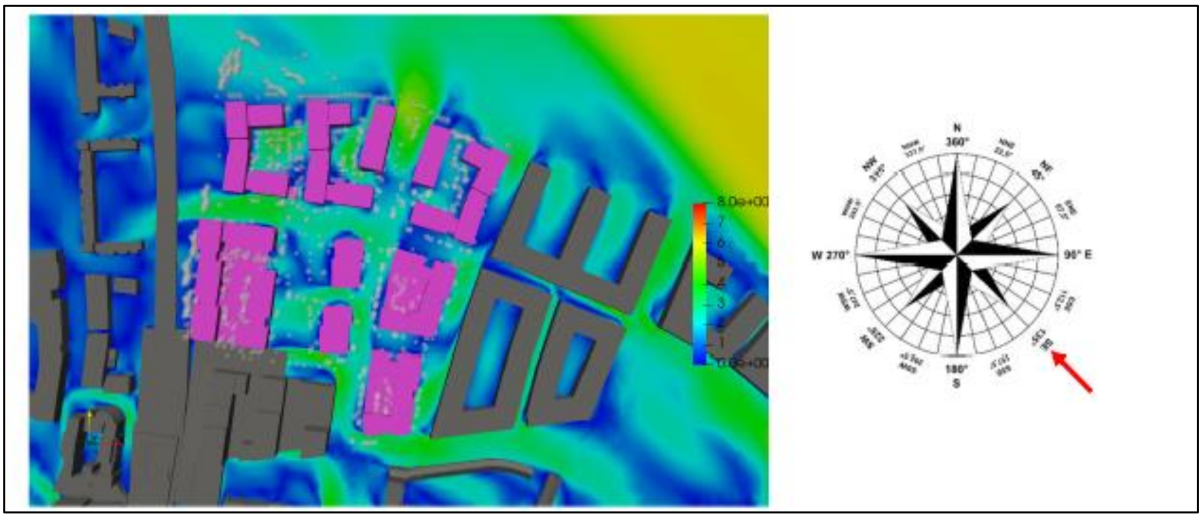


Figure 16.67: Wind Speed Results at 1.5m Above Ground: Cumulative Scenario: 3D View: 135°

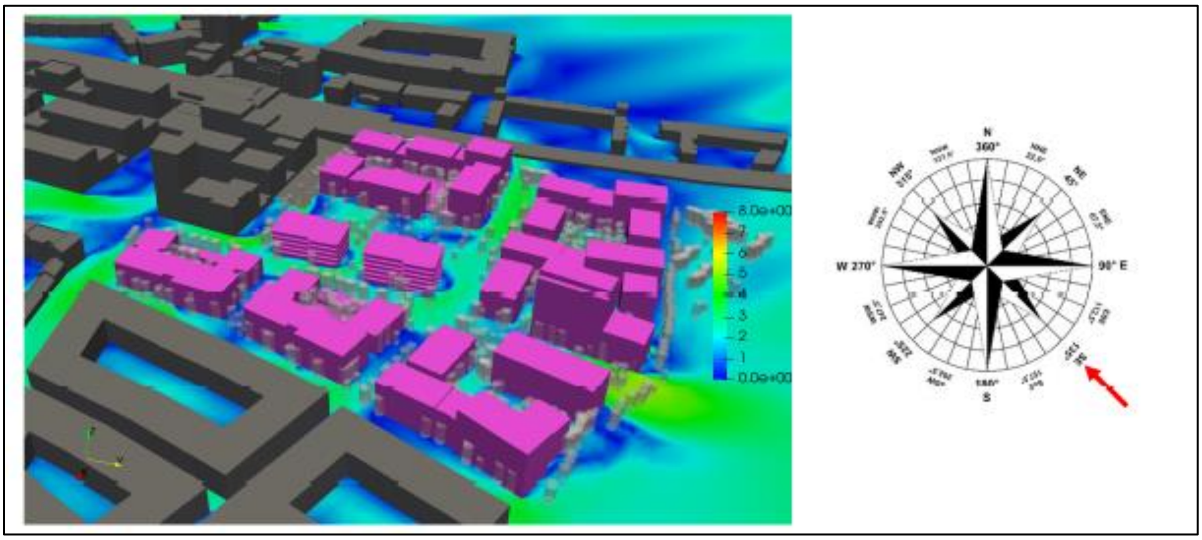


Figure 16.68: Wind Speed Results at 1.5m Above Ground: Cumulative Scenario: 3D View: 135°

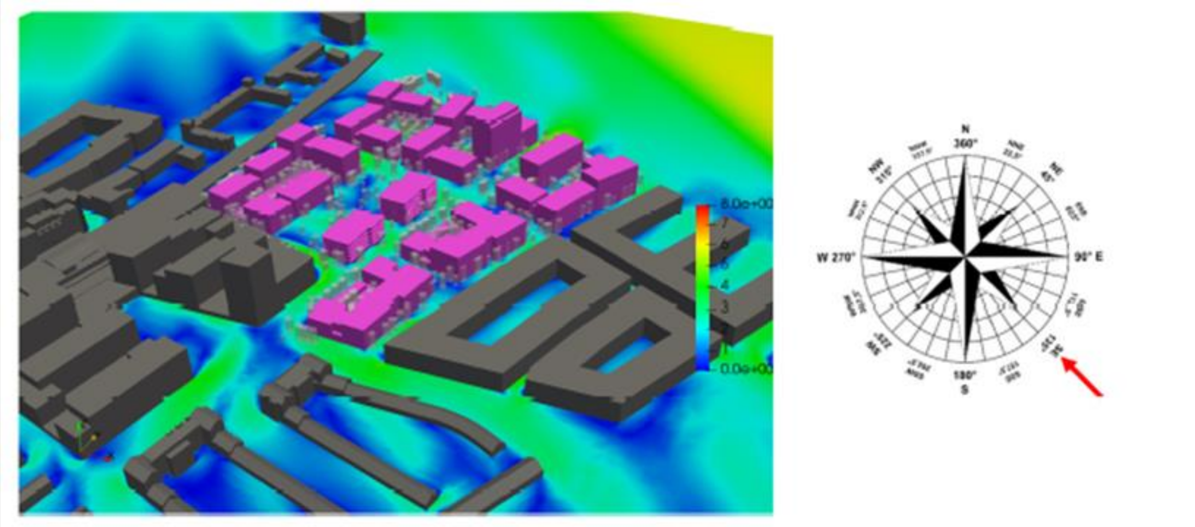


Figure 16.69: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 236

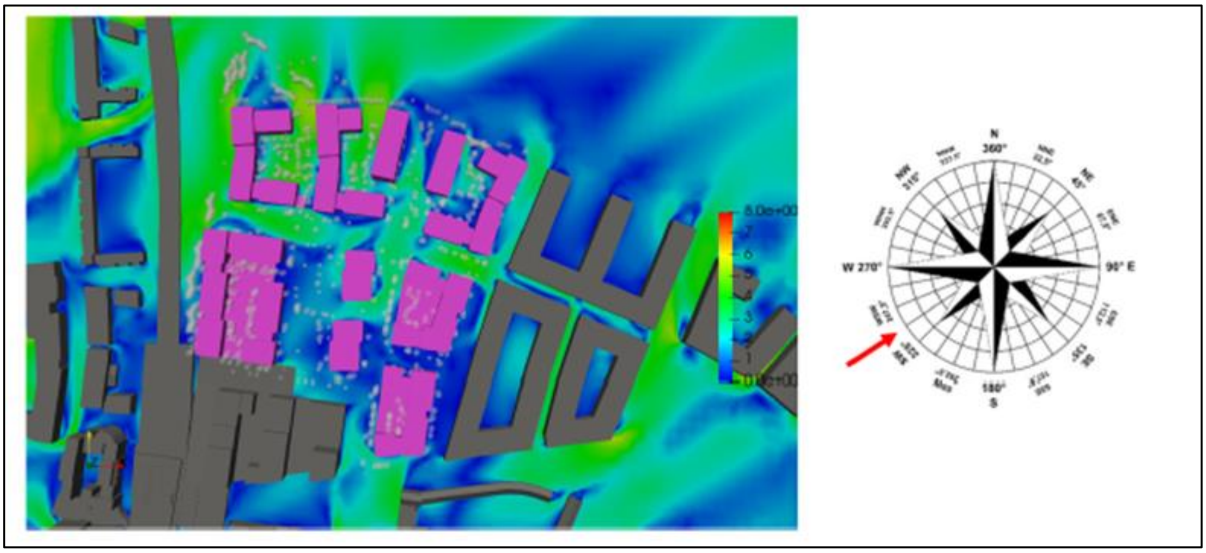


Figure 16.70: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 236°

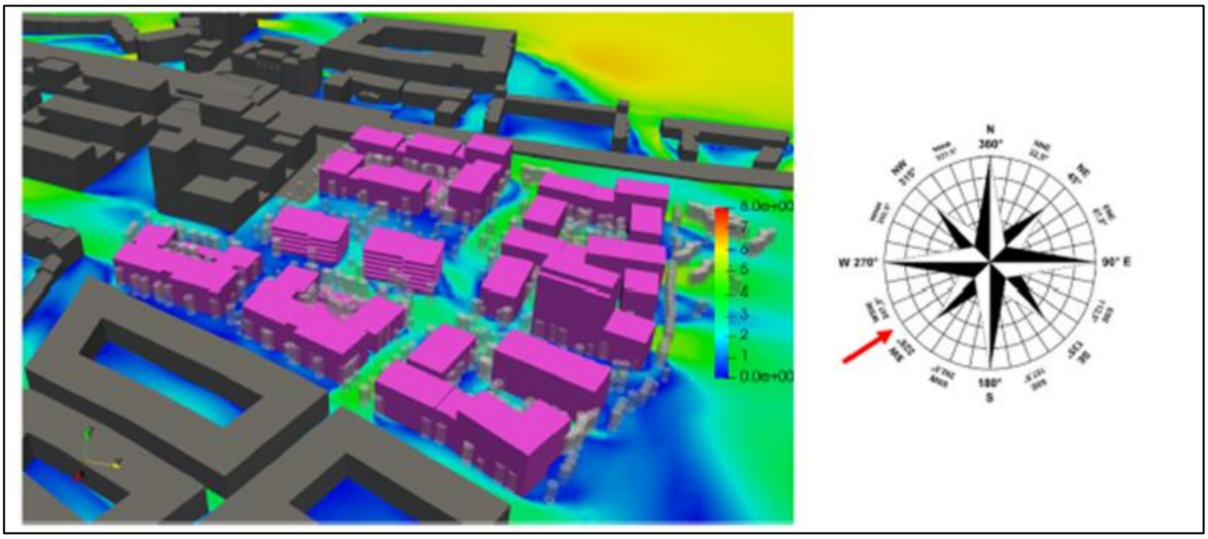


Figure 16.71: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 236°

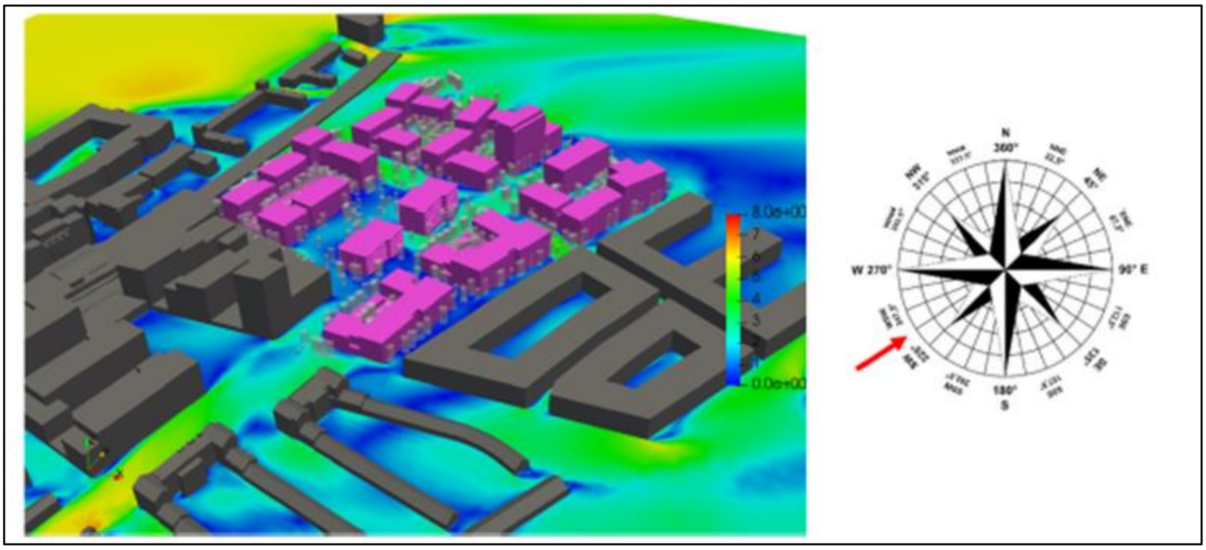


Figure 16.72: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 247°

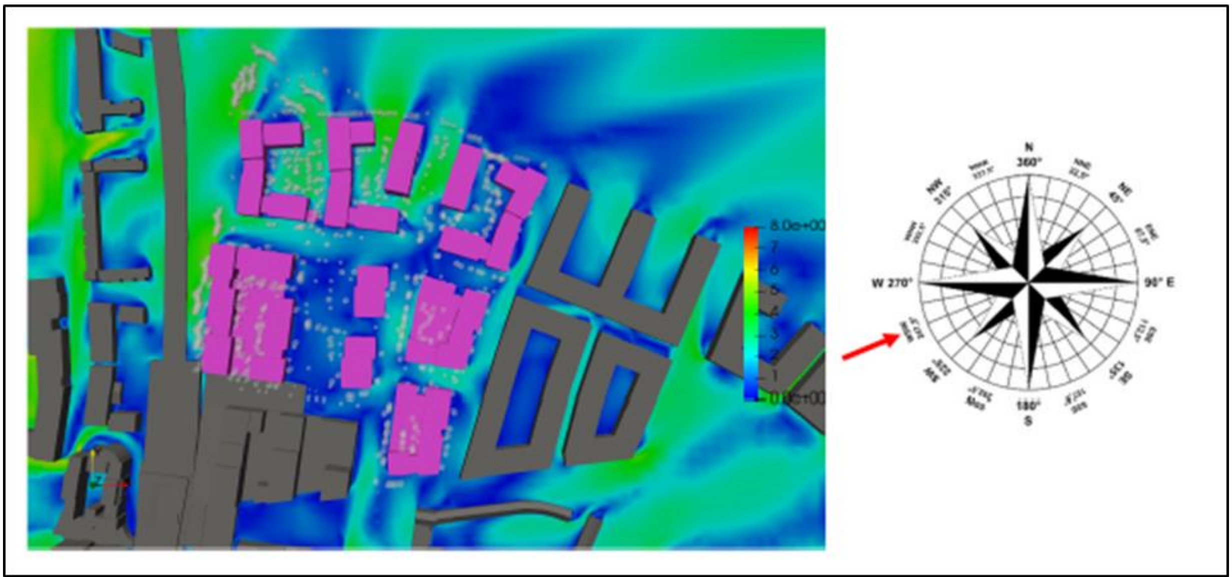


Figure 16.73: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 247°

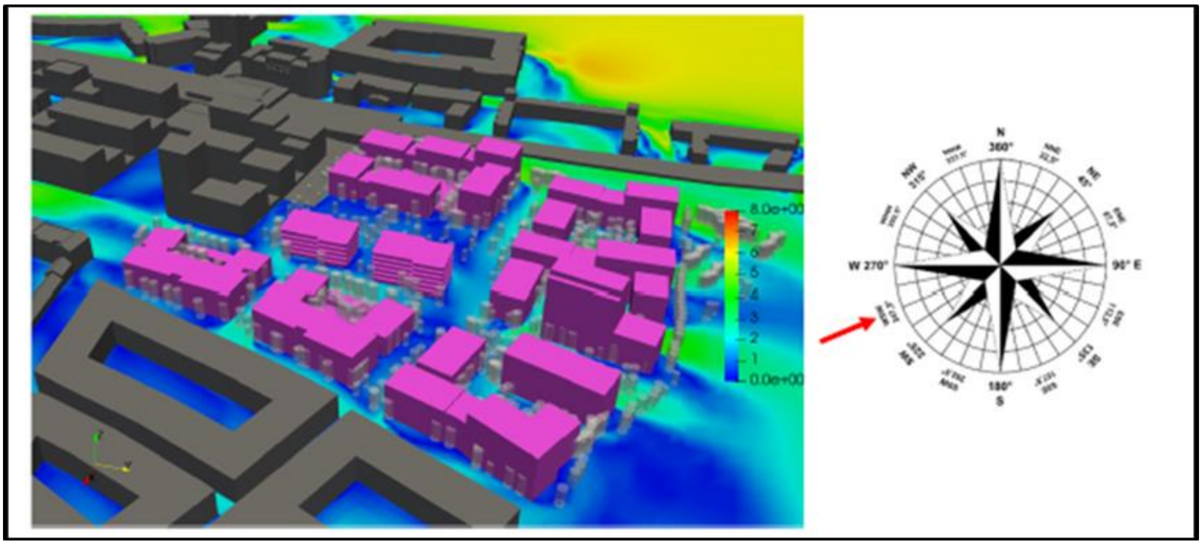


Figure 16.74: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 247°

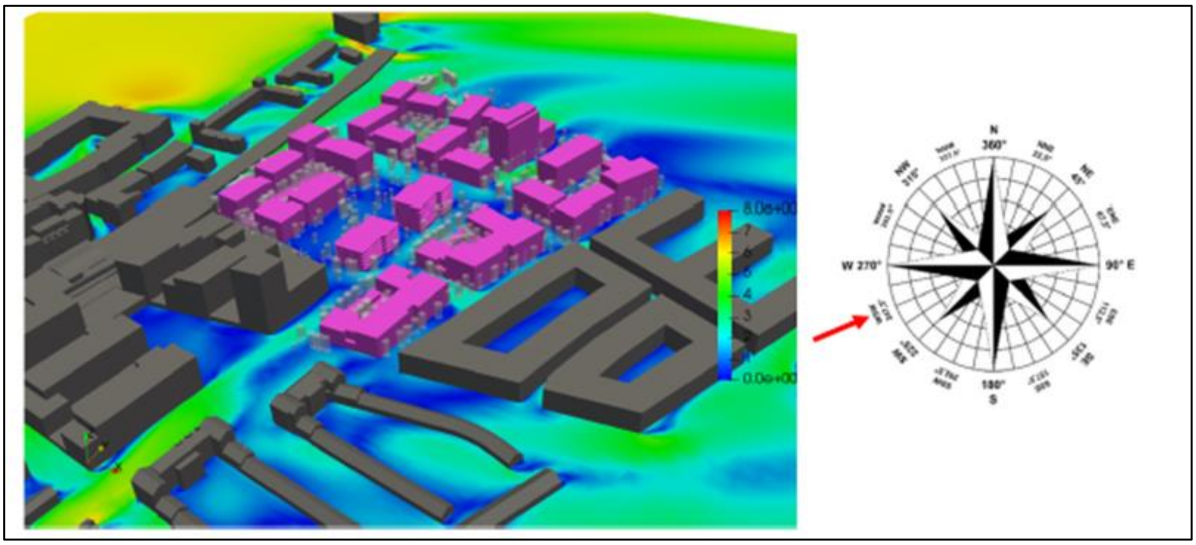


Figure 16.75: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 258°

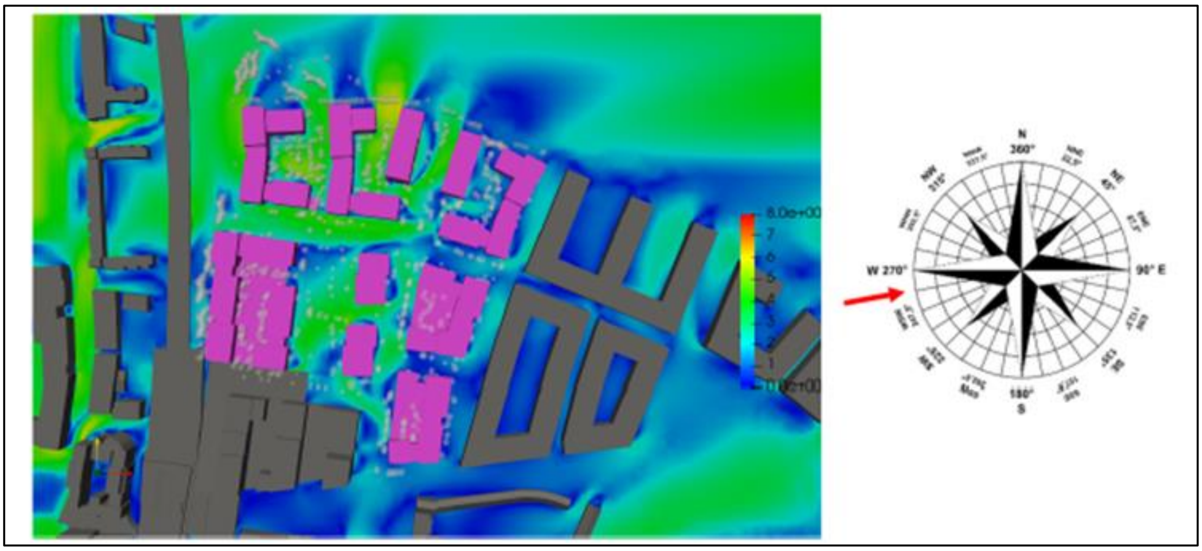


Figure 16.76: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 258°

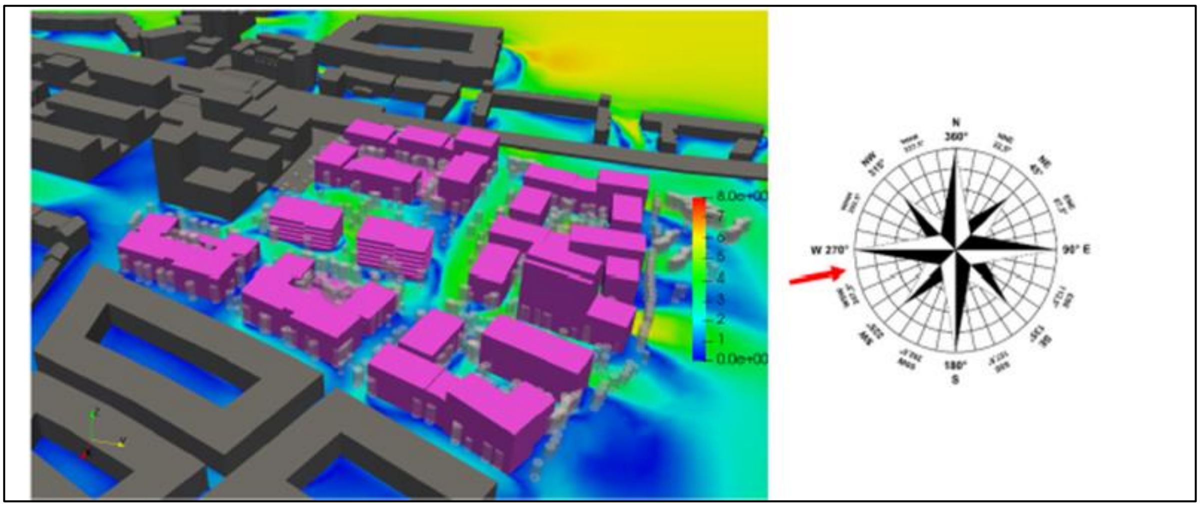


Figure 16.77: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 258°

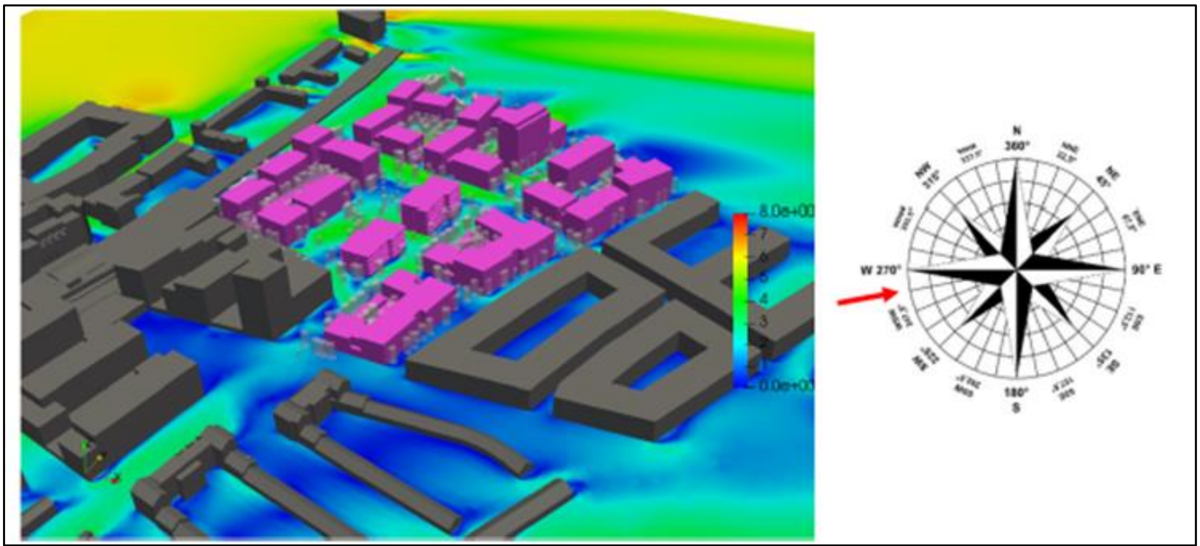


Figure 16.78: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 270°

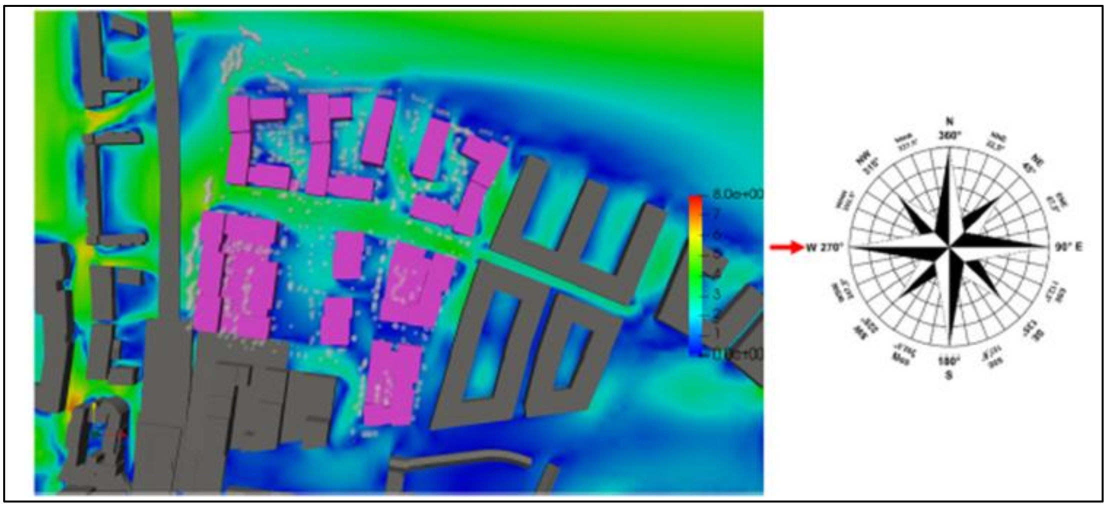


Figure 16.79: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 270°

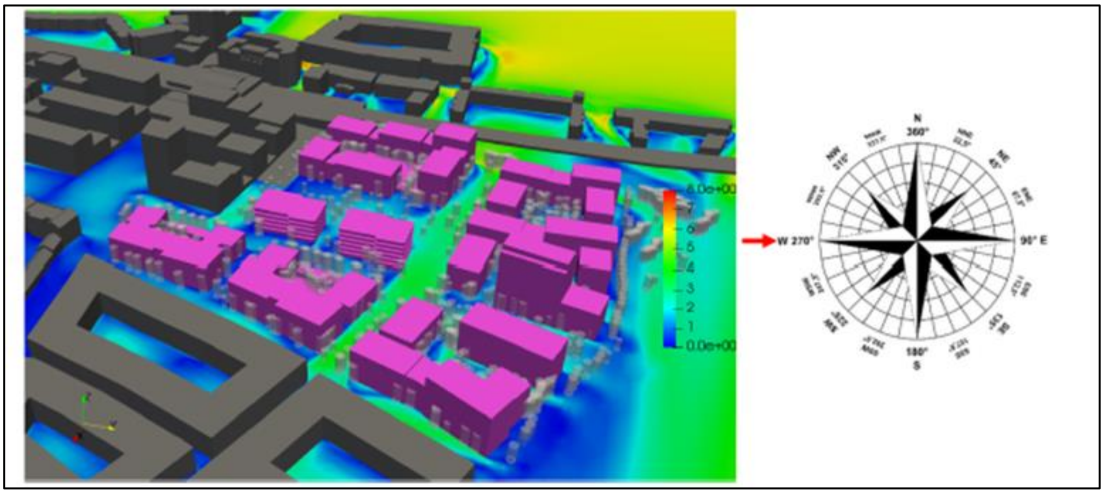


Figure 16.80: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 270°

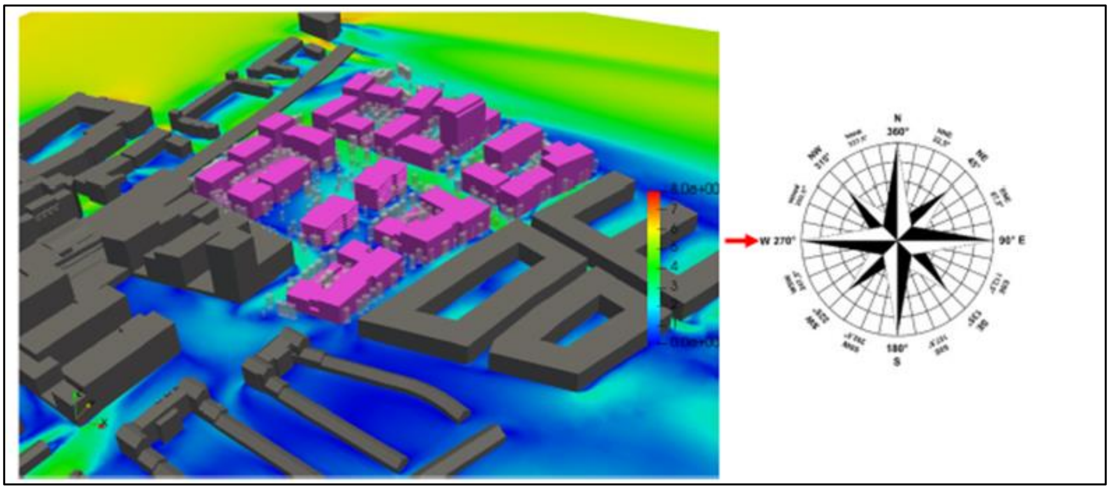


Figure 16.81: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 281°

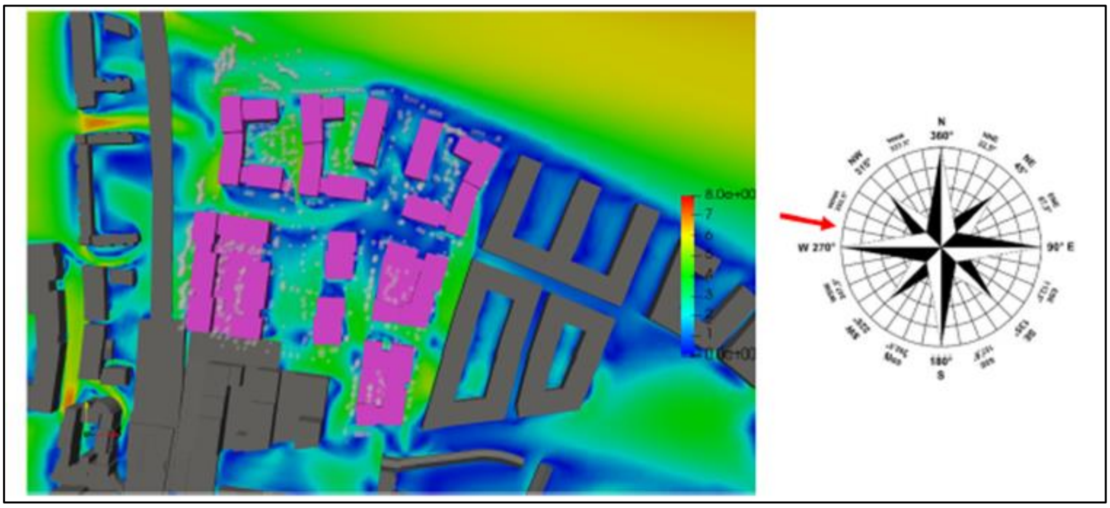


Figure 16.82: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 281°

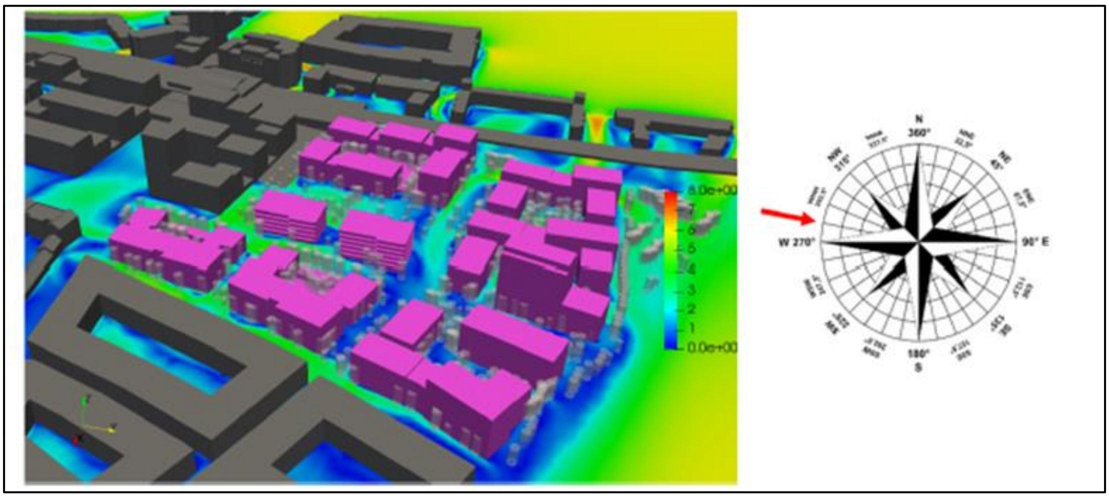


Figure 16.83: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 281°

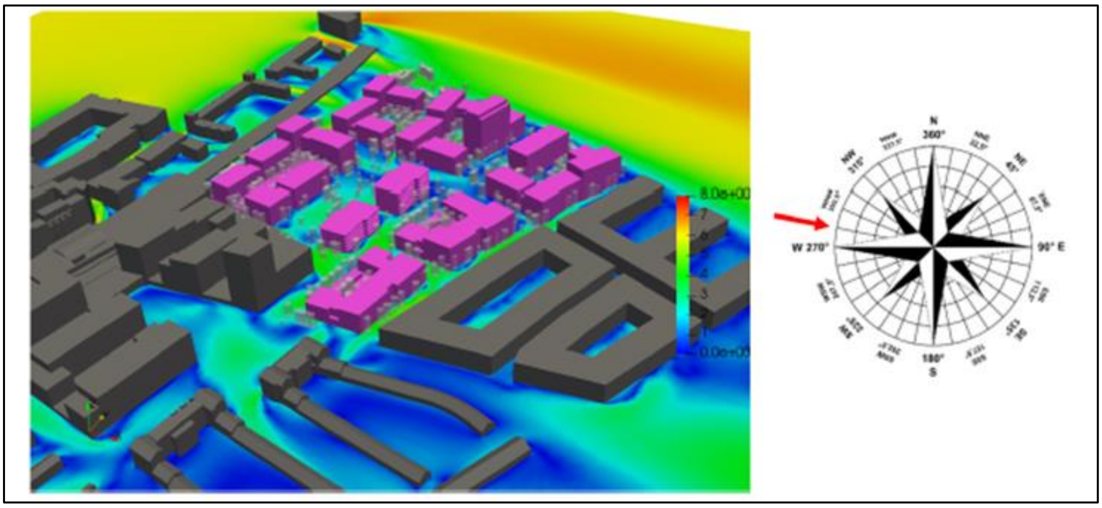


Figure 16.84: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 315°

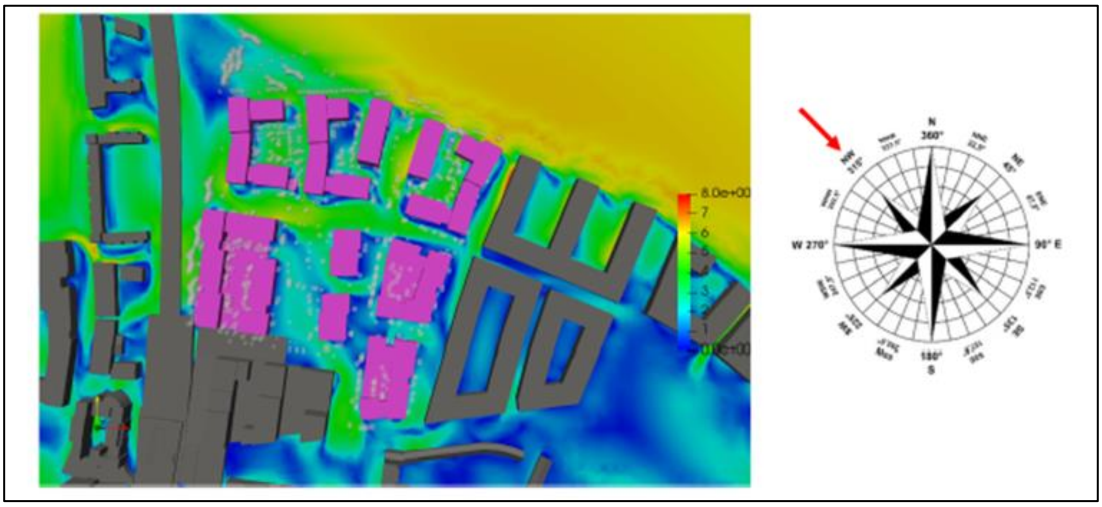


Figure 16.85: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 315°

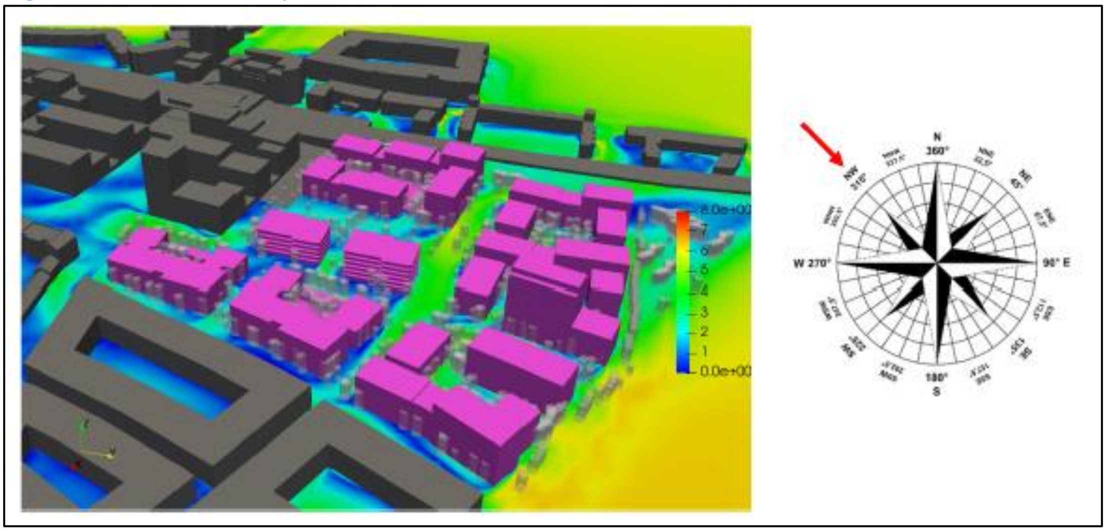


Figure 16.86: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - 3D View: 315°

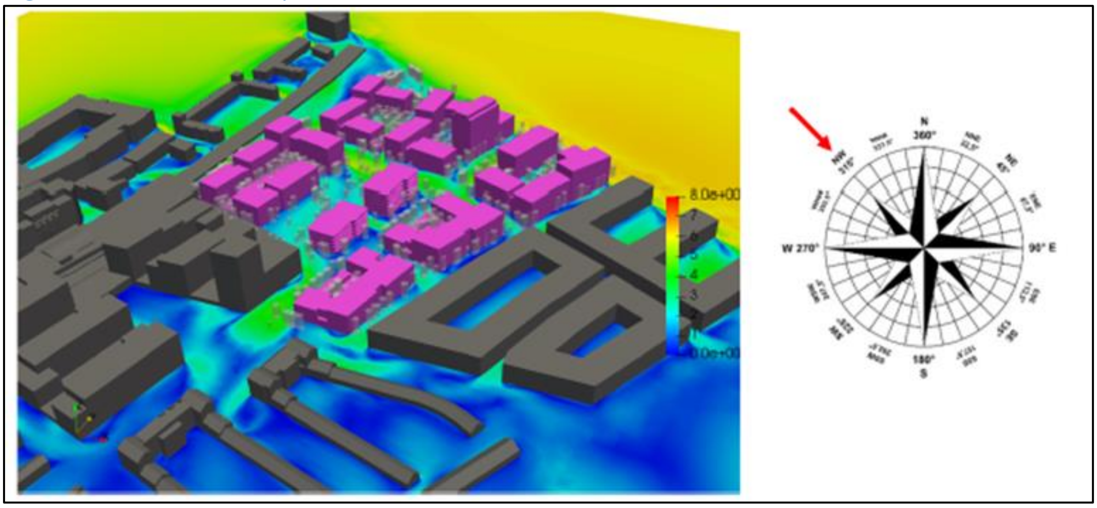


Figure 16.87: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 225°

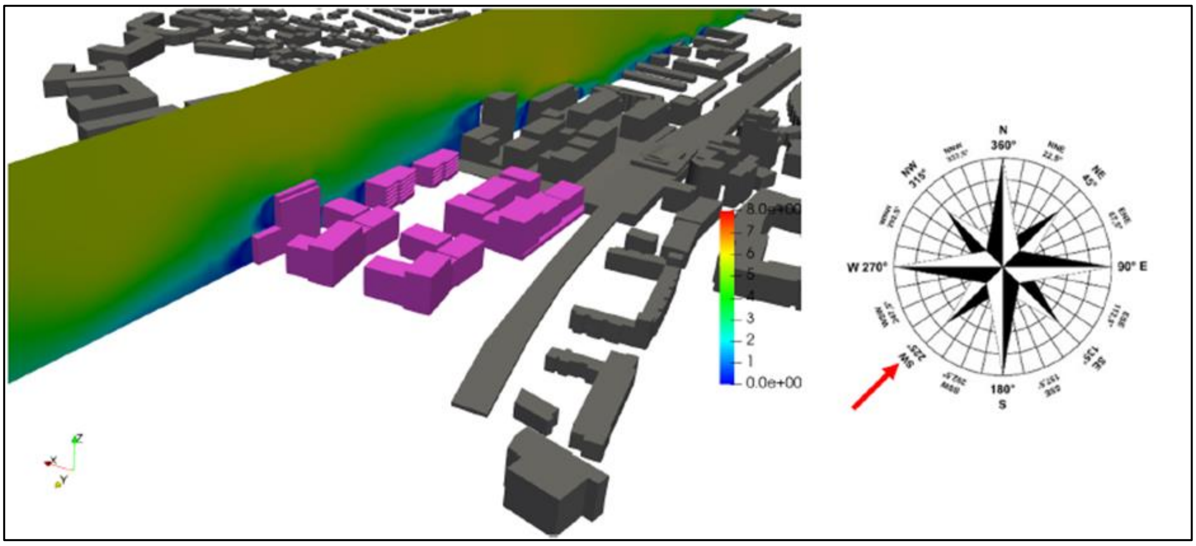


Figure 16.88: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 135°

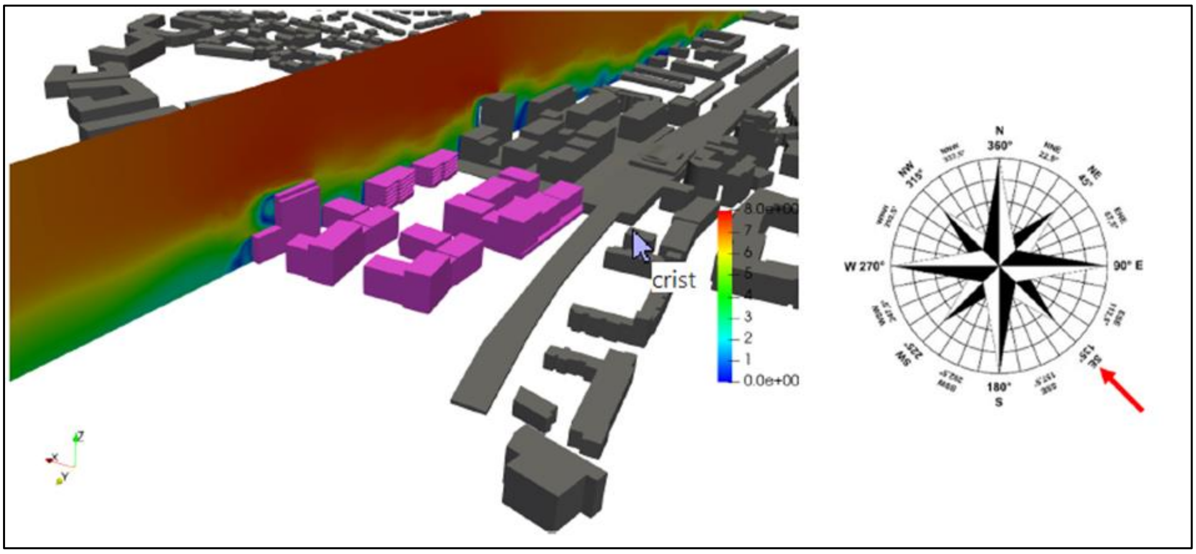


Figure 16.89: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 236°

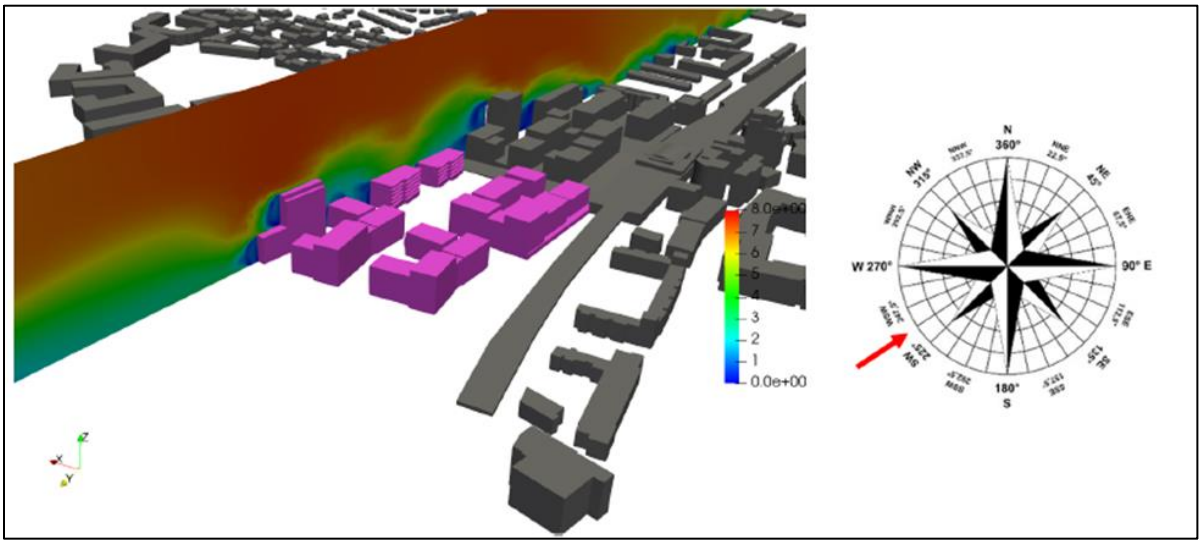


Figure 16.90: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 225°

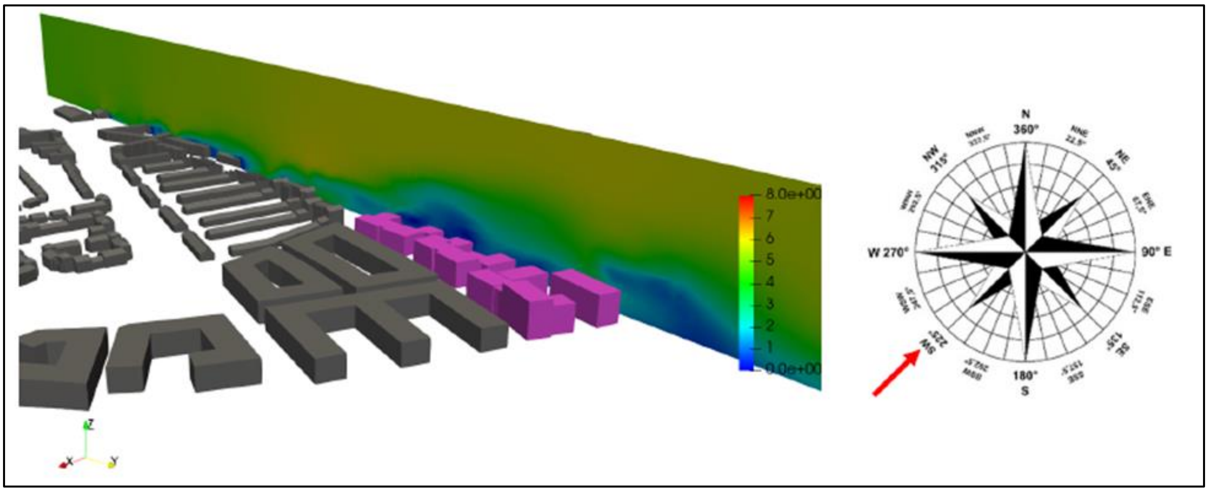


Figure 16.91: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 135°

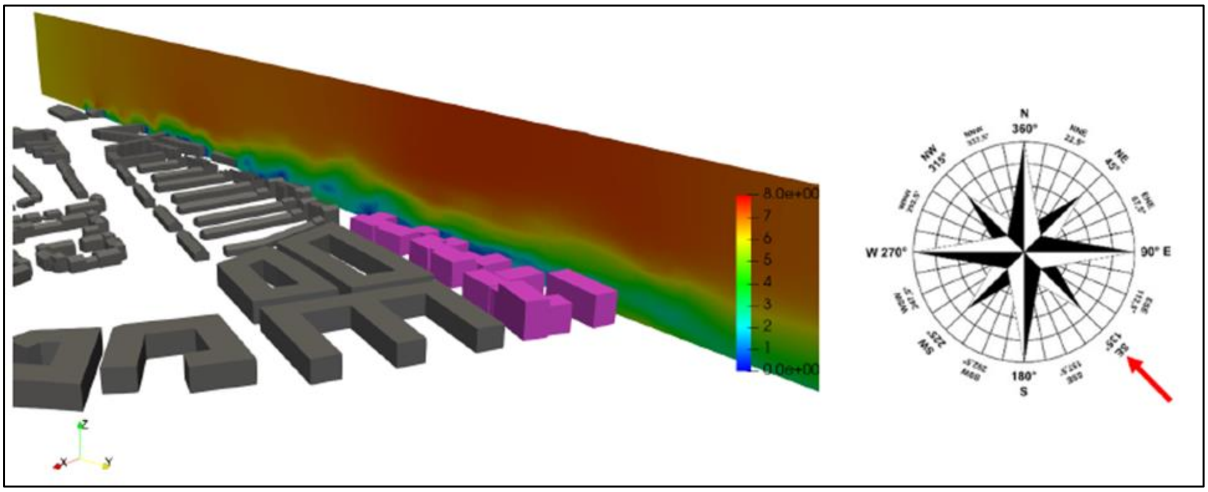
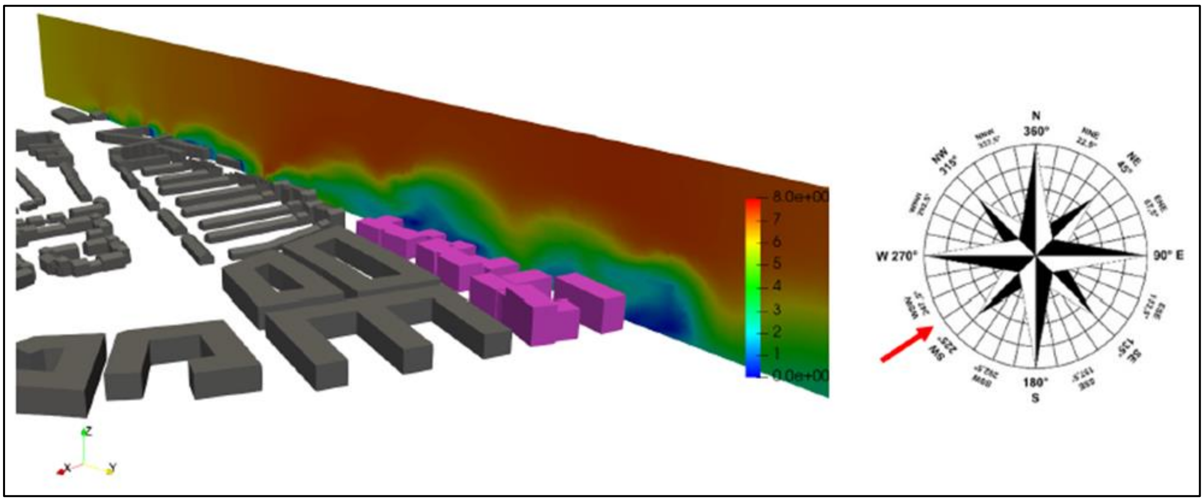


Figure 16.92: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 236°



16.7.6.3 Summary

The existing environment and proposed Project would receive prevailing winds from south-west. As discussed in the previous sections, and demonstrated through this assessment of CFD modelling, all adverse wind impacts have been considered and show the operational phase wind environment of the proposed Project to be suitable to its intended use.

The cumulative assessment has accounted for the modelling and simulation of all topography and existing developments in the surrounding area, as the presence of adjacent buildings dictates how the wind will approach the proposed Project.

From the wind modelling results, it can be concluded that the proposed Project will introduce no negative wind effect on existing, permitted or proposed developments within its vicinity. Wind modelling of future developments (not yet proposed) will need to be performed under the scope of those individual applications.

16.7.6.4 Risks to Human Health

This subsection aims to identify areas of proposed Project where the pedestrian safety and comfort could be compromised (in accordance with the Lawson Acceptance Criteria previously described). Pedestrian comfort criteria are assessed at 1.5 m above ground level.

Discomfort Criteria

The following figures combines all the above directions together and show the Lawson comfort categories over the ground floor area around the proposed Project (including permitted GA1 with under construction blocks as per GA1 (FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-

248970 and as amended under F20A/0258 and F21A/0046), permitted GA2 and existing and permitted Clongriffin developments).

The figures below illustrate the Lawson comfort map obtained at 1.5 m above ground in the study area. For the Lawson discomfort criteria, the onset of discomfort depends on the activity in which the individual is engaged and it is defined in terms of a mean hourly wind speed (or GEM) which is exceeded for 5% of the time. Depending on the wind direction, the suitability of the different areas can be assessed using the maps.

It can be seen that the wind conditions range from 'suitable for long-term sitting' to 'suitable for walking and strolling' and rarely are only suitable for 'business walking' or 'unacceptable for pedestrian comfort'. The results shown demonstrate that there are no critical areas which are unacceptable for pedestrian comfort. Thus, the discomfort criteria is satisfied for all the different cases and in all directions, and the areas all around the proposed Project seems to be always suitable for their intended use.

All the courtyards, parks and squares are always suitable for long-term sitting, short-term sitting, standing, walking and strolling activities.

Figure 16.93: Lawson Comfort Categories

Figure 16.94: Ground Floor - Lawson Discomfort Map - Existing Scenario

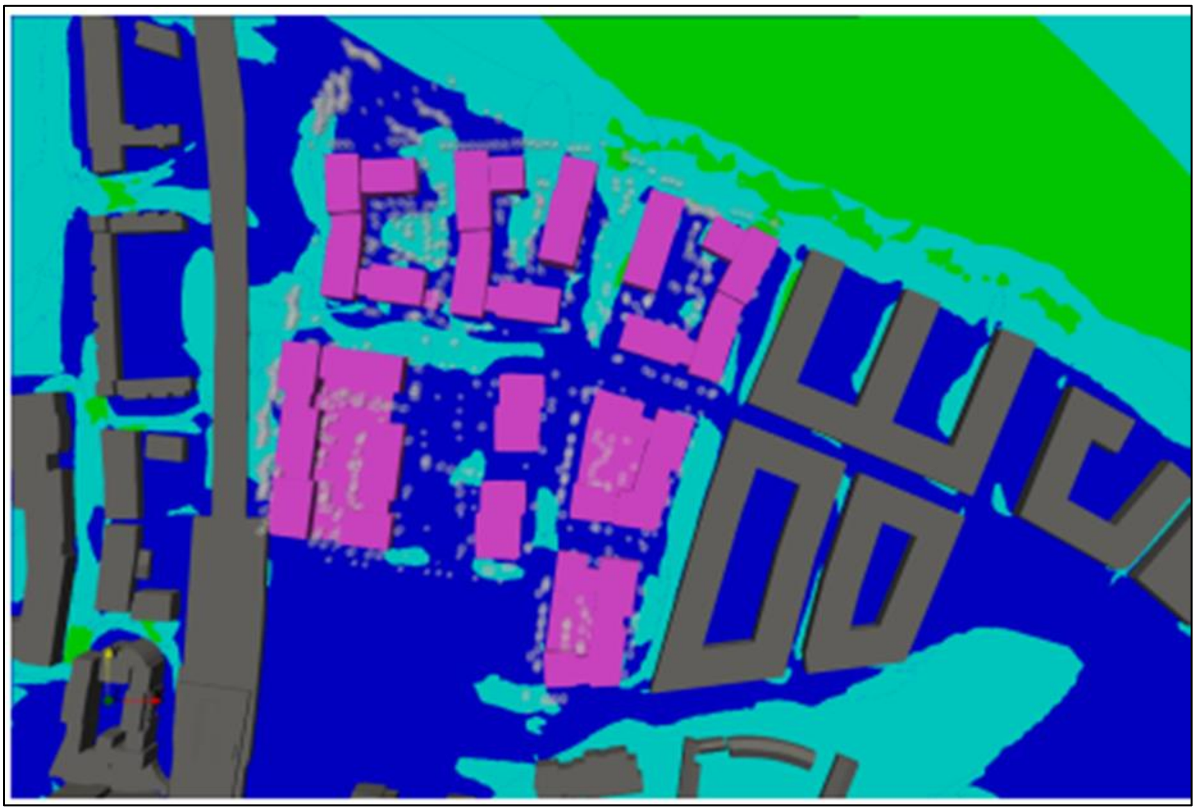


Figure 16.95: Ground Floor - Lawson Discomfort Map - Existing Scenario - 3D view

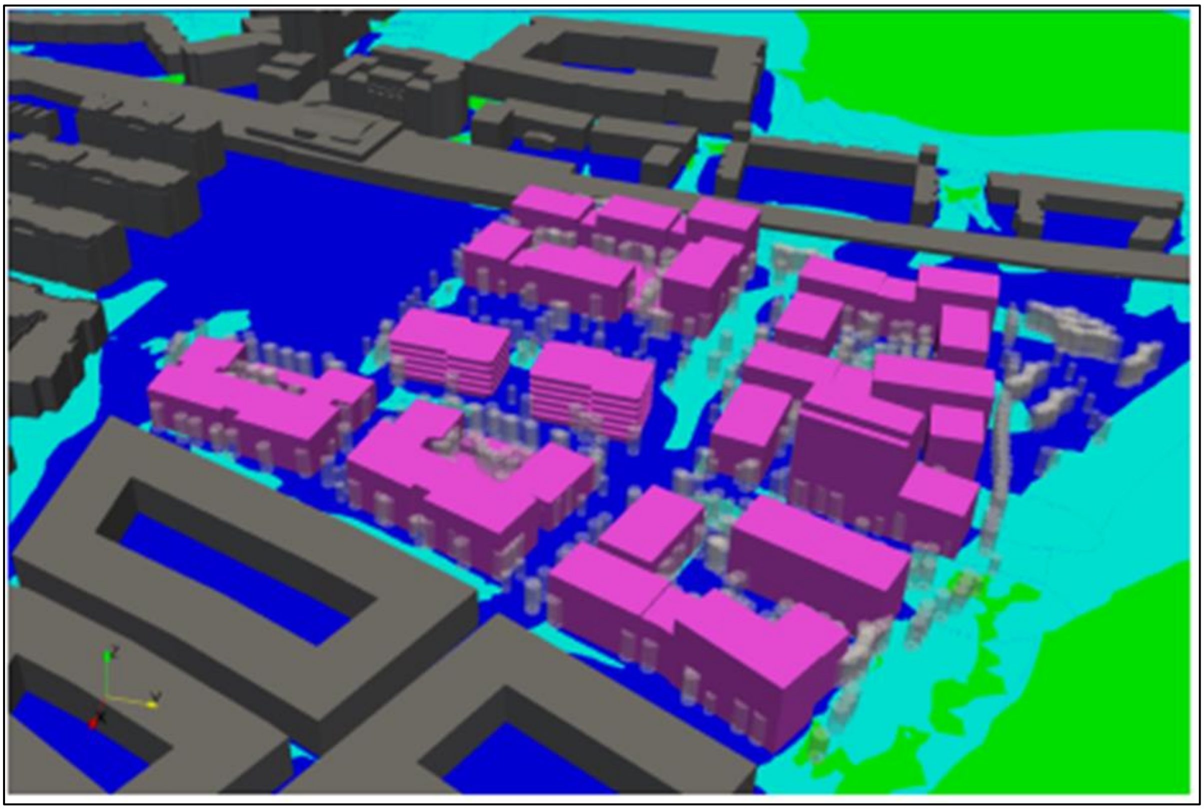


Figure 16.96: Ground Floor - Lawson Discomfort Map - Cumulative Scenario

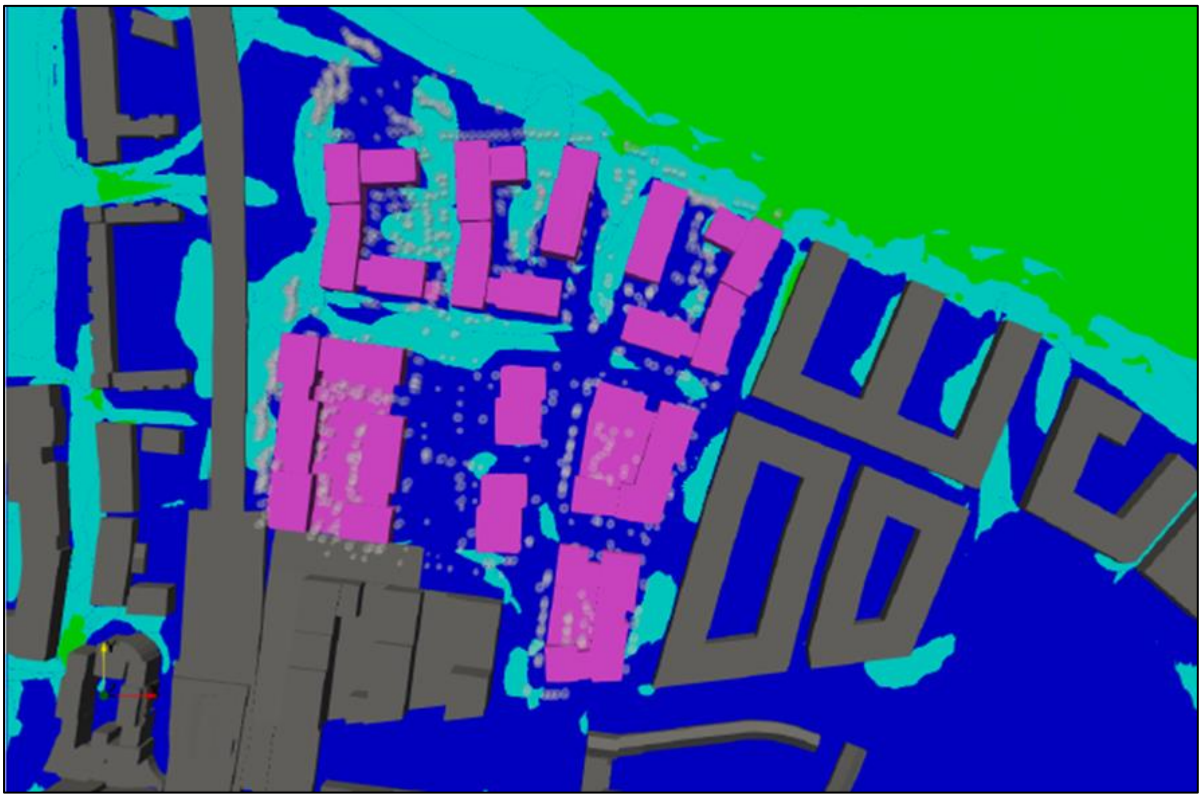
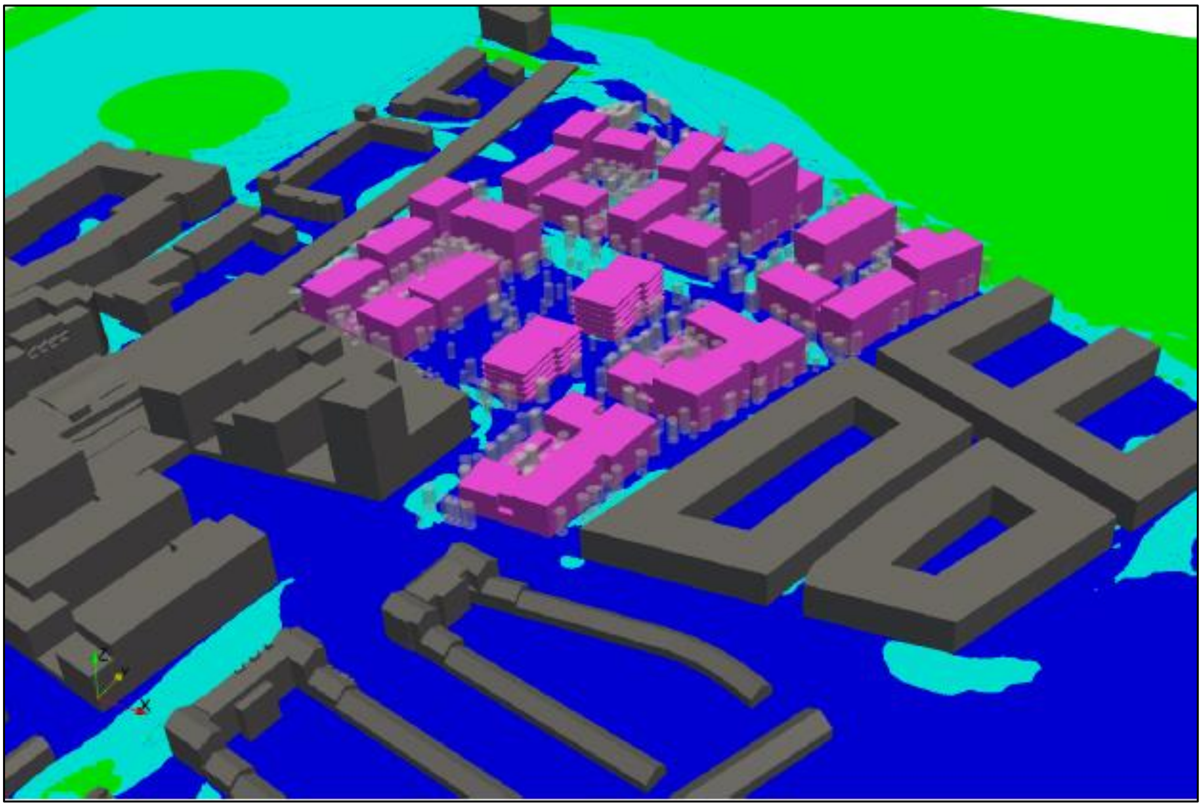


Figure 16.97: Ground Floor - Lawson Discomfort Map - Cumulative Scenario



Distress Criteria

In addition to the criteria for discomfort the Lawson method presents criteria for distress, which focus on wind conditions that may be encountered for hundreds of hours per year. The distress criteria require higher wind speeds to be met but focus on two hours per year. These are rare wind conditions but with the potential for injury rather than inconvenience.

Figure 16.98 shows the hourly wind gust rose for Dublin, from 1985 to 2020. This will be necessary to assess how many hours per year on average the velocity exceeds the threshold values.

Figure 16.98: Hourly Dublin Wind Gust Rose

The criteria for distress for a frail person or cyclist is 15 m/s wind, occurring for more than two hours per year. Limiting the results from the above wind rose to the only values above 15 m/s (as reported in Figures 16.99 and 16.100, respectively, as cumulative hours and cumulative percentage), it is possible to see how many hours in 30 years the gust velocity of 15 m/s is exceed at pedestrian level in each direction.

Figure 16.99: Hourly Dublin Wind Gust Rose - Cumulative Hours when the Velocity is above 15m/s

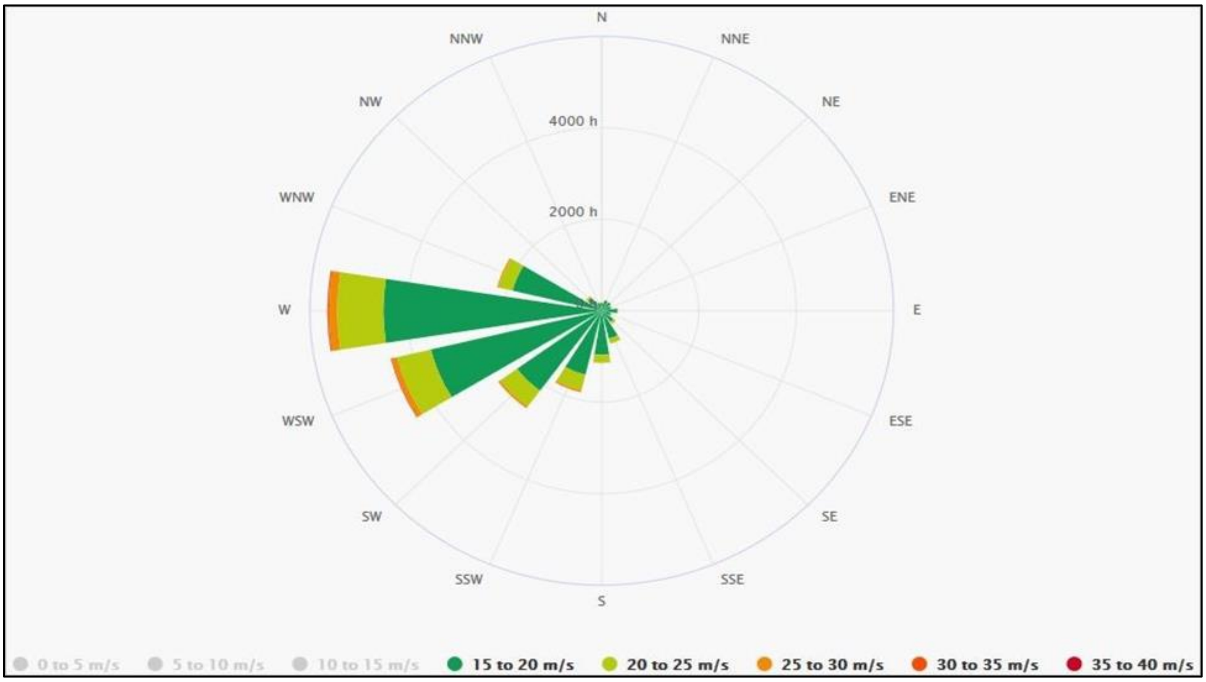
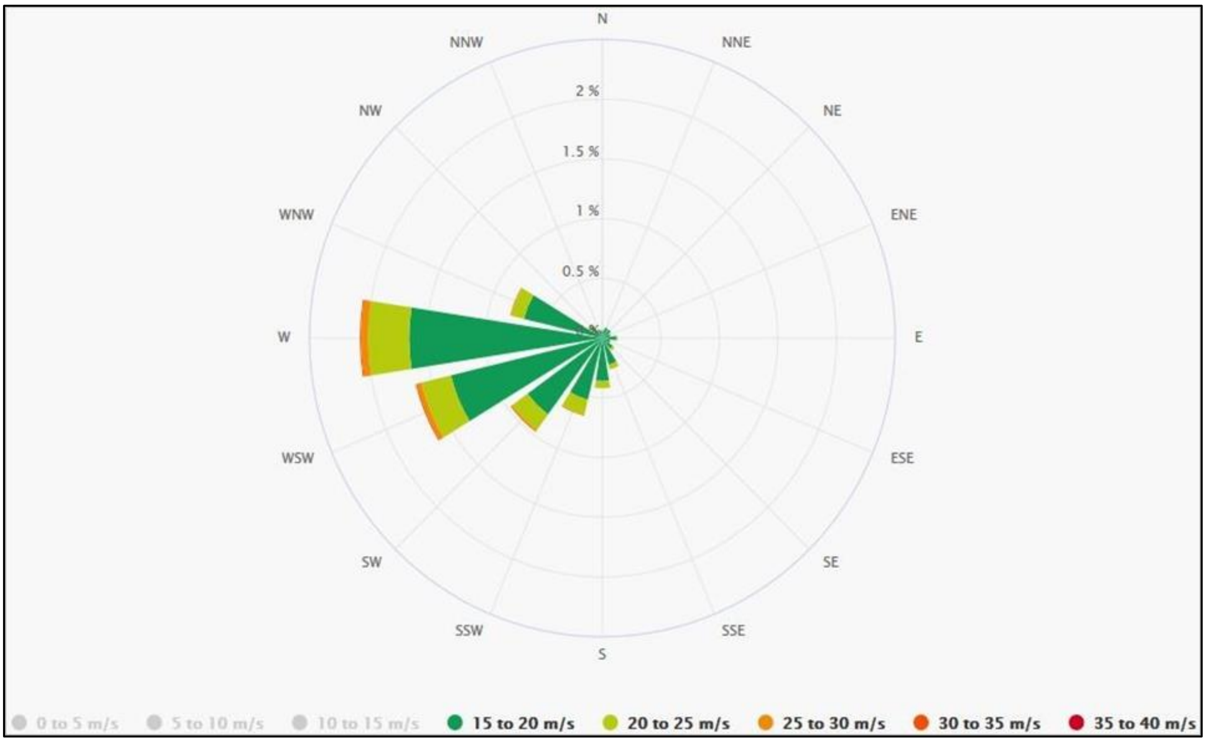


Figure 16.100: Hourly Dublin Wind Gust Rose - Cumulative Percentage (%) of time when the Velocity is above 15m/s



A total of two hours per year corresponds to 0.02% in one year, which means 0.6% in 30 years. Looking at the wind roses above, it is noted that a velocity of 15 m/s was reached in Dublin only for the following directions (in increasing order of percentage) over the years 1985-2020:

1. West 270°.
2. West-south-west 247.5°.
3. South-West 225°.

For this reason, it is of interest to show the distress results for these directions. Figures 16.102 and 16.103, below, combine all the above directions and shows the areas where the measured velocity is above 15 m/s. Figure 16.101 shows the scale used in this case. Results show that there are not critical areas where the velocity increases above 15 m/s.

Figure 16.101: Lawson Distress Categories – Frail Person / Cylist

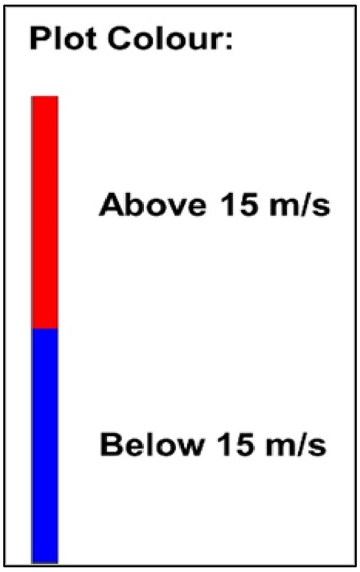


Figure 16.102: Lawson Distress Map - Frail Person or Cyclist - Existing Scenario

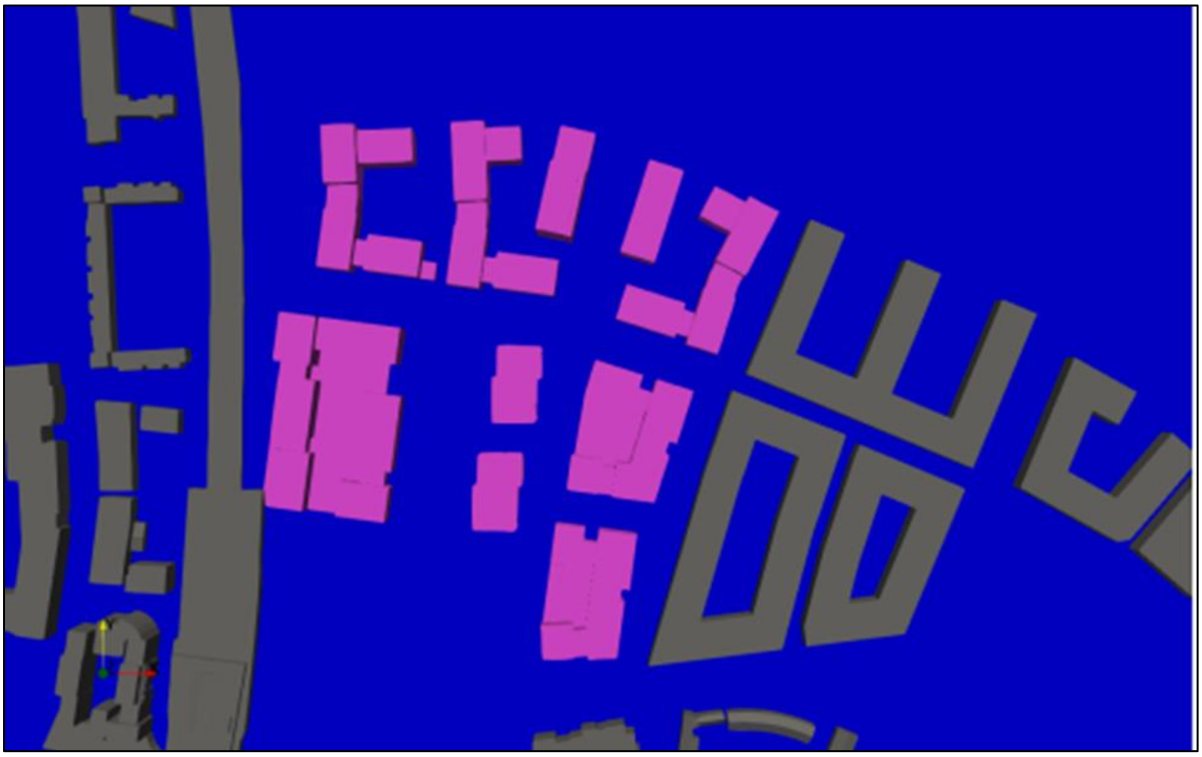
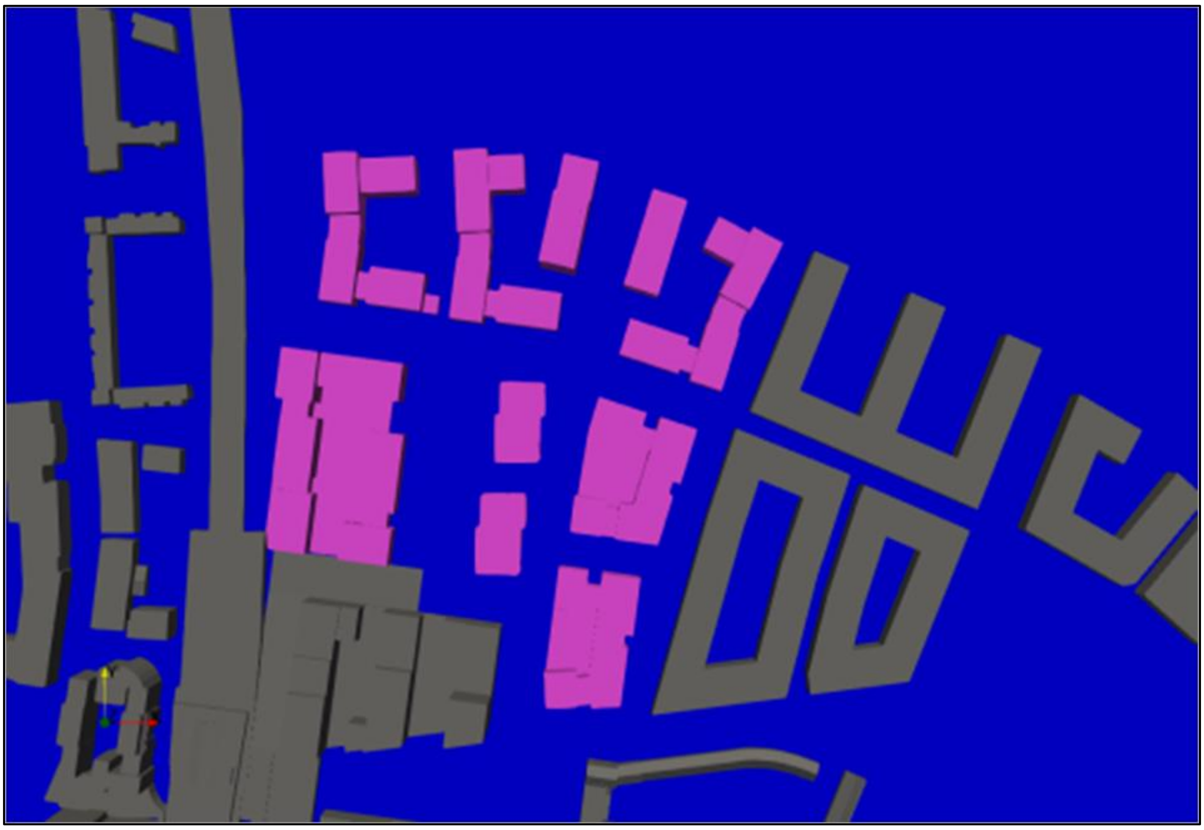


Figure 16.103: Lawson Distress Map - Frail Person or Cyclist - Cumulative Scenario



The criteria for distress for a member of the general population is 20 m/s wind, occurring for more than two hours per year. Limiting the results from the above wind rose to only the values above 20 m/s (as reported in Figures 16.104 and 16.105, respectively, as cumulative hours and cumulative percentage), it is possible to see how many hours in 30 years the gust velocity of 20 m/s is exceed at pedestrian level in each direction.

Figure 16.104: Hourly Dublin Wind Gust Rose - Cumulative hours when the velocity is above 20m/s

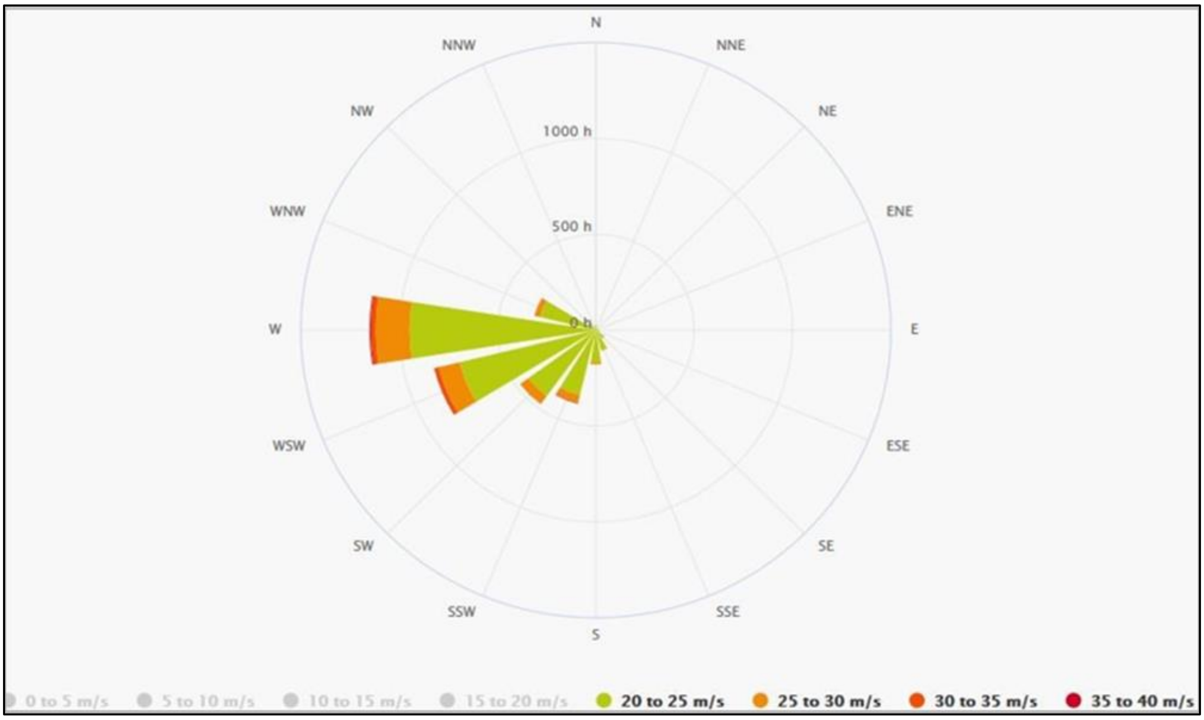
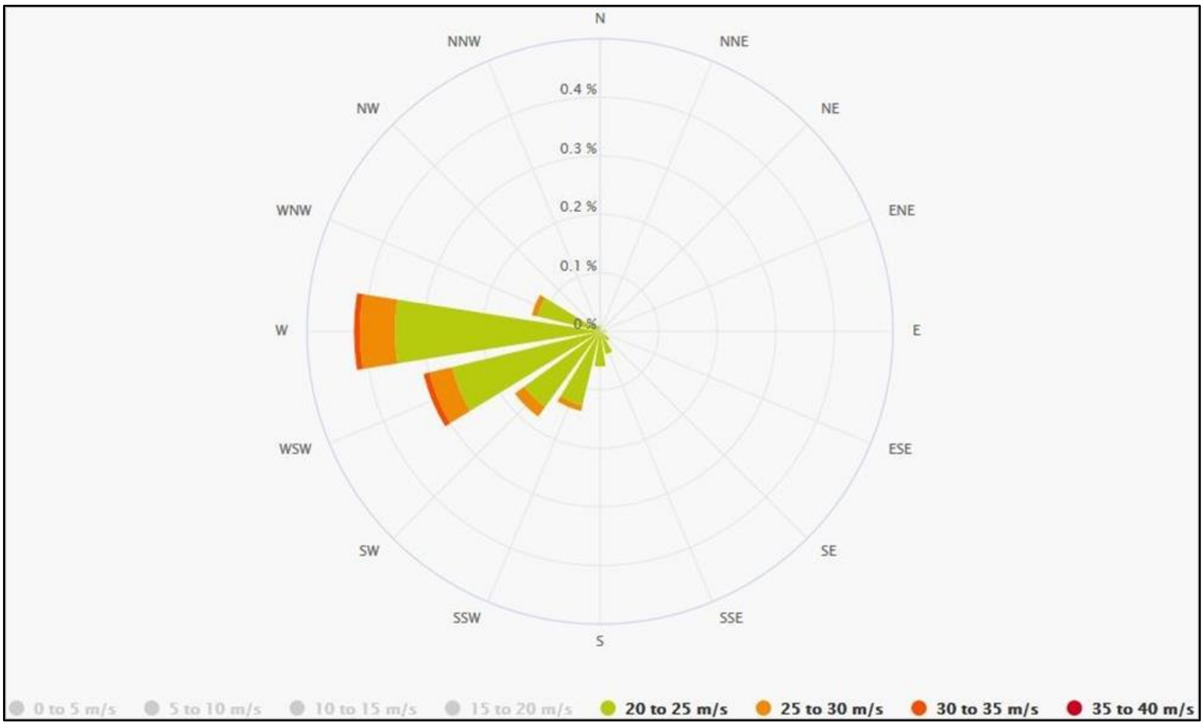


Figure 16.105: Hourly Dublin Wind Gust Rose - Cumulative percentage of time when the Velocity is above 20m/s



A total of two (2 no.) hours per year corresponds to 0.02% in one year, which means 0.6% in 30 years. Looking at the wind roses above, it is noted that a velocity of 20 m/s was never reached in Dublin over the years 1985-2020. For this reason, it is not of interest to show the distress results for any of the wind directions and the criteria is always satisfied.

16.7.7 Summary of Cumulative Predicted Impact of the Proposed Project

From the simulation results the following observations are pointed out:

- The proposed Project will produce a quality environment that is attractive and comfortable for pedestrians at ground floor, both when assessed in the context of existing and permitted environment, including the permitted GA1 (FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and in the context ofF21A/0046), the proposed amendments to permitted GA2 and Clongriffin developments (existing and permitted but not built) both when the GA3 potential development being granted.GA1 (subjected to a different SHD application) was included. In the cumulative scenario, in particular, the area on the south of the Site is further shielded, providing some extra protection from those wind directions.
- Areas around the proposed Project where velocities can be higher have been identified near the corners of the blocks, and on the main road across the proposed Project. However, these were mitigated using tree landscaping, with particulate attention to the corner areas.
- Some flow accelerations, below the critical threshold will be experienced on some of the main roads around the proposed Project, and on the roads in-between some of the blocks. It should be noted that the roads are not used as sitting areas and, therefore, higher flow velocities can be accepted. These effects can be seen as being further reduced during the cumulative assessment.
- Courtyards, parks and squares seem to be well shielded. However, some recirculation effects have been found for certain wind directions. The implementation of tree landscaping in these areas will mitigate these effects.
- The mitigation measures incorporated into the design of the proposed Project significantly reduce the velocities around the Site. The recirculation effects highlighted in the previous sections have been successfully reduced or eliminated. Some slightly

higher velocities are still found for some wind directions around some of the corners of the buildings and on the west side of the proposed Project. However, these velocities are below critical values and significant effects are not likely.

- The pedestrian comfort assessment, performed at ground floor level according to the Lawson criteria, identified the areas that are suitable for the different pedestrian activities in order to guarantee pedestrian comfort. The areas all around the proposed Project would appear to be suitable for every activity, including long-term sitting. Also, the courtyards, parks and squares are always suitable for long-term sitting, short-term sitting, standing, walking and strolling activities. Moreover, in terms of distress, no critical conditions were found in relation to frail persons or cyclists or general public in the proposed Project.

16.8 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered during the assessment of wind and microclimate impacts on the proposed Project or its existing environments.

16.9 Conclusions

This Chapter presents the computational fluid dynamics (CFD) modelling assumptions and results of wind and microclimate impact assessment in respect of the proposed Project located at Baldoyle-Stapolin Growth Area No. 3 (GA3), Baldoyle, Dublin 13.

The results of this modelling have been utilized by the Applicant and design team to configure the optimal layout for the proposed Project with the aim of achieving a high-quality environment for the scope of use intended for each area / building (i.e. comfortable and pleasant for potential pedestrian use), and not introducing any critical wind impact on the surrounding areas / buildings (in accordance with the Lawson Acceptance Criteria).

The desktop study of the existing receiving environment (in terms of wind) may be summarised as follows:

- The wind profile was built using the annual average of meteorological data collected at Dublin Airport Weather Station. In particular, the local wind climate was determined from historical meteorological data recorded 10 m above ground level at Dublin Airport. Eighteen (18 no.) different scenarios were selected in order to take into consideration all the different relevant wind directions. In particular, a total of 18 no. compass directions on the wind rose have been selected. For each direction, the reference wind speed has been set to the 5% exceedance wind speed for that direction, i.e. the wind speed that is exceeded for over 5% of the time whenever that wind direction occurs.

- The wind profile built using the data from Dublin Airport has been compared with the data collected on-Site. With few exceptions, both the wind speed daily mean and the wind gust daily mean recorded on-Site follow the same patterns as those recorded at Dublin Airport. The speed levels registered on-Site are in a few cases slightly lower. This is due to the fact that, despite its vicinity to the coast, the Site is located close to the urban environment and, thus, much more shielded when compared with Dublin Airport. This confirms the fact that using wind data from Dublin Airport ensures a conservative analysis of the wind impact on the proposed Project.
- The prevailing wind directions for the Site are identified as west, west south-west and south-east, with magnitude of approximately 6 m/s.

A microclimate model assessment of the proposed development has been assessed considering permitted GA1 (FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and F21A/0046), permitted GA2 and Clongriffin developments (existing and permitted but not built) as part of the existing environment and including a new proposed GA1 (subjected to a different SHD application) for the cumulative scenario.

- The proposed Project will produce a quality environment that is attractive and comfortable for pedestrians at ground floor both when assessed within the existing environment including the permitted GA1 (FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 and as amended under F20A/0258 and F21A/0046), the permitted GA2 and Clongriffin developments (existing and permitted but not built) both when the potential development GA1 (subjected to a different SHD application) was included. In the cumulative scenario, in particular, the area on the south of the site is further shielded providing some extra protection from those wind directions.

16.9.1 Existing and Cumulative Predicted Impact of the Proposed Project

Micro-climate Model Assessment of the proposed Project and its environment was performed utilizing a CFD methodology. Three worst case wind scenarios were selected for presentation in the assessment, as these scenarios and directions are indicative of the most relevant wind speeds.

The simulation results may be summarised as follows:

- The proposed Project will produce a quality environment that is attractive and comfortable for pedestrians at ground floor, both when assessed in the context of existing and permitted environment, and in the context of the proposed amendments to the GA3 development being granted. In the cumulative scenario, in particular, the area on the south of the Site is further shielded, providing some extra protection from those wind directions.
- Areas around the proposed Project where velocities can be higher have been identified near the corners of the blocks, and on the main road across the proposed Project. However, these were mitigated using tree landscaping, with particulate attention to the corner areas.
- Some flow accelerations, below the critical threshold, will be experienced on some of the main roads around the proposed Project, and on the roads in-between some of the blocks. It should be noted that the roads are not used as sitting areas and, therefore, higher flow velocities can be accepted. These effects can be seen as being further reduced during the cumulative assessment.
- Courtyards, parks and squares seem to be well shielded. However, some recirculation effects have been found for certain wind directions. The implementation of tree landscaping in these areas will mitigate these effects.
- The mitigation measures incorporated into the design of the proposed Project significantly reduce the velocities around the Site. The recirculation highlighted in the previous sections have been successfully reduced or eliminated. Some slightly higher velocities are still found for some wind directions around some of the corners of the buildings and on the west side of the proposed Project. However, these velocities are below critical values and significant effects are not likely.

The pedestrian comfort assessment, performed at ground floor level according to the Lawson criteria, identified the areas that are suitable for the different pedestrian activities in order to guarantee pedestrian comfort. The areas all around the proposed Project would appear to be suitable for every activity, including long-term sitting. Also, the courtyards, parks and squares are always suitable for long-term sitting, short-term sitting, standing, walking and strolling activities. Moreover, in terms of distress, no critical conditions were found in relation to frail persons or cyclists or general public in the proposed Project.

16.10 References

- Lawson, TV. (2001). *Building Aerodynamics*.
- Simiu, E. (2011). *Design of buildings for wind: a guide for ASCE 7-10 Standard users and designers of special structures.* 2nd Edition, John Wiley and Sons, Inc., Hoboken, New Jersey, U.S.A.
- *Building Aerodynamics,* Tom Lawson FREng. Imperial College Press (2001).
- Blocken, B. (2015). *Computational Fluid Dynamics for Urban Physics: Importance, scales, possibilities, limitations and ten tips and tricks towards accurate and reliable simulations*.
- Blocken, B., Janssen, W.D. and van Hooff, T. (2012). *CFD simulation for pedestrian wind comfort and wind safety in urban areas: General decision framework and case study for the Eindhoven University campus*. Environmental Modelling and Software, 30, pp.15–34.
- Franke, J., Hellsten, A., Schlunzen, H., Carissimo, B, Ed. (2007). *Best Practice Guidelines for the CFD Simulation of Flows in the Urban Environment*.

17 Traffic & Transportation

17.1 Introduction

This Chapter of the EIAR assesses and evaluates the likely impact of the proposed Project on the operation of the surrounding road network, as well as identifying proposed mitigation measures to minimise any identified impacts. The focus of the assessment is on the operational stage of the proposed Project, which is anticipated to have a greater impact on the prevailing environment than the construction stage.

This chapter has been prepared by Gordon Finn, BA, BAI, MAI, MIEI, Roads and Traffic Engineer with Cronin & Sutton Consulting Engineers (CS Consulting). It is based primarily on the Traffic Impact Assessment (TIA) prepared by CS Consulting and submitted under separate cover as part of this planning application. Reference should be made to the TIA for full details of the traffic impact assessment methodology and other transport-related aspects of the proposed Project, particularly those that have no direct bearing on environmental impacts.

This assessment has been carried out in accordance with the following guidance and established best practice:

- Environmental Protection Agency (EPA) (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*;
- Transport Infrastructure Ireland (TII) (2014). *Traffic and Transport Assessment Guidelines*;
- TII (2011). *Project Appraisal Guidelines*; and
- The Institute of Highways and Transportation (IHT) (1994). *Guidelines for Traffic Impact Assessments*.

Reference has also been made to the following:

- Fingal County Council (FCC). *Fingal Development Plan (2017 – 2023)*;
- FCC (2013). *Baldoyle-Stapolin Local Area Plan (2013 – 2019)*;
- Department of Housing, Local Government and Heritage (DHLGH) (2020). *Sustainable Urban Housing: Design Standards for New Apartments*;
- the Trip Rate Information Computer System (TRICS) database;
- CSO 2016 Census data;
- National Transport Authority (NTA) (2011). *National Cycle Manual*;

- NTA (2013). *Greater Dublin Area Cycle Network Plan*; and
- Department of Transport, Tourism and Sport (DTTS) (2019). *Design Manual for Urban Roads and Streets* (DMURS).

17.1.1 Summary Description of Proposed Project

A full description of the proposed Project is provided in Chapter 5 (Description of the Proposed Project). Briefly summarised, the proposed Project will comprise 1,221 no. residential units, residential tenant amenity, crèche, cafe / restaurant, and public realm, over a site of approx. 9.5 ha. The proposed Project shall include 669 no. car parking spaces, 4 no. car set-down spaces, and 2,333 no. bicycle parking spaces.

The internal road network of the proposed Project will comprise link roads along the north-south and east-west axes, allowing circulation into and through the Site, as well as a local access spur (Stapolin Way) in the north of the Site, which will provide access to the individual blocks within the proposed Project.

Figure 17.1: Site Extents and Environs (Sources: NTA, OSi, OSM Contributors, Google)

Via the adjacent development currently under construction (see Figure 17.2), the proposed Project shall create a new vehicular connection between Grange Road (to the south, via Longfield Road) and Coast Road (to the east, via Red Arches Road).

A further vehicular access point shall be located on the western boundary of the proposed Project, as follows:

- (D) a ramp rising to meet the existing podium-level roadway at Clongriffin railway station, providing a link to Station Hill and to Clongriffin Main Street (this shall be restricted to use by public service vehicles, cyclists, and pedestrians).

In addition to the above connections to the existing road network and to roads currently under construction, provision has also been made for:

- (E) future connectivity to adjacent development lands in Growth Area 2, immediately to the east of the Site.

Figure 17.2: Vehicular Access Points (Sources: OSi, OSM Contributors, Henry J Lyons, Microsoft)

17.2 Methodology

The methodology adopted in preparing this assessment comprises a sequence of key stages, which are summarised below.

17.2.1 Appraisal of Receiving Environment

An initial desktop study was conducted of the area surrounding the Site, identifying the existing transport links and street junctions with the potential to be affected by the proposed Project. A total of nine such junctions were identified, which were selected for the traffic survey described in Section 17.2.2 of this chapter. The characteristics of the surrounding street network were noted, the most relevant elements of which being:

- Grange Road (R139);
- Red Arches Road; and
- Longfield Road.

A site visit was subsequently made on the 11th of May 2020 to confirm the existing characteristics and conditions of the above streets. Descriptions of these are included in the accompanying TIA report.

As part of the initial appraisal, a review was conducted of statutory planning documentation and other relevant public sector transport development proposals to determine whether any such development objectives would have an impact on the proposed Project Site's receiving environment. This review encompassed the *Fingal Development Plan 2017–2023*, the *Baldoyle-Stapolin Local Area Plan 2013–2019*, and the NTA's *Greater Dublin Area Cycle Network Plan*, as well as the draft development proposals for the Metrolink light rail system, the BusConnects Core Bus Corridors and Dublin Area Revised Bus Network projects, and the Swiftway Bus Rapid Transit project.

17.2.1.1 Greater Dublin Area Cycle Network Plan

The *Greater Dublin Area Cycle Network Plan* provides for the implementation of secondary cycle route 1A along Grange Road in the vicinity of the proposed Project Site. Additionally, it is proposed to implement feeder routes linking the proposed Project Site to this route. No information is yet publicly available on the proposed design or delivery timeframe of these objectives.

17.2.1.2 BusConnects and DART Expansion

It is proposed under the BusConnects Dublin Area Revised Bus Network scheme to implement new Spine routes D1 and D3 along Clongriffin Main Street in the vicinity of the proposed Project Site. These routes will operate at a midday frequency of 15 mins between Dublin's southwestern suburbs and Clongriffin via Dublin city centre. No new Core Bus Corridors are proposed under BusConnects that would impact upon the proposed Project. As part of Irish Rail's DART expansion project, it is proposed to increase the capacity of the northern line (on which Clongriffin station is located) from circa 10,500 passengers in the morning peak hour to approx. 15,000 passengers by 2035. Train frequency shall be increased from the present 10-minute headway to a headway of 5 minutes, and all trains shall be lengthened to 8 carriages. Detailed design studies are being undertaken at present to inform the full delivery programme for DART expansion.

17.2.1.3 Development Plan Objectives

The *Fingal Development Plan 2017–2023* and the *Baldoyle-Stapolin Local Area Plan 2013–2019* propose a number of important new road infrastructure schemes in the area surrounding the proposed Project Site. The delivery of these identified objectives will significantly enhance accessibility across the region, particularly for vehicular journeys to / from the proposed Project.

- ***Baldoyle Public Transport Bridge:*** An extension of Red Arches Road and bridge over the railway line at Clongriffin DART station and connection with the east-west link of Clongriffin Main Street to accommodate buses, pedestrians and cyclists. This will be constructed as part of the proposed Project.
- ***Hole in the Wall Road Upgrade:*** A proposed realignment of the northern end of the Hole in the Wall Road to tie in at the R123 Moyne Road at a four-arm crossroads junction. This will address the existing deficient visibility at the existing junctions on the Moyne Road with the Hole in the Wall Road and the Drumnigh Road. This is currently under construction.
- ***Baldoyle Link Road (within Clongriffin-Belmayne LAP):*** An extension of Clongriffin Main Street to the west of Hole in the Wall Road and connecting to the R107 Malahide Road to the north of the existing Clare Hall traffic signals.
- ***R107 Malahide Road Realignment***: A realignment of the existing Malahide Road from Belcamp Lane to north of Chapel Road. The proposed new link is a dual carriageway with a new grade-separated junction with the R139 (old N32).

- ***R139 (old N32) Upgrade:*** Upgrade of the R139 (old N32) to dual carriageway from the existing Malahide Road to Clonshaugh Road.
- ***East-West Distributor Road:*** A new link road from the existing Malahide Road at Balgriffin Road to the R132 Swords Road at Collinstown Cross, incorporating a bridge over the M1 and facilitating access to new development lands at Belcamp and Clonshaugh.

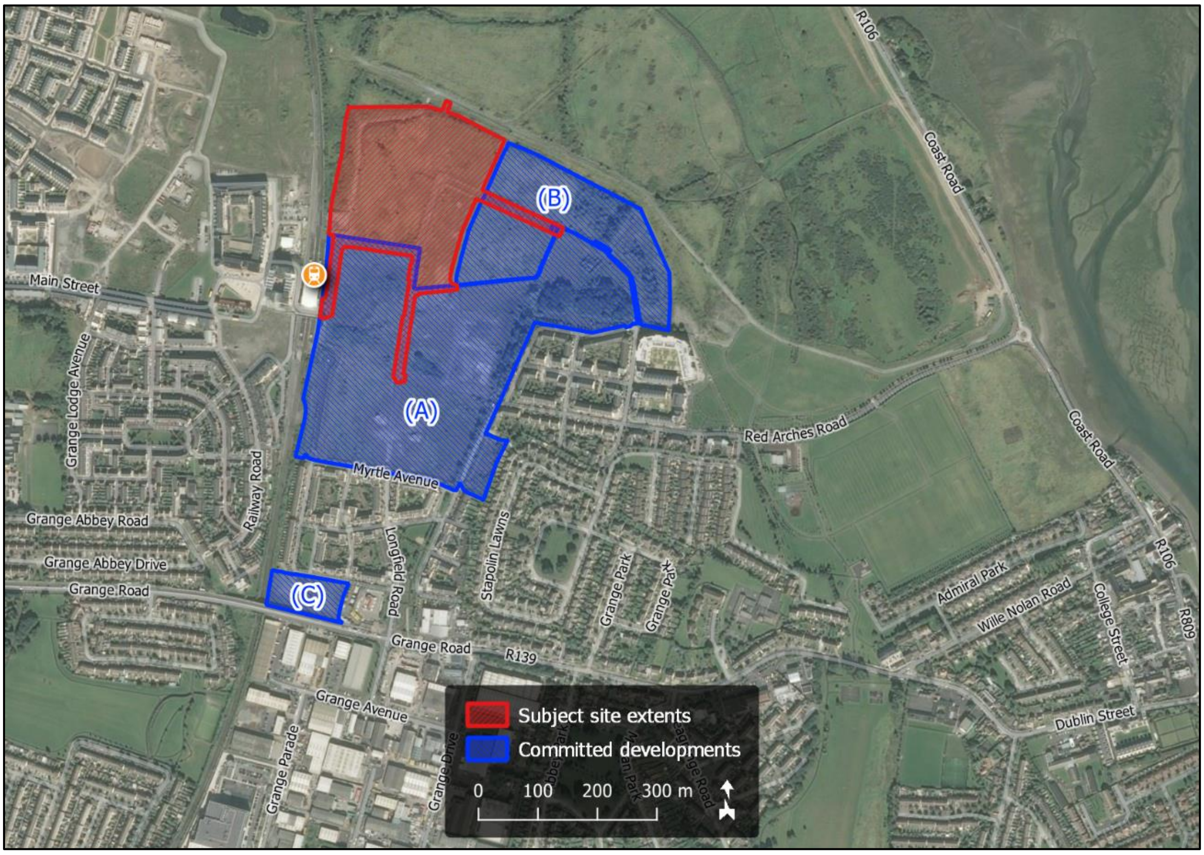
17.2.1.4 Nearby Committed Developments

A separate review was conducted of granted planning permissions in the vicinity of the proposed Project Site, in order to identify any nearby committed developments with the potential to significantly increase vehicular traffic flows on the surrounding street network. Three (3 no.) such relevant committed developments were identified, under the following register references (see Figure 17.3):

- (A) Reg. ref. F16A/0412 / ABP ref. PL 06F.248970, as amended under reg. refs. F20A/0258 and F21A/0046 (residential development at Baldoyle-Stapolin Growth Area 1, comprising 159 no. houses (99 no. of which are currently under construction), 385 no. apartments, 837 m^2 of retail space, an 880 m^2 crèche, and a 200 m^2 café, with 958 no. car parking spaces and vehicular access assumed solely to / from Longfield Road);
- (B) Reg. refs. F11A/0290 and F11A/0290/E1 / ABP ref. PL06F.239732 (residential development at Baldoyle-Stapolin Growth Area 2, comprising 70 no. houses, 330 no. apartments, retail units with a combined gross floor area (GFA) of 356 m^2, and a 430 m^2 crèche, with 852 no. car parking spaces and vehicular access to / from Red Arches Road, connecting to Coast Road); and
- (C) Reg. Ref. F19A/0461 (16-classroom primary school with 22 no. car parking spaces and vehicular access to / from Myrtle Road, connecting to Longfield Road).

For the purposes of the present assessment, it has been assumed that the above-listed permitted developments shall all proceed and shall be operational by the year 2023.

Figure 17.3: Relevant Committed Developments (Sources: FCC, OSi, OSM Contributors, Microsoft)



17.2.1.5 Planned Amendments to Permitted GA1 Development

The proposed Project Site forms part of Baldoyle-Stapolin Growth Area 3 (GA3), as defined by the *Baldoyle-Stapolin Local Area Plan 2013–2019* (as extended). The Site is bounded to the south by further zoned development lands within Baldoyle-Stapolin Growth Area 1 (GA1), which are also in the Applicant's ownership.

Planning permission has been granted (reg. ref. F16A/0412 / ABP ref. PL06F.248970, as amended under reg. refs. F20A/0258 and F21A/0046) for a mixed-use development on these GA1 lands. As currently permitted, this development – referred to in this chapter as committed development (A) – comprises the following:

- 159 no. houses;
- 385 no. apartments;
- retail units with a total GFA of 837 m^2;
- a crèche with a GFA of 880 m^2; and

- a café with a GFA of 200 m^2.

Ninety-nine (99 no.) houses permitted under this application, located in the south-east corner of the site, are currently under construction.

An SHD application (ABP ref. TA06F.310418) has been made to An Bord Pleanála for permission to amend the permitted development to comprise the following (excluding the 99 no. houses currently under construction):

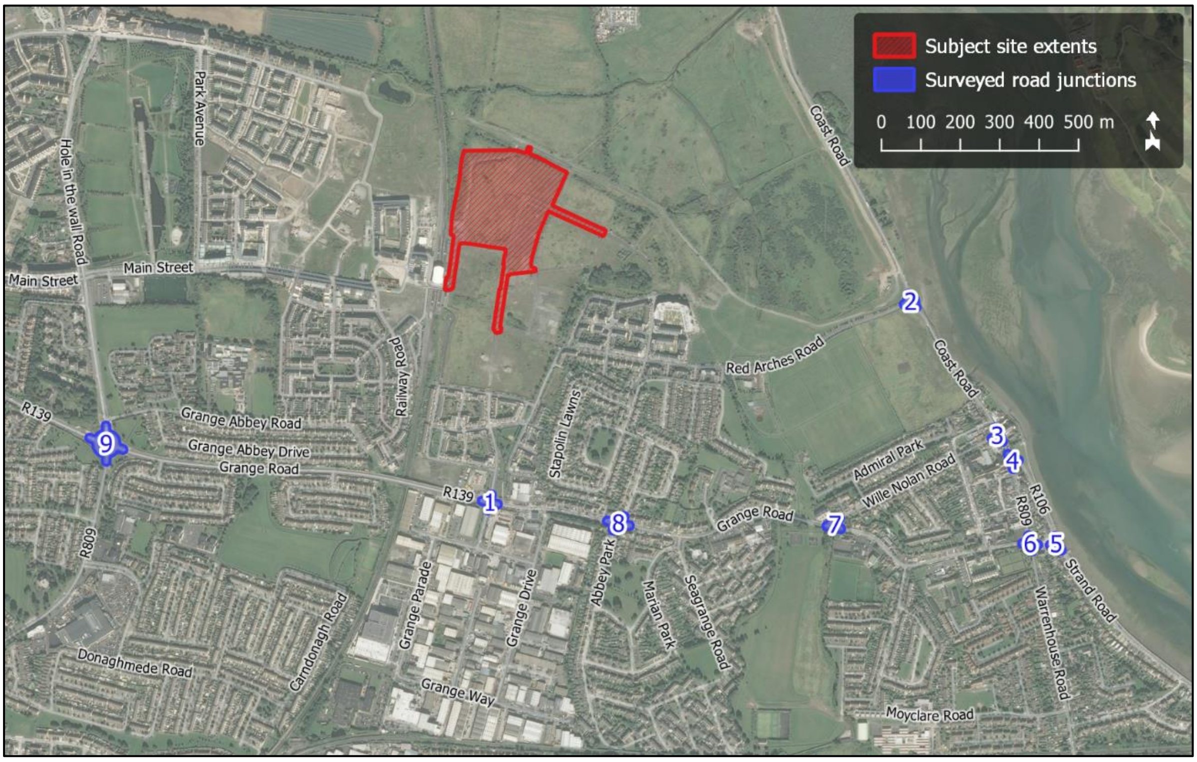
- 135 no. dwelling houses;
- 747 no. apartments;
- convenience retail units with a total GFA of 1,027 m^2;
- a medical centre with a GFA of 462 m^2;
- a pharmacy with a GFA of 268 m^2;
- a crèche with a GFA of 539 m^2;
- a restaurant / café with a GFA of 485 m^2; and
- a gym with a GFA of 411 m^2.

Figure 17.4: Planned GA1 Development Amendments (Sources: FCC, OSi, OSM Contributors, Microsoft)

The full extents of the currently permitted GA1 development, as well as the extents of the area subject to the above amendment application, are shown in Figure 17.4. A decision by An Bord Pleanála on this amendment application is due in September 2021. To account for the potential approval of this application, and the corresponding changes to the make-up of the permitted GA1 development, a separate trip generation and junction modelling exercise has been undertaken as part of the present assessment (see Sections17.2.9 and 17.10).

17.2.2 Traffic Survey

Figure 17.5: Surveyed Road Junction Sites (Sources: OSM Contributors, Microsoft)



Full turning movement classified traffic counts were carried out by Irish Traffic Surveys (ITS), on behalf of CS Consulting, over a 12-hour period (07:00–19:00) on Thursday the 23rd of January 2020. Count information was obtained at the following 9 no. sites (see Figure 17.5):

- J1. Grange Road (R139) / Longfield Road / Grange Rise (4-arm signal-controlled junction);
- J2. Coast Road (R106) / Red Arches Road (3-arm priority-controlled roundabout);
- J3. Main Street (R106) / Willie Nolan Road (R139) / Coast Road (R106) (3-arm signal-controlled junction);

J4. Main Street (R106) / Strand Road (R106) / Main Street (R809) (3-arm priority-controlled junction);

J5. Strand Road (R106) / The Mall (3-arm priority-controlled junction);

J6. Main Street (R809) / The Mall / Warrenhouse Rd (R809) / Dublin Street (4-arm signal-controlled junction);

J7. Grange Road (R139) / Willie Nolan Road (R139) / Brookstone Road (3-arm signal-controlled junction with slip);

J8. Grange Road (R139) / Grange Park / Abbey Park (staggered 4-arm signal-controlled junction); and

J9. Hole in the Wall Road / R138 / R809 (4-arm priority-controlled roundabout).

The peak hour traffic flows across all 9 no. survey sites were found to be between 08:00 and 09:00 (AM peak hour) and between 15:30 and 16:30 (PM peak hour).

The full set of traffic flow data returned by this survey is appended to the TIA report (submitted under separate cover as part of this application).

Table17.1: Total Traffic Movements (Passenger Car Units) at Surveyed Junction Sites

Time Period	Junction No.								
	J1	J2	J3	J4	J5	J6	J7	J8	J9
AM Peak 08:00-09:00	1711	1343	1393	1236	903	1124	1045	1110	2983
PM Peak 15:30-16:30	1745	1101	1230	1089	815	1162	1004	1745	3117

17.2.3 Future Year Background Traffic Growth

The operational impact of traffic on the road network within the proposed Project's area of influence has been assessed for the following years:

- 2020: Baseline year (surveyed traffic flows);
- 2023: Proposed opening year;
- 2028: 5 years after opening; and
- 2038: Design year (15 years after opening).

Unit 5.3 of the TII Project Appraisal Guidelines (PE-PAG-02017 *Travel Demand Projections*) has been used to apply growth factors to the existing traffic flows for the future year junction assessments. The net cumulative growth factors applied are given inTable 17.2.

Table 17.2: Predicted Background Traffic Growth

Assessment Year	2023 Opening Year	2028 5 Years after Opening	2038 Design Year
Cumulative increase over 2020 background traffic levels	+ 4.94%	+ 13.72%	+ 22.31%

17.2.4 Existing Traffic Distribution

The existing peak hour directional splits recorded by the traffic survey at site J1 (Grange Road / Longfield Road / Grange Rise junction) and site J2 (Coast Road / Red Arches Road roundabout) are given in Tables 17.3 and 17.4.

Table 17.3: Existing Surveyed Traffic Splits: Survey Site J1 (Grange Rd [R139] / Longfield Rd / Grange Rise)

Departures FROM Longfield Road to:	Peak Hour Period		Arrivals TO Longfield Road from:	Peak Hour Period	
	AM Peak	PM Peak		AM Peak	PM Peak
Grange Road East	43%	38%	Grange Road East	36%	41%
Grange Rise	7%	10%	Grange Rise	5%	15%
Grange Road West	50%	52%	Grange Road West	59%	44%

Table 17.4: Existing Surveyed Traffic Splits: Survey Site J2 (Coast Rd [R106] / Red Arches Rd)

Departures FROM Red Arches Road to:	Peak Hour Period		Arrivals TO Red Arches Road from:	Peak Hour Period	
	AM Peak	PM Peak		AM Peak	PM Peak
Coast Road South	56%	58%	Coast Road South	56%	64%
Coast Road North	44%	42%	Coast Road North	44%	36%

These junction directional splits have been used to determine indicative distributions across the wider road network of the existing peak hour traffic to and from Longfield Road and Red Arches Road, in terms of the proportions departing to and arriving from the following destinations / origins:

- To / from the west along Grange Road (R139);

- To / from the south (Baldoyle Industrial Estate) via Grange Rise;
- To / from the north along Coast Road (R106); and
- To / from the south-east along Brookstone Road or Main Street.

Figure 17.6: Existing Traffic Distribution to / from Longfield Road (Sources: OSi, OSM Contributors)

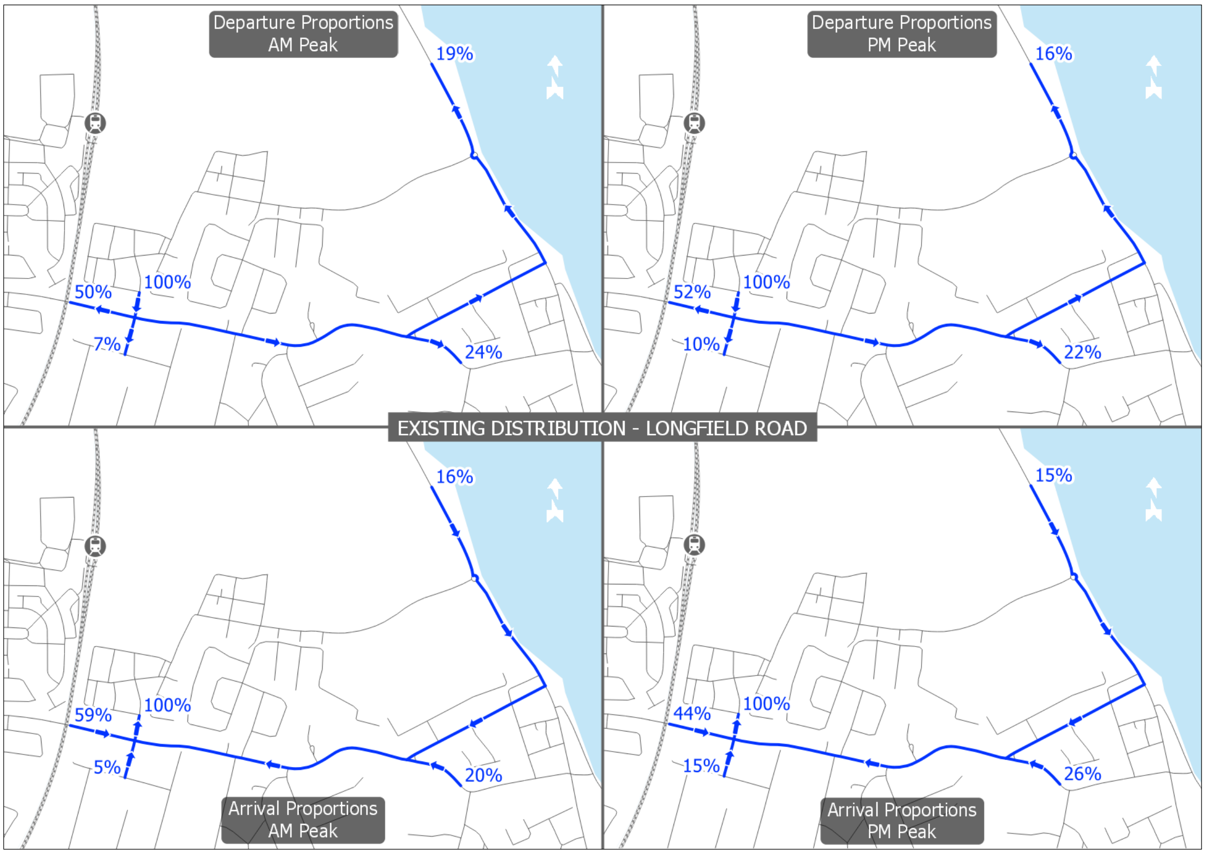


Figure 17.7: Existing Traffic Distribution to / from Red Arches Rd (Sources: OSi, OSM Contributors)

These network origin / destination distributions (shown in Figures 17.6 and 17.7) are based upon the following assumptions:

- That the proportion of departing traffic from Longfield Road that travels to the east along Grange Road is subsequently distributed to the north (to Coast Road, via Willie Nolan Road) and to the south-east (via Brookstone Road and Dublin Street) in the same proportions as the north / south split for traffic departing from Red Arches Road; and
- That the proportion of departing traffic from Red Arches Road that travels to the south along Coast Road is subsequently distributed to the west (to Grange Road, via Willie Nolan Road) and to the south (to Grange Rise, via Willie Nolan Road and Grange Road) in the same proportions as traffic departing from Longfield Road, with the remainder being distributed to the south-east (via Main Street).

These assumptions also apply in reverse for traffic arriving to Longfield Road and Red Arches Road.

17.2.5 Subject Development Trip Generation

Trip generation factors from the Trip Rate Information Computer System (TRICS) database have been used to predict the trip generation to and from the proposed Project, for both the AM and PM peak hour periods. The TRICS database, compiled and maintained by a consortium of County Councils in southern England, comprises records of arrival and departure traffic surveys at a wide range of residential, commercial, and other sites across Great Britain and Ireland. From these, the TRICS database derives arrival and departure trip rates for specific land use categories, which may be refined by geographic and demographic location characteristics.

The proposed Project comprises the following elements:

- 1,221 no. apartments;
- A crèche with a GFA of 452 m^2; and
- A café with a GFA of 205 m^2.

Due to its small size and the fact that it is expected to serve exclusively the proposed Project (or those already passing through it), the proposed café unit is not considered to have any potential to generate external vehicular trips to and from the proposed Project. It has therefore been excluded from the trip generation calculations detailed herein.

The following TRICS land use sub-categories have been employed, being the most appropriate for the significant elements of this proposed Project:

- 03 Residential / C – Flats Privately Owned
- 04 Education / D – Nursery

The TRICS trip rates for the proposed Project have been selected from the above categories, restricted insofar as possible to similar urban locations, and further refined with reference to 2016 CSO census data on the basis of:

- The population within 1 mile of the proposed Project Site (32,000 approx.);
- The population within 5 miles of the proposed Project Site (250,000 approx.); and
- The aggregate mean car ownership rate within 5 miles of the proposed Project Site (1.2 cars per household).

The trip rates selected are given in Tables 17.5 and 17.6. Full details of the TRICS information used in this assessment are provided in the TIA report (submitted under separate cover).

Table 17.5: Selected TRICS Arrival Trip Rates

Time Period	Arrival Trip Rates by Proposed Element	
	Apartments (per unit)	Crèche (per 100 m^2)
AM Peak	0.046	3.466
PM Peak	0.111	1.492

Table 17.6: Selected TRICS Departure Trip Rates

Time Period	Departure Trip Rates by Proposed Element	
	Apartments (per unit)	Crèche (per 100 m^2)
AM Peak	0.165	2.741
PM Peak	0.076	2.015

The forecast trip generation of the proposed Project has been calculated from these selected TRICS rates, based upon the Project characteristics. The resultant trips are given in Table 17.7 to Table 17.9.

Table 17.7: Calculated Proposed Project Arrival Trips

Time Period	Arrival Trips by Proposed Element		Total Arrivals
	Apartments	Crèche	
AM Peak	56	16	72
PM Peak	135	7	142

Table 17.8: Calculated Proposed Project Departure Trips

Time Period	Departure Trips by Proposed Element		Total Departures
	Apartments	Crèche	
AM Peak	201	12	213
PM Peak	93	9	102

Table 17.9: Calculated Combined Proposed Project Trips

Time Period	Combined Trips by Proposed Element		Total Trips (Combined)
	Apartments	Crèche	
AM Peak	257	28	285
PM Peak	228	16	244

17.2.6 Proposed Project Trip Distribution

The proposed Project's internal road network shall connect to the existing surrounding road network both at Longfield Road and at Red Arches Road (via the adjacent development currently under construction). Vehicular traffic departing from and arriving to the proposed Project shall therefore travel either via traffic survey site J1 (Grange Road / Longfield Road / Grange Rise junction) or via survey site J2 (Coast Road / Red Arches Road roundabout). The predicted distribution of traffic to / from the proposed Project is shown in Figure 17.8.

As for the existing traffic described in Section17.2.4, the predicted distribution of peak hour proposed Project traffic across the wider road network has been established in terms of the proportions departing to and arriving from the following destinations / origins:

- To / from the west along Grange Road (R139);
- To / from the south (Baldoyle Industrial Estate) via Grange Rise;
- To / from the north along Coast Road (R106); and
- To / from the south-east along Brookstone Road or Main Street.

Figure 17.8: Predicted Proposed Project Traffic Distribution (Sources: OSi, OSM Contributors)

It has been assumed that the proportion of proposed Project traffic travelling to and from each of these destinations / origins is the mean average of the respective proportions of existing traffic to / from Longfield Road (Figure 17.6) and to / from Red Arches Road (Figure 17.7). It has further been assumed that 50% of proposed Project traffic departing to or arriving from the south-east shall travel via Longfield Road, Grange Road, and Brookstone Road, while 50% shall travel via Red Arches Road, Coast Road, and Main Street.

Proposed Project traffic departing or arriving along Red Arches Road, Coast Road, and Main Street shall also pass through traffic survey site J4 (the junction of Main Street with Strand Road). At this junction, it is assumed that all proposed Project traffic shall be distributed according to the existing surveyed peak hour directional splits, which are given in Table 17.10.

Table 17.10: Existing Surveyed Traffic Splits at Survey Site J4 (Main Street / Strand Road)

Departures FROM Main Street (north) to:	Peak Hour Period		Arrivals TO Main Street (north) from:	Peak Hour Period	
	AM Peak	PM Peak		AM Peak	PM Peak
Strand Road	56%	55%	Strand Road	33%	33%
Main Street (south)	44%	45%	Main Street (south)	67%	67%

Proposed Project traffic departing or arriving along Longfield Road, Grange Road, Brookstone Road, and Dublin Street shall pass through traffic survey site J6 (the junction of Main Street, The Mall, Warrenhouse Road, and Dublin Street) from / to the west. At this junction, it has been assumed that all proposed Project traffic shall follow the existing east / south splits (discounting the existing traffic proportion to / from the north). These are given in Table 17.11.

Table 17.11: Surveyed Traffic Splits at Site J6 (Main St / The Mall / Warrenhouse Rd [R809] / Dublin St)

Departures FROM Dublin Street to:	Peak Hour Period		Arrivals TO Dublin Street from:	Peak Hour Period	
	AM Peak	PM Peak		AM Peak	PM Peak
Main Street	n/a	n/a	Main Street	n/a	n/a
The Mall	29%	25%	The Mall	43%	46%
Warrenhouse Road	71%	75%	Warrenhouse Road	57%	54%

17.2.7 Reallocation of Existing Traffic

As the proposed Project shall create a new link between Longfield Road and Red Arches Road (via the adjacent development currently under construction), it is expected to influence the distribution of existing traffic currently travelling between Grange Road and Coast Road. In particular, it is expected that:

- Traffic currently leaving the existing residential developments on Longfield Road and ultimately heading northward along Coast Road shall in future travel via the proposed Project and access Coast Road via Red Arches Road (and vice versa in the case of arriving traffic); and that
- Traffic currently leaving the existing residential developments on Red Arches Road and ultimately heading westward along Grange Road shall in future travel via the proposed Project and access Grange Road via Longfield Road (and vice versa in the case of arriving traffic).

Figure 17.9: Redistribution of Existing Longfield Road Traffic (Sources: OSi, OSM Contributors)

Figure 17.10: Redistribution of Existing Red Arches Road Traffic (Sources: OSi, OSM Contributors)

Predicted future distributions of such traffic have therefore been established, and are shown in Figures 17.9 and 17.10. The existing traffic flows to / from Longfield Road and to / from Red Arches Road have been redistributed accordingly under all future year 'with proposed Project' assessment scenarios.

These future distributions have been determined in the same manner as the predicted distribution of traffic to / from the proposed Project (Figure 17.8), with the following exceptions:

- All traffic generated by the existing developments accessed via Longfield Road, which departs to / arrives from the south-east, is assumed to continue travelling via Longfield Road, Grange Road, Brookstone Road, and Dublin Street; whereas
- All traffic generated by the existing developments accessed via Red Arches Road, which departs to / arrives from the south-east, is assumed to continue travelling via Red Arches Road, Coast Road, and Main Street.

17.2.8 Committed Development Trip Generation and Distribution

The vehicular trips predicted to be generated by the 3 no. committed developments identified in Section 17.2.1.4 of this Chapter have been included in the background traffic flows for all future assessment years. The peak hour trip generation figures for these committed developments are given in Table 17.12.

Table 17.12: Committed Development Trip Generation

Committed Development	Arrivals		Departures		Total Trips	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
(A)	98	130	164	107	262	237
(B)	28	56	81	39	109	95
(C)	68	0	68	0	136	0

Trip generation for committed development (A) has been calculated from the apartment and crèche trip rates given in Tables 17.5 and 17.6, as well as further TRICS trip rates under the following sub-categories:

- 03 Residential / A - Houses Privately Owned
- 01 Retail / I - Shopping Centre - Local Shops
- 06 Hotel, Food & Drink / B - Restaurants

Table 17.13: Additional TRICS Arrival Trip Rates

Time Period	Arrival Trip Rates by Development Element		
	Houses (per unit)	Retail Units (per 100 m^2)	Café (per 100 m^2)
AM Peak	0.185	2.424	0.000
PM Peak	0.285	3.224	1.152

Table 17.14: Additional TRICS Departure Trip Rates

Time Period	Departure Trip Rates by Development Element		
	Houses (per unit)	Retail Units (per 100 m^2)	Café (per 100 m^2)
AM Peak	0.374	2.051	0.000
PM Peak	0.195	3.230	0.909

Trip generation figures for committed development (B) have likewise been calculated from the trip rates for apartments and houses given in Tables 17.5, 17.6, 17.13, and 17.14, while the trip generation of committed development (C) has been sourced from the Traffic and Transport Statement submitted under reg. ref. F19A/0461.

Under the 'without proposed Project' assessment scenarios (i.e. without the proposed new link between Grange Road and Coast Road, via the proposed Project):

- All trips to be generated by committed developments (A) and (C) have been distributed across the surrounding road network in accordance with the distribution of existing traffic to and from Longfield Road (see Figure 17.6); and
- All trips to be generated by committed development (B) have been distributed in accordance with the distribution of existing traffic to and from Red Arches Road (see Figure 17.7).

Under the 'with proposed Project' assessment scenarios (i.e. including the proposed new link between Grange Road and Coast Road):

- All trips to be generated by committed development (A) have been distributed across the surrounding road network in the same manner as those to / from the proposed Project (see Section17.2.5);
- All trips to and from committed development (B) have been distributed in the same manner as the reallocated existing traffic to / from Red Arches Road (see Section17.2.7); and
- All trips to be generated by committed development (C) have been distributed across the surrounding road network in the same manner as those to / from the proposed Project, with the exception that no AM peak arrival trips are assumed to originate in the Baldoyle Industrial Estate (see Figure 17.11).

Figure 17.11: Predicted School Traffic Distribution with Link Road (Sources: OSi, OSM Contributors)

17.2.9 Amended GA1 Trip Generation and Distribution

As described in Sections17.2.1.4 and 17.2.1.5, planning permission has been granted (reg. ref. F16A/0412 / ABP ref. PL06F.248970, as amended under reg. refs. F20A/0258 and F21A/0046) for a mixed-use development on the GA1 lands immediately to the south of the Site of the proposed Project. As described above, an SHD application (ABP ref. TA06F.310418) has been made to An Bord Pleanála for permission to amend the permitted development.

The peak hour vehicular trip generation of the permitted GA1 development – calculated as described in Section 17.2.8 – is given in Table 17.15.

Table 17.15: Currently Permitted GA1 Development Trip Generation

Time Period	Arrivals	Departures	Total Trips
AM Peak	98	164	262
PM Peak	130	107	237

Trip generation for the proposed amended GA1 development has been calculated in the same manner. For those elements (medical centre and gym) not present in the currently permitted development, TRICS trip rates under the following sub-categories have been used:

- 05 Health / G - GP Surgeries
- 07 Leisure / K - Fitness Club (Private)

The selected TRICS trip rates for these additional sub-categories are given in Table 17.16.

Table 17.16: Supplementary TRICS Arrival and Departure Trip Rates

Time Period	Arrival Trip Rates (per 100 m^2)		Departure Trip Rates (per 100 m^2)	
	Medical Centre	Gym	Medical Centre	Gym
AM Peak	2.964	0.854	1.491	0.493
PM Peak	2.261	1.140	2.504	0.766

Including the 99 no. houses currently under construction, the resultant total amended GA1 development trip generation is as follows:

Table 17.17: Proposed Amended GA1 Development Trip Generation

Time Period	Arrivals	Departures	Total Trips
AM Peak	144	261	405
PM Peak	219	174	393

The increases in GA1 vehicular trip generation that would result from the proposed amendments are given in Table 17.18.

Table 17.18: Increases in GA1 Development Trip Generation

Time Period	Arrivals	Departures	Total Trips
AM Peak	46	97	143
PM Peak	89	67	156

The above increases in vehicular traffic are applied under the Design Year sensitivity assessment scenario detailed in Section 17.10. Under this assessment scenario, all trips to and from GA1 have been distributed across the surrounding road network in the same manner as those to / from the proposed Project (see Section 17.2.6).

17.2.10 Network Analysis

Table 17.19 shows the absolute and proportional increases in peak hour traffic flows that shall result from the proposed Project at each of the 9 no. surveyed junctions shown in Figure 17.5. The additional trips at each of these junctions are the sum of:

- The vehicular trips directly generated by the proposed Project; and
- The existing traffic on the surrounding road network that shall be redistributed as a result of being able to travel between Grange Road and Coast Road via the proposed Project.

Table 17.19: Changes in Traffic Flows at Surveyed Junctions

Surveyed Junction No.	Background Traffic Flows at Junction (Year 2020)		Additional Trips Through Junction		Proportional Change	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
J1	1711	1745	132	131	+7.7%	+7.5%
J2	1343	1101	56	41	+4.2%	+3.7%
J3	1393	1230	-65	-42	-4.7%	-3.4%
J4	1236	1089	33	30	+2.7%	+2.8%
J5	903	815	28	24	+3.1%	+2.9%
J6	1124	1162	50	47	+4.4%	+4.0%
J7	1045	1004	-64	-42	-6.1%	-4.2%
J8	1110	1745	-64	-42	-5.8%	-2.4%
J9	2983	3117	117	93	+3.9%	+3.0%

The TII *Traffic and Transport Assessment Guidelines* (PE-PDV-02045) advise that transport assessments should generally be applied where traffic to and from a development is predicted to exceed 10% of the existing background traffic on the adjoining road (or 5% at sensitive locations). As shown in Table 17.19, the proposed Project shall not result in an increase of more than 10% in total traffic flows at any location in either peak hour period. Surveyed junction J1 (the junction of Grange Road with Longfield Road and Grange Rise) shall, however, experience increases of over 5% in total traffic flows in both peak hour periods. This should be considered a sensitive location, as it constitutes the only existing vehicular access to the established residential developments located on Longfield Road.

Within the scope of this assessment, therefore, only existing junction J1 requires detailed operational assessment. All other surveyed junctions are considered at low risk of detrimental effects as a result of the proposed Project, given the generally lower proportional increases (or indeed net reductions) in traffic flows that it shall give rise to at these locations. Given its key location, however, surveyed junction J2 (the junction of Coast Road with Red Arches Road) has been included in the operational assessments detailed in Sections 17.3, 17.6, 17.10, and 17.11. At the request of FCC, full assessment of surveyed junction J9 (the existing roundabout junction of Hole in the Wall Road with Grange Road and Clarehall Avenue) has also been carried out.

Figure 17.12: Modelled Road Junctions (Sources: OSM Contributors, Microsoft)

Operational assessments of Junction 1 (J1), Junction 2 (J2), and Junction 3 (J3) have therefore been undertaken using the industry-standard TRL computer programs TRANSYT and ARCADY, for both the weekday AM peak hour and the weekday PM peak hour (see Figure 17.12):

J1. Grange Road (R139) / Longfield Road / Grange Rise (4-arm signal-controlled junction);

J2. Coast Road (R106) / Red Arches Road (3-arm priority-controlled roundabout); and

J9. Hole in the Wall Road / R138 / R809 (4-arm priority-controlled roundabout).

17.2.10.1 Assessment Scenarios

The performances of these junctions have been assessed under the following primary scenarios, using the existing and predicted traffic flows given in Appendix C of the TIA report (submitted under separate cover as part of this application):

- 2020 – surveyed traffic conditions;
- 2023 (planned year of opening) – with and without proposed Project;
- 2028 – with and without proposed Project; and
- 2038 (design year) – with and without proposed Project.

In addition to the above primary assessment scenarios, a sensitivity assessment has been carried out for the design year 2038, which takes into account the effects of the proposed amendments to the extant planning permissions on the adjacent GA1 zoned lands to the south of the Site of the proposed Project (as described in Section 17.2.9). The results of this sensitivity assessment, representing the cumulative development impact, are presented in Section 17.10.

17.2.10.2 Assessment Criteria

Junction performance is assessed using the following five metrics:

- ***Degree of Saturation:*** The ratio of current traffic flow to ultimate capacity (also known as RFC) on a link or traffic stream. Account is taken of the green time given to the link per cycle when calculating this value (for signalised junction approaches), as well blocking effects and oversaturation effects.
- ***Mean Maximum Queue:*** The highest estimated mean number of Passenger Car Units (PCUs) queued in any lane of a junction approach link, averaged over the entire analysis period.
- ***Maximum Queue at End of Red:*** The maximum length of queue in any lane of a signal-controlled junction approach link by the end of the red signal phase for that approach, measured in PCUs.
- ***Mean Delay per PCU:*** The average delay incurred by a vehicle on a junction approach link or traffic stream, as a result of having to queue at signals or having to give way at a priority junction.
- ***Practical Reserve Capacity:*** The percentage by which the arriving traffic flow on a stream could increase before the stream would reach its effective capacity (i.e. 90% saturation).

17.2.10.3 Junction 1 Modelling Parameters

Assessed J1 (the existing signal-controlled junction of Longfield Road with Grange Road and Grange Rise) has been replicated in a TRANSYT model matching the junction's existing physical configuration and operational characteristics. Details of specific parameters incorporated into the model, such as signal phasing sequence and cycle time, are given in the TIA report submitted under separate cover.

17.3 Baseline Environment

Tables 17.20, 17.21, and 17.22 show the TRANSYT and ARCADY modelling results for the baseline year 2020, at the 3 no. existing surveyed junctions that have been assessed.

These results indicate that each of the assessed junctions currently operates within its effective capacity on all junction approaches during both the AM and PM peak periods. Existing vehicle queues and delays during peak hour periods generally range from minimal (at J2) to moderate (on most J1 approaches). More significant queueing and / or delays are, however, experienced on the northern and eastern approaches to J1.

Table 17.20: Junction 1 Assessment Results – Baseline Year 2020

Junction Approach Arm and Traffic Stream		Degree of Saturation (%)		Mean Maximum Queue (PCU)		Maximum Queue at End of Red (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
Arm	Stream[70]	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	30	45	3	2	3	1	77	109	200	100
	R	30	41	3	2	3	2	76	102	205	117
Grange Road (east)	S / L	77	70	27	21	18	16	51	53	17	29
	R	40	60	1	2	1	2	105	136	125	50
Grange Rise (south)	L	22	53	4	15	4	12	50	43	317	69
	S / R	29	38	3	7	3	6	75	61	209	138
Grange Road (west)	S / L	42	48	12	15	10	11	26	30	112	87
	R	75	35	18	7	9	4	56	33	20	158

[70] Traffic stream movements: S = straight ahead, L = left turn, R = right turn

Table 17.21: Junction 2 Assessment Results – Baseline Year 2020

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Coast Road (south)	34	44	1	1	3	4	31	112
Red Arches Road (west)	15	5	0	0	4	3		
Coast Road (north)	69	40	2	1	10	5		

Table 17.22: Junction 9 Assessment Results – Baseline Year 2020

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Hole in the Wall Road (north)	50	48	1	1	7	5	12	4
Grange Road (east)	56	77	1	3	7	13		
Grange Road (south)	65	85	2	5	8	21		
Clarehall Avenue (west)	78	65	4	2	11	7		

J1 experiences:

- Mean maximum vehicle queues of at most 27 PCU during the AM peak hour and at most 21 PCU during the PM peak hour; and
- Mean delays per PCU of at most 105 seconds during the AM peak hour and at most 136 seconds during the PM peak hour.

J2 experiences:

- Mean maximum vehicle queues of at most 2 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and
- Mean delays per PCU of at most 10 seconds during the AM peak hour and at most 5 seconds during the PM peak hour.

J9 experiences:

- Mean maximum vehicle queues of at most 4 PCU during the AM peak hour and at most 5 PCU during the PM peak hour; and
- Mean delays per PCU of at most 11 seconds during the AM peak hour and at most 21 seconds during the PM peak hour.

17.4 Potential Impacts of the Proposed Project

17.4.1 Construction Phase

Junction performance assessment has not been conducted for the construction phase of the proposed Project.

During construction of the proposed Project, it is expected that vehicular traffic to / from the Site shall reach a peak during site clearance works and basement excavation earthworks, which shall require the removal from Site of construction waste and spoil. Under a worst-case scenario, it is possible that up to 10 no. heavy goods vehicle (HGV) trips may be made to the Site each hour during this phase (one HGV arrival and one HGV departure every 6 minutes); this would equate to total movements of 20 HGVs in each of the background peak hours, equivalent to 46 Passenger Car Units (PCU).

Allowing for a potential additional 50 no. light vehicle arrivals and 5no. light vehicle departures during the AM peak, with these movements reversed during the PM peak, the maximum potential construction-related vehicle movements in either of the peak hours is 101 PCU. This is significantly lower than the operational phase peak hour trip generation given in Table 17.9. Furthermore, as described in Section 17.5.1, all construction traffic shall be routed via a haulage road to / from the north, thereby avoiding the junctions on Grange Road and Coast Road, which have the greatest potential to be adversely impacted by construction traffic.

Table 17.23: Maximum Potential Construction-related Trip Generation

Vehicle Type	Arrivals (PCU)		Departures (PCU)		Total Trips (PCU)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Light	50	5	5	50	55	55
Heavy	23	23	23	23	46	46
Total	73	28	28	73	101	101

It is also recognised that there is potential during the construction phase for construction-related activity to impact upon the surrounding road network in ways beyond the operational performance of the junctions assessed, e.g. as a result of surrounding roads being temporarily obstructed by stopped / parked construction vehicles or by delivery / loading operations, or their condition being temporarily degraded by the presence of dirt / debris originating from the construction site. The construction phase mitigation measures detailed in Section 17.5.1

are intended specifically to minimise such impacts, and these measures will be strictly adhered to.

17.4.2 Operational Phase

In its operational phase, the proposed Project will generate regular vehicular trips on the surrounding road network, increasing traffic flows at nearby existing junctions. Should the resultant total traffic flows at these junctions become too high (particularly at peak times), the junctions may become oversaturated and cease to function efficiently. The purpose of the present assessment is therefore to quantify the trip generation of the proposed Project, establish the distribution of these trips and the resultant total traffic flows at nearby junctions, and to assess the operational performance of these junctions with the proposed Project in place. The resultant effects of the proposed Project on these junctions represent its Residual Impact, as described in Section 17.6.

17.5 Mitigation Measures

17.5.1 Construction Phase

Construction phase mitigation measures in relation to traffic and transportation are as follows:

- The lead contractor appointed for the construction of the proposed Project will be required to prepare a site-specific Construction Management Plan (CMP), including a plan for the scheduling and management of construction traffic, which will set out measures to be taken to mitigate the effects of construction traffic on the surrounding road network.

  The final site-specific CMP will be based upon the Outline CMP prepared by CS Consulting and submitted under separate cover as part of this application. This includes (inter alia) the following measures for minimising construction traffic and mitigating its effects:

  - Routing all construction traffic via a haulage road to / from the north, connecting to Mayne Road, avoiding Grange Road and Coast Road.
  - Conducting all loading and unloading operations within the Site, away from the public roads.

- Scheduling deliveries outside of peak hour periods to avoid disturbance to surrounding pedestrian and vehicular traffic.
- Staggering HGV movement to / from Site to avoid queues.
- Preventing haulage vehicles travelling in convoys of more than two vehicles at any time and spacing haulage vehicles by a minimum of 250 m at all times.
- Installation of a wheel wash at exit from the Site to prevent any dirt being carried out into the public roads.
- Deployment of a road sweeper as necessary to keep the public roads around the Site clean.

- A Designated Community Liaison Officer (CLO) will be nominated for the construction phase of the proposed Project, who will work with CLOs (or equivalent) on other active sites to coordinate construction activities. The CLO will also act as a point of contact for local residents, FCC, and An Garda Síochána.

- Construction personnel will be encouraged to make use of the available high-quality public transport links to the area and / or to commute by bicycle, to minimise private car trips to and from the Site. To avoid problems of parking overspill on surrounding streets, however, limited essential staff parking shall be provided within the Site. In parallel with this, parking restrictions and management measures on surrounding streets will be reviewed and implemented as necessary in agreement with local residents and FCC.

17.5.2 Operational Phase

The proposed Project shall incorporate several design elements (mitigation by design) intended to mitigate the impact of the Project on the surrounding road network during its operational phase. These include:

- Reduced car parking provision, which shall discourage higher vehicle ownership rates and excessive vehicular trips to the Site of the proposed Project (by residents and visitors); and

- A high provision of secure bicycle parking, which shall encourage bicycle journeys by both occupants and visitors.

In addition to the above-listed mitigation by design, the following mitigation measures shall be implemented during the operational phase:

- As described in the Residential Travel Plan (RTP) framework document submitted under separate cover as part of this application, a RTP Coordinator shall be appointed for the proposed Project, with the remit to implement and oversee an ongoing RTP. This shall promote a modal shift among residents away from single-occupant car journeys in favour of more environmentally sustainable alternatives (e.g. rail, public bus, cycling, walking, etc.). The Site benefits from a highly advantageous location in proximity to high-frequency rail services and bus services. The RTP framework sets a suggested initial target of reducing the modal share of private car use from 33% to 28% over a 2-year period following completion of the Project. This equates to a reduction of approximately 15% in car journeys made to and from the Site.

17.6 Residual Impacts

Tables 17.24, 17.25, and 17.26 give the peak hour TRANSYT and ARCADY modelling results for the 3 no. assessed junctions in the design year of 2038 (15 years after proposed Project completion). The traffic flows used in this assessment scenario account for all committed developments described in Section 17.2.1.4, including the adjacent development at Baldoyle-Stapolin Growth Area 1 as currently permitted (reg. ref. F16A/0412 / ABP ref. PL 06F.248970, as amended under reg. refs. F20A/0258 and F21A/0046), as well as traffic generated by the proposed Project itself.

The effect of traffic redistribution via the proposed new link between Longfield Road and Red Arches Road has also been accounted for. The current SHD application for further amendments to the adjacent development at Baldoyle-Stapolin Growth Area 1 (ABP ref. TA06F.310418), which is described in Section 17.2.1.5, has not been accounted for in these traffic flows as this application is yet to be decided.

Table 17.24: Junction 1 Assessment Results – Design Year 2038 – with Proposed Project

Junction Approach Arm and Traffic Stream		Degree of Saturation (%)		Mean Maximum Queue (PCU)		Maximum Queue at End of Red (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
Arm	Stream[70]	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	39	38	6	3	6	3	65	81	128	138
	R	87	77	19	9	16	8	97	105	3	18
Grange Road (east)	S / L	96	88	41	29	29	21	94	72	-7	3
	R	58	78	3	4	3	4	110	149	56	16
Grange Rise (south)	L	33	74	6	22	5	16	60	58	173	21
	S / R	85	62	6	11	6	10	160	72	6	46
Grange Road (west)	S / L	70	83	25	31	17	20	40	54	29	9
	R	98	52	31	10	18	6	122	50	-8	74

Table 17.25: Junction 2 Assessment Results – Design Year 2038 – with Proposed Project

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Coast Road (south)	42	57	1	1	4	6	-3	57
Red Arches Road (west)	39	17	1	0	5	4		
Coast Road (north)	94	58	12	1	44	7		

Table 17.26: Junction 9 Assessment Results – Design Year 2038 – with Proposed Project

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Hole in the Wall Road (north)	76	70	3	2	16	11	-14	-19
Grange Road (east)	94	113	12	79	44	203		
Grange Road (south)	90	117	8	96	28	336		
Clarehall Avenue (west)	108	87	66	6	136	19		

Under this assessment scenario, J1 shall experience:

- Mean maximum vehicle queues of at most 41 PCU during the AM peak hour and at most 31 PCU during the PM peak hour; and
- Mean delays per PCU of at most 160 seconds during the AM peak hour and at most 149 seconds during the PM peak hour.

J2 shall experience:

- Mean maximum vehicle queues of at most 12 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and
- Mean delays per PCU of at most 44 seconds during the AM peak hour and at most 7 seconds during the PM peak hour.

J9 shall experience:

- Mean maximum vehicle queues of at most 66 PCU during the AM peak hour and at most 96 PCU during the PM peak hour; and
- Mean delays per PCU of at most 136 seconds during the AM peak hour and at most 336 seconds during the PM peak hour.

The predicted residual impact of the proposed Project is obtained through comparison of the preceding design year assessment results with those of the Do-Nothing scenario for the same year (given in Section 17.11). These comparisons, for each of the junctions assessed, are given in Tables 17.27, 17.28, and 17.29.

Table 17.27: Junction 1 – Variation Between 2038 Do-Nothing and Do-Something Assessment Results

Junction Approach Arm and Traffic Stream		Degree of Saturation (%)		Mean Maximum Queue (PCU)		Maximum Queue at End of Red (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
Arm	Stream[70]	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	-22	-23	-3	-1	-2	-1	-13	-19	+80	+90
	R	+26	+16	+9	+4	+7	+3	+21	+7	-45	-30
Grange Road (east)	S / L	-5	-3	-13	-3	-10	-2	-35	-7	+4	+4
	R	-6	-4	-2	-2	-2	-2	+8	+6	+14	+6
Grange Rise (south)	L	+2	+4	0	+1	0	+1	+2	+5	-14	-8
	S / R	+21	+11	+1	+2	+1	+1	+57	+8	-34	-31
Grange Road (west)	S / L	-1	+4	0	+3	0	+1	-2	+2	+2	-5
	R	-5	-1	-5	0	-5	0	-42	-1	+4	+3

Table 17.28: Junction 2 – Variation Between 2038 Do-Nothing and Do-Something Assessment Results

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Coast Road (south)	-4	-1	0	0	0	0	-3	-3

Red Arches Road (west)	+11	+6	0	0	+1	0		
Coast Road (north)	+3	+5	+3	0	+11	+1		

Table 17.29: Junction 9 – Variation Between 2038 Do-Nothing and Do-Something Assessment Results

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Hole in the Wall Road (north)	0	+2	0	0	0	+1	-1	-1
Grange Road (east)	+6	+4	+5	+18	+18	+40		
Grange Road (south)	+2	+1	+1	+9	+4	+39		
Clarehall Avenue (west)	+1	+2	+6	+1	+10	+2		

At J1 in the year 2038, the proposed Project shall result in:

- Maximum increases in vehicle queue length of 9 PCU during the AM peak hour and of 4 PCU during the PM peak hour; and
- Maximum increases in mean delay per PCU of 57 seconds during the AM peak hour of 8 seconds during the PM peak hour.

At J2 in the year 2038, the proposed Project shall result in:

- Maximum increases in vehicle queue length of 3 PCU during the AM peak hour and of 0 PCU during the PM peak hour; and
- Maximum increases in mean delay per PCU of 11 seconds during the AM peak hour of 1 second during the PM peak hour.

At J9 in the year 2038, the proposed Project shall result in:

- Maximum increases in vehicle queue length of 6 PCU during the AM peak hour and of 18 PCU during the PM peak hour; and
- Maximum increases in mean delay per PCU of 18 seconds during the AM peak hour of 40 seconds during the PM peak hour.

During its operational phase, the proposed Project is therefore predicted to result overall in a ***long-term, moderate, adverse*** impact on the operation of junctions on the surrounding road network. This impact should be considered ***reversible*** to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, junction redesign, or changes in general traffic flow restrictions) have the potential to improve local traffic flows generally, as well as to reduce vehicle trips to / from the proposed Project.

It should be noted that the Do-Nothing assessment results presented in Section 17.11 indicate that at least one junction approach shall exceed ultimate capacity during one or both peak hour periods by the year 2038 at both J1 and J9, without the proposed Project, due to the influence of background traffic growth and the addition of traffic generated by other committed developments. Because of the pre-existing oversaturated condition of these junctions under the Do-Nothing assessment scenario, the residual impacts of the proposed Project are disproportionate to the actual vehicular traffic generation of the Project itself.

17.7 Monitoring

Post-construction monitoring of the surrounding street network's performance is not required or proposed in this case.

Within the scope of the Residential Travel Plan (RTP) to be implemented for the proposed Project, however, the RTP Coordinator shall be responsible for monitoring the travel habits of occupants and visitors. An RTP is a dynamic process whereby a package of measures and campaigns is identified, piloted, and then monitored on an ongoing basis. The RTP will identify specific targets against which the effectiveness of the plan can be assessed at each review; these will typically take the form of target modal splits for journeys to and from a site. The RTP Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of occupants.

17.8 Reinstatement

Reinstatement is not directly applicable to the traffic assessment chapter of this EIAR. No reinstatement works of relevance to traffic and transport are proposed as part of the proposed Project, with the exception of any repair works necessary to remedy minor damage to the adjoining roads that may possibly result from the passage of construction traffic.

17.9 Interactions

The vehicular traffic flows that shall be generated by the proposed Project may contribute to changes in air quality and noise levels in the vicinity of the surrounding road network. The natures, extents, and consequences of these changes are assessed in Chapters 11 (Air Quality & Climate) and 12 (Noise & Vibration) of this EIAR.

17.10 Cumulative Impacts

The cumulative impact of the proposed Project is represented in this case by the sensitivity assessment carried out for the design year 2038, which includes the effects of the proposed amendments to the extant planning permissions on the adjacent GA1 zoned lands to the south of the Site of the proposed Project (as described in Sections 17.2.1.5 and 17.2.9). The results of this sensitivity assessment are given in Tables 17.30, 17.31, and 17.32.

Table 17.30: Junction 1 Assessment Results – Design Year 2038 – Cumulative Sensitivity Assessment

Junction Approach Arm and Traffic Stream		Degree of Saturation (%)		Mean Maximum Queue (PCU)		Maximum Queue at End of Red (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
Arm	Stream[70]	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	43	38	7	4	7	4	65	78	110	136
	R	95	78	24	10	20	9	122	102	-5	15
Grange Road (east)	S / L	96	88	41	29	29	21	94	72	-7	3
	R	63	91	3	6	3	6	116	206	42	-1
Grange Rise (south)	L	34	78	6	23	5	17	61	63	167	16
	S / R	97	68	8	12	8	11	231	77	-7	32
Grange Road (west)	S / L	72	88	26	35	17	22	41	61	25	2
	R	98	53	31	10	19	6	123	51	-8	69

Table 17.31: Junction 2 Assessment Results – Design Year 2038 – Cumulative Sensitivity Assessment

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Coast Road (south)	43	59	1	1	4	6	-5	50
Red Arches Road (west)	43	20	1	0	6	4		
Coast Road (north)	96	60	15	1	54	8		

Table 17.32: Junction 9 Assessment Results – Design Year 2038 – Cumulative Sensitivity Assessment

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Hole in the Wall Road (north)	77	71	3	2	17	11	-15	-20
Grange Road (east)	98	115	18	92	62	234		
Grange Road (south)	92	119	9	103	31	364		
Clarehall Avenue (west)	109	88	75	7	152	21		

Under this assessment scenario, J1 shall experience:

- Mean maximum vehicle queues of at most 41 PCU during the AM peak hour and at most 35 PCU during the PM peak hour; and
- Mean delays per PCU of at most 231 seconds during the AM peak hour and at most 206 seconds during the PM peak hour.

J2 shall experience:

- Mean maximum vehicle queues of at most 15 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and
- Mean delays per PCU of at most 54 seconds during the AM peak hour and at most 8 seconds during the PM peak hour.

J9 shall experience:

- Mean maximum vehicle queues of at most 75 PCU during the AM peak hour and at most 103 PCU during the PM peak hour; and
- Mean delays per PCU of at most 152 seconds during the AM peak hour and at most 364 seconds during the PM peak hour.

These cumulative impact assessment results are similar to the residual impact described in Section 17.6, representing a ***long-term, moderate, adverse*** impact on the operation of junctions on the surrounding road network.

17.11 'Do-Nothing' Impact

Tables 17.33, 17.34, and 17.35 give the TRANSYT and ARCADY junction assessment results for the design year 2038 under the Do-Nothing scenario. The traffic flows used in these assessments are those surveyed in January 2020, scaled up to 2038 levels using standard TII growth factors, and with the addition of traffic generated by known committed developments. No traffic generation by the proposed Project is included, and no redistribution of existing traffic has been applied.

Table 17.33: Junction 1 Assessment Results – Design Year 2038 – Do-Nothing Scenario

Junction Approach Arm and Traffic Stream		Degree of Saturation (%)		Mean Maximum Queue (PCU)		Maximum Queue at End of Red (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
Arm	Stream[70]	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	61	61	9	5	8	4	78	99	48	48
	R	61	61	9	5	8	5	77	98	48	48
Grange Road (east)	S / L	101	91	54	33	38	23	129	79	-11	-1
	R	64	82	5	6	5	6	102	143	42	10
Grange Rise (south)	L	31	70	6	21	5	16	58	53	187	29
	S / R	64	51	5	9	5	8	103	64	40	77
Grange Road (west)	S / L	71	79	25	28	17	19	42	52	27	14
	R	103	53	36	10	23	6	164	51	-12	71

Table 17.34: Junction 2 Assessment Results – Design Year 2038 – Do-Nothing Scenario

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Coast Road (south)	46	58	1	1	4	6	0	60
Red Arches Road (west)	28	11	0	0	5	4		
Coast Road (north)	91	53	9	1	33	7		

Table 17.35: Junction 9 Assessment Results – Design Year 2038 – Do-Nothing Scenario

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Hole in the Wall Road (north)	76	68	3	2	16	10	-13	-18
Grange Road (east)	88	109	6	61	26	163		
Grange Road (south)	88	116	7	88	24	298		
Clarehall Avenue (west)	107	85	60	5	126	17		

Under this assessment scenario, J1 is shown to exceed its ultimate capacity on two approach streams in the AM peak hour period and to exceed its effective capacity on one approach stream in the PM peak hour period, while J9 shall exceed its ultimate capacity on at least one approach in each of the peak hour periods, with correspondingly high values of queue length and mean delay. J2 shall exceed its effective capacity on one approach in the AM peak hour period, but queue lengths and delays shall, for the most part, remain low.

J1 shall experience:

- Mean maximum vehicle queues of at most 54 PCU during the AM peak hour and at most 33 PCU during the PM peak hour; and
- Mean delays per PCU of at most 164 seconds during the AM peak hour and at most 143 seconds during the PM peak hour.

J2 shall experience:

- Mean maximum vehicle queues of at most 9 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and
- Mean delays per PCU of at most 33 seconds during the AM peak hour and at most 7 seconds during the PM peak hour.

J9 shall experience:

- Mean maximum vehicle queues of at most 60 PCU during the AM peak hour and at most 88 PCU during the PM peak hour; and
- Mean delays per PCU of at most 126 seconds during the AM peak hour and at most 298 seconds during the PM peak hour.

17.12 Difficulties Encountered in Compiling the Chapter

No particular difficulties were encountered in compiling this chapter of this EIAR.

17.13 References

- Central Statistics Office (CSO) (2017). *2016 Census data.*
- DHPLG (2018). *Sustainable Urban Housing: Design Standards for New Apartments.*
- Department of Transport, Tourism and Sport (DTTS) (2019). *Design Manual for Urban Roads and Streets.*
- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.

- FCC (2017). *Fingal Development Plan 2017 – 2023.*
- FCC (2013). *Baldoyle-Stapolin Local Area Plan 2013 – 2019.*
- IHT (1994). *Guidelines for Traffic Impact Assessments.*
- NTA (2011). *National Cycle Manual.*
- NTA (2013). *Greater Dublin Area Cycle Network Plan.*
- TII (2014). *Traffic and Transport Assessment Guidelines.*
- TII (2011). *Project Appraisal Guidelines.*
- TRICS Consortium (n.d.). *Trip Rate Information Computer System (TRICS) database*

18 Material Assets – Waste

18.1 Introduction

This chapter of the EIAR comprises an assessment of the likely impact of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, on the waste generated from the Project as well as identifying proposed mitigation measures to minimise any impacts.

This chapter was prepared by Chonaill Bradley of AWN Consulting. Chonaill Bradley is a Senior Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science. He is an Associate Member of the Institute of Waste Management (CIWM). Chonaill has over seven years' experience in the environmental consultancy sector.

A site-specific Construction and Demolition Waste Management Plan (C&D WMP) has been prepared by AWN Consulting Ltd to address waste generation during the excavation and construction phases of the proposed Project, and has been included as Appendix 18.1. The C&D WMP was prepared in accordance with the '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects*' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

A separate Operational Waste Management Plan (OWMP) has also been prepared for the operational phase of the proposed Project, and is included as Appendix 18.2.

These documents will ensure the sustainable management of wastes arising at the Site of the proposed Project, in accordance with legislative requirements and best practice standards.

18.2 Methodology

The assessment of the impacts of the proposed Project arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodologies specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management; including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. A summary of the documents reviewed, and the relevant legislation, is provided in the C&D WMP and in the OWMP provided in Appendices 18.1 and 18.2.

This Chapter is based on the proposed Project, as described in Chapter 5 (Description of the Proposed Project) and considers the following aspects:

- Legislative context;
- Construction phase (including Site preparation and excavation; and
- Operational phase.

A desktop study was carried out which included the following:

- Review of applicable policy and legislation, which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction and operational phases of the proposed Project have been calculated. The waste types and estimated quantities are based on the EPA's *National Waste Reports and National Waste Statistics*, data recorded from similar previous developments, information on the two phases of this proposed Project, and Irish and US EPA waste generation research, as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed Project on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. These are presented in Section 18.5.

18.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation, which stipulates how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC), which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) (Figure 18.1).

Figure 18.1: Waste Hierarchy (Source: European Commission)

In addition, the Irish government issues policy documents which outline measures aimed to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, *Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland*, was published in 2020 and shifts focus away from waste disposal and back up the production chain. The shift of focus from national waste targets is due to changes in the Irish and international waste context in the years since the launch of the previous waste management plan, *A Resource Opportunity*, in 2012. The need to embed climate action in all strands of public policy aligns with the goals of the European Green Deal.

The strategy for the management of waste during the construction phase is in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects*, published in 2006. The guidance document *Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers* was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance in this respect is taken from industry guidelines, plans and reports including the *Eastern Midlands Region* (EMR) *Waste Management Plan 2015 – 2021*, BS 5906:2005 *Waste Management in Buildings – Code of Practice*, the *Fingal County Council* (FCC) *Segregation,* *Storage and Presentation of Household and Commercial Waste Bye-Laws 2020*, and the EPA national waste statistics 1998 – 2018.

18.2.2 Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste – Any substance or object which the holder discards or intends or is required to discard.

Prevention – Measures taken before a substance, material or product has become waste that reduce:

- The quantity of waste, including through the re-use of products or the extension of the life span of products;
- The adverse impacts of the generated waste on the environment and human health; or
- The content of harmful substances in materials and products.

Reuse – Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse – Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment – Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery – Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling – Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal – Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations.

18.3 Baseline Environment

The proposed development site is located at Baldoyle-Stapolin, Dublin 13. It is a site of c. 6.89 hectares, and comprises lands referred to as Growth Area 3 (GA3) within the Baldoyle-Stapolin Local Area Plan. The lands are bound by the Dublin-Belfast / DART train line to the west, existing and proposed residential areas to the south and east, and future Racecouse Park to the north.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 9 (Land, Soils, Geology and Hydrogeology), which also discusses the environmental quality of any soils to be excavated to facilitate construction of the proposed Project.

In terms of waste management, the receiving environment is largely defined by FCC as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the *EMR Waste Management Plan 2015 – 2021*, which sets out the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "*70% preparing for reuse, recycling and other recovery of construction and demolition waste*" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020. The National Waste Statistics update published by the EPA in August 2020 identifies that Ireland's current progress against this target is at 77%, and our progress against *"Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)"* is at 51%. Both of these targets are required to be met by 12 December 2020 in accordance with the requirements of the Waste Framework Directive; however, the EPA are yet to confirm whether these were met.

The *Fingal Development Plan 2017 – 2023* also sets policies and objectives for the FCC area, which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, FCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the EMR for management of waste from the construction industry, as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

18.4 Potential Impacts of the Proposed Project

This section details the potential waste effects associated with the proposed Project.

18.4.1 Characteristics of the Proposed Project

A full description of the proposed Project can be found in Chapter 5 (Description of the Proposed Project). The characteristics of the proposed Project that are relevant in terms of waste management are summarised below.

18.4.1.1 Demolition Phase

The Site is a greenfield Site and, as such, there will be no demolition of existing structures associated with this Project.

18.4.1.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The appointed Contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

In addition, topsoil, sub-soil and made ground on the Site will need to be excavated to facilitate site levelling, construction of foundations, and installation of underground services. The Project Engineers have estimated that c. 31,966.6 m^3 of material will require excavation. It is envisaged that the majority of this material will be removed off-site in with c. 10,096.0 m^3 of material expected to be kept for on-site reuse. These estimates will be refined prior to commencement of construction. If the material that requires removal from Site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material, as appropriate, will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Article 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011).

In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, the material will first need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous*. Environmental soil analysis will be carried out on a number of the soil samples, prior to removal of the material, in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC – Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste, including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction phase workers, e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables, and potentially sewage sludge from temporary welfare facilities provided on-site. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further detail on the waste materials likely to be generated during the construction works are presented in the project-specific C&D WMP (Appendix 18.1). The C&D WMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed Project. These are summarised in Table 18.1.

Table 18.1: Estimated off-site Reuse, Recycle and Disposal Rates for Construction Waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	2318.4	10	231.8	80	1854.8	10	231.8
Timber	1967.2	40	786.9	55	1081.9	5	98.4
Plasterboard	702.6	30	210.8	60	421.5	10	70.3
Metals	562.0	5	28.1	90	505.8	5	28.1
Concrete	421.5	30	126.5	65	274.0	5	21.1
Other	1053.8	20	210.8	60	632.3	20	210.8
Total	**7025.6**		**1594.8**		**4770.4**		**660.4**

18.4.1.3 Operational Phase

As noted in Section 18.1, an OWMP has been prepared for the proposed Project and is included in Appendix 18.2. The OWMP provides a strategy for segregation at source, storage and collection of all wastes generated within the building during the operational phase; including dry mixed recyclables, organic waste and mixed non-recyclable waste; as well as providing a strategy for management of waste glass, batteries, WEEE, printer / toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the proposed Project for the main waste types, based on the AWN waste generation model (WGM), is presented in Table 18.2, and is based on the uses and areas as advised by the Project Architects. Further unit breakdowns can be found in Appendix 18.2.

Table 18.2: Estimated off-site Reuse, Recycle and Disposal Rates for Construction Waste

Waste type	Waste Volume (m^3/week)	
	Residential Units (Combined)	Commercial Units (Combined)
Organic Waste	17.93	0.24
DMR	127.06	2.50
Glass	3.47	0.01
MNR	66.82	1.68
Total	**215.27**	**4.43**

The residents and tenants will be required to provide and maintain appropriate waste receptacles within their units to facilitate segregation at source of these waste types. The location of the bins within the units will be at the discretion of the residents. As required, the residents and tenants will need to bring these segregated wastes from their units to their allocated Waste Storage Areas (WSAs). All WSAs can be viewed on the plans submitted under separate cover with the application.

The OWMP seeks to ensure that the proposed Project contributes to the targets outlined in the *EMR Waste Management Plan 2015 – 2021* and the FCC waste bye-laws.

18.4.2 Construction Phase Impacts

The proposed Project will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the proposed Project and in adjacent areas. The indirect effect of litter issues is the presence of vermin in affected areas. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and indirect negative environmental impacts. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

Wastes arising from the proposed works will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the EMR which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the proposed Project would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. The majority of construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

There is a quantity of excavated material which will need to be excavated to facilitate the proposed Project. It is anticipated that c. 21,870 m^3 of excavated material will need to be removed off-site, however it is envisaged that c. 10,096.6 m^3 tonnes of excavated material will be reused on-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers or on water or soil, both on and off-site. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

18.4.3 Operational Phase Impacts

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

The nature of the proposed Project means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and in adjacent areas. The knock-on effect of litter issues is the presence of vermin in affected areas. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

Waste contractors will be required to service the development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and negative environmental impacts. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

18.5 Mitigation Measures

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

18.5.1 Construction Phase

As previously stated, a project specific C&D WMP has been prepared in line with the requirements of the guidance document issued by the Department of Environment Heritage, Local Government (DEHLG) and is included as Appendix 18.1. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the proposed Project. Prior to commencement of on-site works, the appointed Contractor(s) will be required to refine / update the C&D WMP or submit an addendum to C&D WMP to FCC, to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

A quantity of topsoil, sub-soil and made ground which will need to be excavated to facilitate the proposed Project. Project Engineers have estimated that c. 21, 870.0 m^3 of excavated material will need to be removed off-site; however, it is envisaged that c. 10,096.0 m^3 of excavated material will be reused on-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers or on water or soil, both on and off-site.

The following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste'.

- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. It is anticipated that the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible.
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site.
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles in suitably bunded areas.
- A Waste Manager will be appointed by the main Contractor to ensure effective management of waste during the excavation and construction works.
- All construction staff will be provided with training regarding the waste management procedures.
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal.
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities.
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed Project is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997, and the *EMR Waste Management Plan (2015 – 2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

18.5.2 Operational Phase

As previously stated, a project specific OWMP has been prepared and is included as Appendix 18.2. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the Site of the proposed Project. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *EMR Waste Management Plan 2015 – 2021* and abiding by the FCC waste bye-laws.

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Organic waste;
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE);
  - Batteries (non-hazardous and hazardous);
  - Cooking oil;
  - Light bulbs;
  - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
  - Furniture (and from time to time other bulky waste);
  - Abandoned bicycles; and
  - Healthcare waste from the medical centre and pharmacy.

- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross-contamination of waste materials.
- All waste collected from the Site of the proposed Project will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available.
- All waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed Project is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015 - 2021)* and the FCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

18.6 Residual Impacts

The implementation of the mitigation measures outlined in Section 18.5 will ensure that the high rate of reuse, recovery and recycling is achieved at the Site of the proposed Project during the construction and operational phases. It will also ensure that European, national and regional legislative waste requirements are met and that the proposed Project contributes to the achievement of associated targets for waste management.

18.6.1 Construction Phase

A carefully planned approach to waste management as set out in Section 18.5 and adherence to the C&D WMP during the construction phase will ensure that the residual effect on the environment will be ***short-term***, ***imperceptible*** and ***neutral***.

18.6.2 Operational Phase

During the operational phase, a structured approach to waste management as set out in Section 18.5 and adherence to the OWMP will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and high rates of reuse, recycling and recovery are achieved, the predicted residual effect of the operational phase on the environment will be ***long-term, imperceptible*** and ***neutral***.

18.7 Monitoring

The management of waste during the construction phase will be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the mitigation measures, including the C&D WMP and maintenance of waste documentation. The Waste Manager appointed by the Contractor will be responsible for this.

The management of waste during the operational phase will be monitored by the building management company and the nominated waste contractor(s) to ensure effective implementation of the OWMP.

18.7.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the Excavation and Construction Phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The C&D WMP specifies the need for a Waste Manager to be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste, as required. Where targets are not being met, the Waste Manager will identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the construction phase of the proposed Project will enable better management of waste contractor requirements and identification of trends. The data collected should be maintained to inform future projects.

18.7.2 Operational Phase

During the operational phase, waste generation volumes will be monitored against the predicted waste volumes outlined in the OWMP by the building management company (who will have the primary responsibility) and the nominated waste contractor(s). There may be opportunities to reduce the number of bins and equipment required in the WSAs, where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contactor costs.

18.8 Interactions

The following interactions between the topic of waste and other specialist environmental topics have been addressed in this EIAR:

18.8.1 Land & Soils

During the construction phase, soil, stone and made ground (c. 31966.6 m^3) will be excavated from the Site to facilitate levelling and construction of foundations and the installation of services. It is estimated that c. 21870.0 m^3 of excavated material will need to be removed off-site, while c. 10,096.0 m^3 of this material will be reused on-site. Where material has to be taken off-site, it will be taken for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures set out herein and in the C&D WMP (Appendix 18.1) will ensure that the associated effect is ***long-term***, ***imperceptible*** and ***neutral.***

18.8.2 Traffic

Local traffic volumes will be affected by the additional vehicle movements generated by removal of waste from the Site during the construction and operational phases. The increase in vehicle movements during the construction phase will be temporary. There will be an increase in vehicle movements in the area as a result of waste collections during the operational phase, but these movements will be imperceptible in the context of the overall traffic volumes. This matter has been addressed in Chapter 17 (Traffic & Transportation). Provided the mitigation measures detailed in Chapter 17 and the OWMP (Appendix 18.2) are adhered to, the associated effect will be ***long-term, imperceptible*** and ***neutral***.

18.8.3 Population & Human Health

The potential impacts on human beings in relation to the generation of waste during the construction and operational phases are that incorrect management of waste could result in littering, which could in turn cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the above-listed mitigation and project-specific C&D WMP and OWMP (Appendices 18.1 and 18.2), will ensure appropriate management of waste and avoid any negative impacts on the local population. The predicted effect is ***long-term***, ***imperceptible*** and ***neutral.***

Refer to Chapter 20 (Interactions) for an overview of all interactions between environmental topics addressed in this EIAR.

18.9 Cumulative Impacts

18.9.1 Construction Phase

If multiple permissions remain in place for both residential and commercial developments within the vicinity of the proposed Project. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the Construction Phase. Due to the high number of waste contractors in the Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative effects associated with waste generation and waste management. As such the effect will be ***short-term, not significant*** and ***neutral***.

18.9.2 Operational Phase

If improper, or a lack of, waste management, was to occur during the Operational Phase of the proposed Project this would cause a diversion from the priorities of the waste hierarchy. This would lead to small volumes of waste being sent unnecessarily to landfill.

The nature of the development means the generation of waste materials during the Operational Phase is unavoidable. Waste estimations for the Operational Phase of the proposed Project are provided in Table 18.2. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. At present, there is sufficient capacity for the acceptance of the likely operational waste arisings at facilities in the region. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which are typically exported for conversion in recycled products (*e.g.* paper mills and glass recycling). At present, there is sufficient capacity for the acceptance of the likely operational waste arisings at facilities in Europe.

Waste contractors will be required to service the proposed Project on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. The potential impact of operational waste generation from the proposed Project is considered to be ***long-term***, ***not significant*** and ***neutral***.

18.10 'Do-Nothing' Impact

If the proposed Project was not to go ahead, there would be no excavation or construction or operational waste generated at this Site. In this case, there would be a ***neutral*** effect on the environment.

The site is zoned for development and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies to promote sustainable growth with enhanced emphasis on housing policy and significant demand for housing in the Dublin Metropolitan Area.

18.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered during the production of this Chapter of the EIAR.

18.12 References

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation include:
  - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended.
  - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended.
  - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended.
  - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended.
  - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended.
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended.
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015).
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014).

- ◻ European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended.
- ◻ Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended.
- ◻ European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015).
- ◻ Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended.
- ◻ Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended.
- ◻ The European Communities (Transfrontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988).
- ◻ European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011).
- ◻ European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended.

- BS 5906:2005 *Waste Management in Buildings – Code of Practice.*
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
- Department of Communications, Climate Action and Environment (DCCAE) (2020). *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025.*
- Department of Environment and Local Government (DELG) (1998). *Waste Management – Changing Our Ways, A Policy Statement*.
- Department of Environment, Communities and Local Government (DECLG) (2012*). A Resource Opportunity - Waste Management Policy in Ireland*.
- FCC (2017). *Fingal County Council Development Plan 2017 – 2023.*
- FCC (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2020).
- Department of Environment, Heritage and Local Government (DEHLG) (2020). *Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities.*

- Department of Environment, Heritage and Local Government (DEHLG) (2006). *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*
- Eastern Midlands Waste Region (2015). Eastern-Midlands Region Waste Management Plan 2015 – 2021.
- EPA. National Waste Database Reports 1998 – 2012.
- EPA (2015). *Waste Classification-List of Waste & Determining if Waste is Hazardous or Non-Hazardous*.
- EPA and Galway-Mayo Institute of Technology (GMIT) (2015). *EPA Research Report 146- A Review of Design and Construction Waste Management Practices in Selected Case Studies-Lessons Learned.*
- FÁS and the Construction Industry Federation (CIF) (2002). *Construction and Demolition Waste Management-a handbook for Contractors and Site Managers.*
- Forum for the Construction Industry (n.d.). *Recycling of Construction and Demolition Waste*.
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended.
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended.
- Protection of the Environment Act 2003, (No. 27 of 2003) as amended.

19 Material Assets – Services

19.1 Introduction

This Chapter of the EIAR was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin, with over 2 years of experience in EIA. This Chapter considers and assesses the effects of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, on material assets during the construction and operational phases.

Material assets are resources that are valued and intrinsic to the Site of the proposed Project and the surrounding area. Material assets may be of either natural or human origin and the value may arise for economic or cultural reasons. In relation to material assets, the EPA 2017 Draft EIAR Guidelines state that:

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

Based on this interpretation of what constitute 'material assets', impacts on material assets have been assessed throughout this EIAR, but particularly in the following other EIAR Chapters:

Table 19.1 Preceding EIAR Chapters Where Impacts on Material Assets are Assessed

Chapter	Material Asset Addressed
Chapter 7 (Population & Human Health)	Community amenities and facilities Housing
Chapter 9 (Land, Soils, Geology & Hydrogeology)	Land Quarrying / mining
Chapter 10 (Hydrology)	Water (quality)
Chapter 14 (Cultural Heritage, Archaeology & Architectural Heritage)	Built environment
Chapter 17 (Traffic & Transportation)	Transport infrastructure

Chapter	Material Asset Addressed
Chapter 18 (Material Assets – Waste)	Waste management infrastructure

This leaves the following outstanding material assets to be addressed herein:

- Ownership and access;
- Water supply infrastructure;
- Wastewater infrastructure;
- Gas supply;
- Electricity supply; and
- Telecommunications and broadband.

Water supply, wastewater infrastructure, gas supply, electricity supply, telecommunications and broadband infrastructure are referred to collectively as 'services / utilities infrastructure' hereafter.

19.2 Methodology

The potential impacts to material assets as a result of the proposed Project were assessed through a desktop study of available information. The methodology is consistent with the following relevant guidance:

- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Reports.*
- EPA (2015). *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.*
- NRA (2008). *Environmental Impact Assessment of National Road Schemes - A Practical Guide.*

In preparing this chapter, the following documents have been referred to:

- CS Consulting (2021). *Engineering Services Report – Strategic Housing Development: Stapolin Growth Area 3, Baldoyle, Co. Dublin*.
- CS Consulting (2021). *Road Infrastructure Design Report – Strategic Housing Development: Stapolin Growth Area 3, Baldoyle, Co. Dublin*.
- FCC (2017). *Fingal Development Plan 2017 – 2023*;

- FCC (2013). *Baldoyle-Stapolin Local Area Plan 2013* as extended;
- Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire-Rathdown County Council & Dublin City Council (2018). *Greater Dublin Regional Code of Practice for Works*; and
- Geological Survey of Ireland (GSI) Maps.

Impacts have been assessed and characterised in accordance with the criteria set out in Section 1.6 of Chapter 1 (Introduction).

19.3 Baseline Environment

19.3.1 Ownership & Access

The Site of the proposed Project is under the ownership of the Applicant.

The Site is bounded to the west by the Dublin-Belfast railway line and on all other sides by further zoned development lands. There is currently no public vehicular access to the Site, although there are a number of private site access points to the development lands, as indicated in Figure 19.1, above. Permitted and future planned developments to the east and south of the Site will extend both Longfield Road and Red Arches Avenue northward.

Figure 19.1: Existing Site Access

19.3.2 Services / Utilities Infrastructure

19.3.2.1 Water Supply

There is an existing 300 mm watermain running along the eastern (Stapolin Avenue) and part of the southern (Myrtle Avenue) side of the proposed Project. This infrastructure was installed to serve the future developments within the LAP. In addition, there is existing watermain infrastructure located within the Site.

19.3.2.2 Wastewater Infrastructure

Storm Water

At present there is an existing 1350mm stormwater culvert traversing the subject site along the line of Longfield Road, flowing south to north. This culvert is a diversion of a culvert which previously ran along the western boundary of the development lands.

In addition, there is an existing 1050mm stormwater culvert running from south to north along the line of Stapolin Avenue, which discharges into the Mayne River. Based on the previous planning application for the subject site (Fingal County Council Planning Application F16A/0412), this culvert has been constructed by previous developers at a low level so that it can pass below the North Fringe Sewer located approximately 200m north of the proposed development. The depth of this outfall is approximately 2m below the existing ground level as it passes through to the flood plain further north. The culvert serves the existing developments constructed to date and discharges directly to the Mayne River.

Foul Water

There is an existing 375mm diameter foul sewer that runs in a northern direction to the south east of the site (along Stapolin Avenue). This infrastructure was installed by previous developers to serve the entire LAP lands and extends upstream in a southerly direction serving the Myrtle development.

Downstream, this existing 375mm foul sewer discharges to an existing foul pump station located on the north side of Stapolin Haggard. The foul pumping station discharges via a 300mm rising main to the North Fringe Foul Sewer, that runs around the north / north eastern boundary of the site approximately 150m away from the pump station. The pump station currently serves the existing Myrtle and Red Arches Developments.

There is also an existing foul drainage network located on the proposed Project Site.

19.3.2.3 Electricity Supply

A map of the existing electricity supply infrastructure in the area from the Electricity Supply Board (ESB), dated 20th of June 2016, has been provided by O'Connor Sutton Cronin Consulting Engineers (OCSC), and is appended in Appendix 19.1. It indicates that the southern end of the Site is served by a medium / low voltage underground cable via Stapolin Avenue / Longfield Road. Otherwise, there is no electricity supply infrastructure serving the Site.

19.3.2.4 Gas Supply

A map of the existing gas supply infrastructure in the area from Gas Networks Ireland (GNI), dated 23rd of May 2016, has been provided by OCSC, and is appended in Appendix 19.1. It indicates that there is a live, low pressure distribution pipe traversing the Site under Longfield Road and also serving the Growth Area 2 (GA2) lands immediately to the east, with which the Site partially overlaps.

19.3.2.5 Telecommunications & Broadband

A map of the existing telecommunications infrastructure in the area from Eir, dated 20th of May 2016, has been provided by OCSC, and is appended in Appendix 19.1. It indicates that there is currently no on-Site telecommunications infrastructure, although there is infrastructure serving the existing residential areas immediately adjacent to the Site, including at the nearest end of Red Arches Road.

A map of the existing broadband infrastructure in the area from Virgin Media, dated 17th of May 2016, has been provided by OCSC, and is appended in Appendix 19.1. It indicates that there is currently no on-Site broadband infrastructure, although there is infrastructure serving the existing residential area adjacent to the Site, including at Castlerosse View and Red Arches Drive to the east, and Clongriffin Junction to the west.

19.4 Predicted Impacts of the Proposed Project

19.4.1 Construction Phase

19.4.1.1 Ownership & Access

The Site of the proposed Project will remain under the ownership of the Applicant. There will be no acquisition of land by Compulsory Purchase Order to facilitate the build. ***No significant impacts*** are anticipated in relation to land ownership.

During the construction phase, it is envisaged that the Site will be accessed from the north via an existing entrance at Moyne Road, as detailed in Chapter 5, Description of the Proposed Project. There may be some minor impacts on the surrounding road network due to the presence of construction traffic on the surrounding road network and entering / leaving the Site. However, a suite of traffic management measures will be implemented to minimise associated impacts on local road users, residents and business owners, as set out in Chapter 17 of this EIAR (Traffic & Transportation) and in the finalised Construction Traffic Management Plan to be finalised by the Contractor in agreement with FCC, as stipulated in the Outline Construction Management Plan (submitted under separate cover as part of the planning application). ***No significant impacts*** are anticipated in relation to access during the construction phase.

19.4.1.2 Services / Utilities Infrastructure

In order to facilitate the proposed Project, replacement of certain existing utilities infrastructure and, in other cases, placement of new infrastructure, will be required during the construction phase, as summarised below:

- Due to the condition and system layout of the existing water supply infrastructure, it is not intended to retain the existing on-Site elements, which will be removed and replaced to current Irish Water specifications.
- While, as described above, there is an existing stormwater drainage network located in the vicinity of the Site; due to its poor condition, it is not intended to make use of the existing network and it is proposed that this be removed and a new network constructed in its place.
- Due to its poor condition it is not intended to make use of the existing foul water drainage network on the Site. It is instead proposed to remove the existing foul sewers and construct a new, separate foul drainage network to collect and convey effluent from the proposed Project.
- New electricity supply, telecommunications and broadband infrastructure will be put in place at the Site, tying in with existing infrastructure in neighbouring areas.
- The proposed Project will not require any gas connections. Therefore, the works will be carried out carefully around the existing on-Site live gas main.

All utilities works shall be carried out in accordance with the relevant requirements of the respective service providers / authorities (i.e. Irish Water, ESB, GNI, Eir, Virgin Media and any others of relevance). These works will be carried out in a manner that is safe, and which avoids or minimises interruptions of service which might affect local residents and businesses, and adjacent development. As such, ***no significant impacts*** are predicted to occur in relation to services / utilities infrastructure as a result of the proposed Project.

19.4.2 Operational Phase

19.4.2.1 Ownership & Access

The Site of the proposed Project will remain under the ownership of the Applicant during the operational phase. ***No significant impacts*** are anticipated in relation to land ownership.

In terms of access / transport infrastructure, the objectives of the proposed design are to:

- Ensure ease of access for emergency services, refuse collection and service vehicles;
- Encourage walking and cycling;
- Create short walking routes to shops, public transport, etc.; and
- Create a safe, secure and pleasant environment for people, particularly vulnerable road users such as children.

Design measures have been implemented to support the above-listed objectives in accordance with the Government's *Design Manual for Urban Roads and Streets* (DMURS) (2013), and also with due reference to the following documents:

- FCC (2017). *Fingal Development Plan (2017 – 2023)*;
- FCC (2013). *Baldoyle-Stapolin Local Area Plan (2013 – 2019) as extended*;
- Department of Transport, Tourism and Sport (2019). *Traffic Signs Manual*;
- TII (2017). *DN-GEO-03060: Geometric Design of Junctions*;
- Department of Housing, Local Government and Heritage (2020). *Sustainable Urban Housing: Design Standards for New Apartments*;
- Institution of Structural Engineers (2011). *Design recommendations for multi-storey and underground car parks* (4th Edition).
- NTA (2011). *National Cycle Manual*; and
- NTA (2013). *Greater Dublin Area Cycle Network Plan*.

Once the proposed Project is operational, its internal road network will tie-in with the existing road network at four locations to the south and west, with provision made for a further connection to future road infrastructure immediately to the east.

The proposed Project will have three primary access points, as follows:

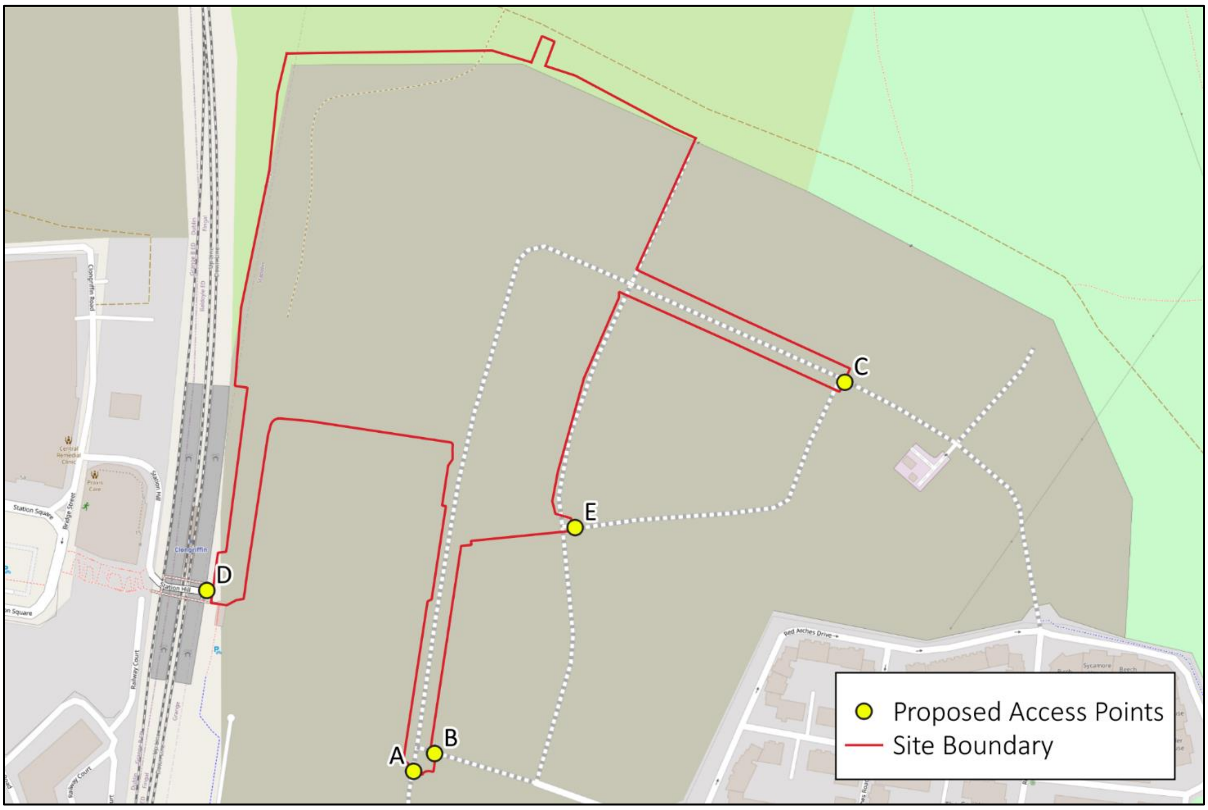
- The northward continuation of Longfield Road (via adjacent GA1 lands), which originates at Grange Road approx. 440m to the south (A in Figure 19.2, below);
- The westward continuation of Red Arches Road (via adjacent GA1 lands), which originates at Coast Road approx. 1,000m to the east (B in Figure 19.2); and
- The continuation to the north and west of the existing Red Arches Avenue (via adjacent GA1 lands), which connects to Red Arches Road (C in Figure 19.2).

A further vehicular access point will be located on the western boundary of the proposed Project (D in Figure 19.2). Its use will be restricted to service vehicles, cyclists and pedestrians.

Here, a ramp will rise to meet the existing podium-level roadway at Clongriffin rail station, providing a link to Station Hill and to Clongriffin Main Street.

Provision has also been made for future connectivity to adjacent development lands in GA2, immediately to the east of the Site (E in Figure 19.2).

Figure 19.2: Proposed Site Access



The proposed road infrastructure is described in greater detail in Chapter 5 (Description of the Proposed Project), Chapter 17 (Traffic & Transportation), and in CS Consulting's *Road Infrastructure Design Report*, submitted under separate cover. Please also refer to CS Consulting drawing nos. BD-CSC-ZZ-G3-DR-C-0100 (overall Site layout), BD-CSC-ZZ-G3-DR-C-0116 and BD-CSC-ZZ-G3-DR-C-0117 (road layout), and BD-CSC-ZZ-G3-DR-C-0118 and BD-CSC-ZZ-G3-DR-C-0119 (road markings).

During the operational phase, the proposed Project is expected to significantly improve permeability across the Site (which is currently closed to the public) and wider area, providing a gateway between the Baldoyle-Stapolin development lands and (i) the Racecourse Park to the north and (ii) Clongriffin to the west via access point D, as illustrated in Figure 19.2. A ***moderate, positive, localised, long-term*** impact is predicted in terms of access.

19.4.2.2 Services / Utilities Infrastructure

During the operational phase, maintenance of utilities infrastructure on the Site will be carried out in accordance with the relevant requirements of the various utilities providers / authorities. The capacity of the proposed on-Site utilities infrastructure will be sufficient to provide for its operation. As such, ***no significant impacts*** on services or utilities themselves are predicted to occur as a result of the operational phase. An overview of the proposed infrastructure is provided below.

Water Infrastructure

An overview of the proposed water supply and wastewater drainage infrastructure is provided in Section 5.3.9 of Chapter 5 (Description of the Proposed Project). A detailed description is provided in CS Consulting's Engineering Services Report and the corresponding set of drawings, submitted under separate cover as part of the planning application.

Other Utilities

As stated above, new electricity supply, telecommunications and broadband infrastructure will be put in place at the Site, tying in with existing infrastructure in neighbouring areas. All new infrastructure will be designed, constructed and maintained in accordance with the specifications of the relevant service providers / authorities. As stated above, no new gas supply infrastructure will be provided on-Site.

19.5 Mitigation Measures

19.5.1 Construction Phase

As stated above, no significant impacts are predicted to occur as a result of the construction or operation of the proposed Project. However, in order to avoid / minimise impacts insofar as practicable, the following mitigation measures shall be implemented during the construction phase:

- The exact locations of all existing on-Site services (underground and overhead, where applicable) will be confirmed, e.g. using slit trenches at key areas, prior to the commencement of on-Site works.
- In planning and executing the proposed works, due reference shall be had to the GNI *Guidelines for Designers and Builders – Industrial and Commercial (Non-Domestic) Sites* (2018) and the Health & Safety Authority (HSA) *Code of Practice for Avoiding Danger from Underground Services* (2016).
- All possible precautions shall be taken to avoid unplanned disruptions to any services / utilities during the proposed works.

- Consultation with all relevant service providers shall be undertaken in advance of works, ensuring all works are carried out to the relevant standards and in a safe manner. In particular, close liaison will be required with GNI in relation to works in proximity to the existing on-Site gas infrastructure.
- There will be an interface established between the Contractor and the relevant utilities service providers / authorities during the construction phase of the proposed Project. This interface will be managed in order to ensure a smooth construction schedule with no / minimal disruption to the local residential and business community.
- All new infrastructure will be installed in accordance with the applicable standards, guidelines and codes of practice.
- All mitigation measures in relation to Site access / egress and construction traffic management set out in Chapter 17 of this EIAR (Traffic & Transportation) and in the finalised Construction Traffic Management Plan to be finalised by the Contractor in agreement with FCC, as stipulated in the Outline Construction Management Plan (submitted under separate cover as part of the planning application) shall be fully implemented by the Site contractors.
- Prior to the operational phase of the proposed Project, utilities infrastructure connections will be tested by a suitably qualified person using an appropriate methodology, approved by the relevant service provide, and under the supervision of FCC. The proposed Project water supply will be tested to the satisfaction of FCC and Irish Water prior to the connection to the public potable water.
- The successful contractor will ensure that the drainage and water supply networks are kept clear and free from materials which could cause diminished capacity or blockages. Routine visual inspections shall be carried out to this end.

19.5.2 Operational Phase

As stated above, no significant impacts are predicted to occur as a result of the construction or operation of the proposed Project. However, in order to avoid / minimise impacts insofar as practicable, the following mitigation measures shall be implemented during the operational phase:

- Any necessary maintenance and / or upgrades of on-Site utilities infrastructure during the operational phase of the proposed Project, will be carried out in accordance with the specifications of the relevant service providers and facilitated by the buildings / estate manager.

19.6 Residual Impacts

No significant residual impacts in relation to material assets are anticipated to occur as a result of the proposed Project.

19.7 Monitoring

Monitoring will be provided for by each utility company with an overseeing responsibly by the appointed Contractor during the construction phase. Any monitoring of the built services required during the operational phase will be as advised by the relevant services provider and facilitated by the buildings / estate manager.

19.8 Reinstatement

On completion of Site works (including the installation of utilities infrastructure), all open areas will be landscaped in accordance with the proposed landscape design.

19.9 Interactions

Generally speaking, this Chapter can interact with Chapter 7 (Population & Human Health), in that impacts on ownership, access and / or utilities have the potential to affect the local population, e.g. by resulting in service interruptions or impeding access to a residence or business. However, in this case, since no significant impacts are predicted in relation to ownership, access or utilities infrastructure, there is no potential for associated impacts on the local community to arise (i.e. no interactions are expected to occur).

As noted in Section 19.1, the understanding of what constitutes a material asset is broad, and impacts on material assets have been assessed throughout this EIAR, but particularly in Chapters 7, 9, 10, 14, 17 and 18.

19.10 Cumulative Impacts

The effects of the proposed Project in relation to ownership, access and utilities will generally not be felt outside the Project Site, which limits the potential for cumulative impacts to arise.

The exception would be in relation to access, since the positive impact of increased permeability across the area will benefit the population in the surrounding areas. At present, there is no access to the Project Site or across the Project Site for the general public. The internal road network of the proposed Project has been designed to tie-in with the other permitted and proposed future elements of the adjacent Baldoyle-Stapolin development lands. The proposed Project, in combination with these projects would significantly enhance permeability across the wider area, with associated positive impacts on the local community.

The list of plans and projects set out in Chapter 21 have been considered in terms of their potential to result in significant negative cumulative impacts in combination with the proposed Project, and no potential pathway was identified by which cumulative impacts could occur on ownership, access or utilities.

In short, ***no significant negative cumulative impacts*** are predicted to occur as a result of the proposed Project in combination with other existing / proposed plans or projects.

19.11 'Do-Nothing' Impact

The Do-Nothing scenario might entail a continuation of the existing status of the Site (i.e. undeveloped greenfield site with some limited existing infrastructure), in which case the baseline environmental described above (or similar) would likely endure at this location. In this case, no significant impacts would occur in relation to material assets.

Considering the strategic location of the Site, its zoning status, and the ongoing trends and policies in relation to residential development, it is also possible that a residential development (under the scope of a separate application / proposal) would be progressed for the Site at some point in the future, under the scope of a separate application. It is not possible to predict precisely the likely impacts of this latter scenario, as the nature and scale of any potential future proposals for the Site are not known. However, it is likely that the impacts of such a proposal in relation to material assets would be similar to those described herein.

19.12 Difficulties Encountered in Compiling the Chapter

No particular difficulties were encountered in the preparation of this Chapter.

19.13 References

- EPA (2017). *Draft Guidelines on the Information to be Contained in EIARs*.

- EPA (2015). *Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*.
- GNI (2018). *Guidelines for Designers and Builders – Industrial and Commercial (Non-Domestic) Sites.*
- HSA (2016). *Code of Practice for Avoiding Danger from Underground Services*.
- NRA (2008). *Environmental Impact Assessment of National Road Schemes – A Practical Guide.*

20 Interactions

20.1 Introduction

This Chapter of the EIAR was prepared in respect of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin, with over 2 years of experience in EIA.

As a requirement of the Planning Regulations and the EPA (2017) Draft EIAR Guidelines, not only are the individual significant impacts required to be considered when assessing the impact of a development / project on the environment, but so must the inter-relationships between these factors be identified and assessed. This chapter of the EIAR addresses the interactions between the various environmental aspects of the proposed Project. This approach is considered to meet with the requirements of Part X of the PDA 2000 and Part 10, and Schedules 5, 6 and 7 of the PDR 2001 as amended.

In preparing the EIAR, each of the specialist consultants have and will continue to liaise with each other and will consider the likely interactions between effects predicted as a result of the proposed Project during the preparation of the proposals for the Site and this ensures that mitigation measures are incorporated into the design process. As this EIAR document has been prepared by a number of specialist consultants, an important aspect of the EIA process is to ensure that interactions between the various disciplines have been taken into consideration.

20.2 Methodology

The consideration of interactions between EIA topics is provided for by Article 3 section 1(e) of the EIA Directive. The EPA (2017) Draft EIAR Guidelines and EPA (2015) *Advice Notes for Preparing Environmental Impact Statements* have also been referred to.

Article 3 of the EIA Directive states that:

> *"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*
>
> > *a) population and human health;*

> b) *biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
>
> c) *land, soil, water, air and climate;*
>
> d) *material assets, cultural heritage and the landscape; and*
>
> e) *the interaction between the factors referred to in points (a) to (d)."*

The EPA Draft EIAR Guidelines (2017) point out that interactions should be addressed, where relevant, in the corresponding specialist EIAR chapters, with an 'interactions matrix' and brief text provided by way of summary:

> *"The interactions between impacts on different environmental factors should be addressed as relevant throughout the EIAR. For example, where it is established in the Hydrology section that there will be an increase in suspended solids in discharged surface waters during construction, then the Biodiversity section should assess the effect of that on sensitive aquatic receptors. […] It is general practice to include a matrix to show where interactions between effects on different factors have been addressed. […] This is typically accompanied by brief text describing the interactions."* (S3, p. 56)

A matrix of interactions is provided in Table 20.1, below, summarising where effects / impacts in relation to one EIAR topic (the source) have been found to directly or indirectly result in effects / impacts in relation to another EIAR topic (the receptor).

A brief description of these interactions is presented in Section 20.3, below. Note that this Chapter provides an overview of the potential impacts that have been considered in relation to interactions in this EIAR. It does not repeat the characterisation of any associated impacts, or reiterate any mitigation measures that have been prescribed in relation to same. These are discussed in the corresponding specialist EIAR Chapters, as identified below.

Table 20.1: Interactions Matrix

Source \ Receptor	Population & Human Health	Biodiversity	Land, Soils, Geology & Hydrogeology	Hydrology	Air Quality & Climate	Noise & Vibration	Landscape & Visual	Cultural Heritage, Archaeology & Architectural Heritage	Microclimate –Daylight / Sunlight	Microclimate – Wind	Traffic & Transportation	Material Assets – Waste	Material Assets – Services
Population & Human Health													
Biodiversity													
Land, Soils, Geology & Hydrogeology				✓	✓							✓	
Hydrology			✓										
Air Quality & Climate	✓	✓											
Noise & Vibration	✓	✓											
Landscape & Visual	✓												
Cultural Heritage, Archaeology & Architectural													
Microclimate – Daylight / Sunlight													
Microclimate – Wind													
Traffic & Transportation	✓				✓	✓							
Material Assets – Waste	✓										✓		
Material Assets – Services													

20.3 Summary of Interactions

Interactions addressed in this EIAR are discussed under the headings of the corresponding receptor topics / media, below.

No noteworthy interactions were identified in respect of the following potential receptors:

- Landscape & Visual (Chapter 13)
- Cultural Heritage, Archaeology & Architectural Heritage (Chapter 14)
- Microclimate – Daylight / Sunlight (Chapter 15)
- Microclimate – Wind (Chapter 16)
- Material Assets – Services (Chapter 19)

20.3.1 Population & Human Health

Population and human health is an EIA topic which tends to interact with numerous other environmental topics / media addressed elsewhere in the EIAR. Where the potential for impacts on population and human health has been identified as a result of such interactions, these have been addressed comprehensively in Chapter 7 (Population & Human Health).

In respect of the proposed Project, the noteworthy interactions with population and human health and other EIA topics (where population and human health is the receptor) are summarised below. All of these interactions have been addressed above and, where feasible, appropriate mitigation measures have been prescribed in the corresponding specialist Chapter.

Note that there is also an interaction between (i) Noise & Vibration and (ii) Traffic & Transportation, due to vehicular noise, which is of relevance to the assessment of impacts on population and human health.

All of the specialist chapters listed below have considered the potential for significant cumulative impacts to arise as a result of the proposed Project in combination with one or more other existing / proposed development, including the adjacent permitted and proposed development at GA1.

Air Quality & Climate (Chapter 11)

- Potential for nuisance impacts due to dust-generating activities of proposed works.

Noise & Vibration (Chapter 12)

- Potential for nuisance and disturbance due to noisy elements of proposed works;
- Potential for nuisance and disturbance due to construction traffic noise;
- Potential for nuisance and disturbance due to noisy plant, services, deliveries, and operation of railway line and Dublin Airport during operational phase; and
- Potential for nuisance and disturbance due to additional traffic during operational phase.

Landscape & Visual (Chapter 13)

- Potential for negative impacts on landscape and visual amenity due to presence of construction site; and
- Impacts on visual amenity and landscape during the operational phase due to completion of proposed Project.

Traffic & Transportation (Chapter 17)

- Potential for negative impacts on journey characteristics due to additional (construction) traffic on road network during proposed works;
- Potential for nuisance and disturbance due to construction traffic noise;
- Potential for negative impacts on journey characteristics due to additional traffic on road network during the operational phase; and
- Potential for nuisance and disturbance due to operational traffic noise.

Material Assets – Waste (Chapter 18)

- Potential for negative impacts due to improper waste management during construction phase; and
- Potential for negative impacts due to improper on-Site waste management during operational phase.

20.3.2 Biodiversity

Where the potential for impacts on biodiversity has been identified as a result of interactions with other EIAR topics, these have been addressed comprehensively in Chapter 8 (Biodiversity). In respect of the proposed Project, the noteworthy interactions with biodiversity and other topics / media (where biodiversity is the receptor), in the absence of mitigation, are summarised as follows:

Air Quality & Climate (Chapter 11)

There is the potential for interactions between air quality and biodiversity as the Baldoyle Bay Special Area of Conservation (SAC) and Proposed Natural Heritage Area (pNHA) (site code 000199), along with the Baldoyle Bay Special Protection Area (SPA) (site code 004016) are to the east of the proposed Project. Dust emissions from construction works have the potential to impact vegetation in the SAC, pNHA and SPA. Vehicular emissions also have the potential to impact vegetation as a result of NO_x emissions leading to nitrogen deposition.

Noise & Vibration (Chapter 12)

There is potential for impacts on wildlife (i.e. disturbance) due to noise and vibration during the construction phase of the proposed Project.

20.3.3 Land, Soils, Geology & Hydrogeology

The principal interaction between land, soils, geology and hydrogeology (Chapter 9) and other EIAR topics – wherein land, soils, geology and / or hydrogeology is the receptor – is with hydrology (Chapter 10), since contaminated surface water run-off may have the limited potential to enter soil and groundwater, resulting in negative impacts. This has been addressed in Chapters 9 and 10.

20.3.4 Hydrology

The principal interaction between hydrology (Chapter 10) and other EIAR topics – wherein hydrology is the receptor – is with land, soils, geology and hydrogeology (Chapter 9). On construction sites which feature or are situated in close proximity to surface water bodies, there is generally a risk of discharge of sediment-laden run-off, resulting in adverse water quality impacts. As there is no open watercourse within or close to this Site, there is no potential for a direct water quality impact of this nature. However, there is the potential for impacts on the current on-site storm water drainage on roads to the south of the Site (Myrtle Avenue), which discharges to the Mayne River. Furthermore, there is a potential for blocking of storm water drainage if run-off containing sediment or other materials is not managed adequately. This has been addressed in Chapters 9 and 10.

20.3.5 Air Quality & Climate

Where the potential for impacts on air quality and climate has been identified as a result of interactions with other EIAR topics, these have been addressed comprehensively in Chapter

11 (Air Quality & Climate). In respect of the proposed Project, the noteworthy interactions with air quality and climate and other topics / media (where air quality and climate is the receptor), in the absence of mitigation, are summarised as follows:

Land, Soils, Geology & Hydrogeology (Chapter 9)

Construction phase activities such as land clearance, excavations, stockpiling of materials, etc., have the potential to results in interactions between air quality and land and soils in the form of dust emissions.

Traffic & Transportation (Chapter 17)

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase, with associated air quality effects.

20.3.6 Noise & Vibration

Noise and vibration (Chapter 12) interacts with traffic and transportation (Chapter 17), in that increased traffic volumes during the construction and operational phases of the proposed Project have the potential to increase background noise levels. This has been addressed in Chapter 12.

20.3.7 Traffic & Transportation

The principal interaction between traffic (Chapter 17) and other EIAR topics – wherein traffic is the receptor – is with waste (Chapter 18). Local traffic volumes will be affected by the additional vehicle movements generated by removal of waste from the Site during the construction and operational phases. This matter is addressed in Chapter 17 (Traffic & Transportation).

20.3.8 Material Assets – Waste

The principal interaction between waste (Chapter 18) and other EIAR topics – wherein waste is the receptor – is with land, soils, geology and hydrogeology (Chapter 9). During the construction phase; soil, stone and made ground (c. 31,966.6 m^3) will be excavated from the Site to facilitate levelling and construction of foundations and the installation of services. It is estimated that c. 21,870.0 m^3 of excavated material will need to be removed off-site, while c. 10,096.0 m^3 of this material will be reused on-site. Certain unsuitable materials (including pyrite-containing hardcore and some fill material exceeding the S4ULs for future residential use) will need to be exported from the Site for treatment / disposal, as appropriate. Thus, during the construction phase, material excavated from the Site will become a waste management matter. This is addressed in Chapters 9 and 18, and in Appendix 18.1 (Construction & Demolition Waste Management Plan).

21 Cumulative Impacts

21.1 Introduction

This Chapter considers the potential for cumulative impacts to arise as a result of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13, in combination with existing and / or approved projects in the surrounding area. It was prepared by Lorraine Guerin, BSc (Hons) (Ecology) and MSc (Environmental Management & Policy), Environmental Consultant with Brady Shipman Martin, with over 2 years of experience in EIA.

The EU *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (1999) define cumulative impacts as *"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project"* (p. iii). Similarly, the EPA Draft EIAR Guidelines (2017), define cumulative effects as *"The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects"* (Section 3, p. 52).

The EPA Draft EIAR Guidelines (2017) further state that:

> *"While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or significant), result in a cumulative impact that is collectively significant. For example, effects on traffic due to an individual industrial project may be acceptable however it may be necessary to assess the cumulative impacts taking account of traffic generated by other permitted or planned projects. It can also be prudent to also have regard to the likely future environmental loadings arising from the development of zoned lands in the immediate environs of the proposed project."* (Section 3, p. 54)

Cumulative impacts can be assessed by taking account of the existing baseline environment and the predicted impacts associated with the construction and operation of the proposed Project in-combination with predicted impacts of any other existing and / or approved projects in the area.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments (Chapters 7 to 19) in relation to the plans and projects listed in this Chapter.

While there is the potential for negative impacts to occur during the construction and operational stages of the proposed Project, this has been assessed in respect of each of the specialist chapters, and with the implementation of the mitigation measures outlined in this EIAR, the residual cumulative impacts are not considered to be significant.

21.2 Key Plans & Projects

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out and a list of key plans and projects for consideration was developed (Tables 21.1 and 21.2, below). In identifying plans and projects for inclusion in this list, the following principal sources were consulted:

- Dublin City Council (DCC) Planning Department;
- Dublin City Development Plan (2016 – 2022);
- Fingal County Council (FCC) Planning Department;
- Fingal Development Plan (2017 – 2023);
- Baldoyle-Stapolin Local Area Plan (LAP) (2013) as extended;
- Clongriffin-Belmayne Local Area Plan (2012 – 2018);
- Portmarnock South Local Area Plan (2013); and
- An Bord Pleanála (ABP) website.

Cumulative impacts were assessed by the EIAR specialists who reviewed the list of plans and projects set out in Tables 21.1 and 21.2, and available information in relation to same, in terms of their potential to give rise to cumulative impacts in combination with the proposed Project.

It is noted that this list of key projects is non-exhaustive and that there are a wide variety of other applications and permissions for small scale projects, extensions and one-off developments in the surrounding areas. However, these are minor projects without significant environment effects that are generally located on appropriately zoned lands and will not result in any potential for significant cumulative environmental impacts in combination with the proposed Project.

Table 21.1 provides a brief description of the key plans and projects in the immediate vicinity of the proposed Project, whilst Table 21.2 provides a brief description of the key plans and projects in the wider area. Figure 21.1 illustrates key projects in relation to the proposed Project Site.

Table 21.1: Key Plans & Projects for Consideration in Assessment of Cumulative Impacts – Immediate Vicinity

Plan / Project	Description
Baldoyle-Stapolin LAP 2013	The Site forms part of a wider 'RA' zoning as set out in the Baldoyle-Stapolin Local Area Plan (LAP) 2013 (as extended). Development of the remainder of the LAP development lands, including the GA1 project to the south of the Site, as well as further potential future residential and landscape / amenity works as indicated in the LAP, to be considered. For further information, refer to Section 3.5.2 and / or the LAP document itself.
Primary School Myrtle, Grange Road, Baldoyle (FCC Ref. F19A/0461)	Three storey, 16 classroom primary school building in Baldoyle (roll number 20519G), including a two-classroom special education needs (SEN) base. The proposal also includes a general purpose hall, support teaching spaces, ancillary accommodation, external junior play areas, secure SEN hard and soft play area, sensory garden, car parking, access road, pedestrian access, bicycle lane, construction of two external ball courts, landscaping, connection to public services and all associated site works.
Baldoyle-Stapolin LAP Growth Area 1 (GA1) (ABP Ref. TA06F.310418; FCC Ref. 16A/0412; ABP Ref. ABP-248970; SHD Ref. 307288-20)	An application was lodged on the 4th of June 2021 (ABP case ref. TA06F.310418) for alterations of a previously permitted development (previously permitted under FCC Reg. Ref. F16A/0412 (ABP Ref. PL06F.248970) as amended by F20A/0258 and F221A0046) for the development of 544 no. residential units (747 no. apartments and 135 no. houses) retail and a crèche. The proposed altered development would consist of 882 no. new residential dwellings (747 apartments, 135 houses), residential tenant amenity, retail, crèche, and public realm, over a site area of approx. 9.1 ha of which the development area is 8.89 ha.
Baldoyle-Stapolin LAP Growth Area 2 (GA2) (FCC Ref. F11A/0290 (/E1); ABP Ref. PL06F.239732)	Regents Park Development Ltd. were granted permission on appeal on 11th April 2013 and given a further extension of duration of permission in 2018 (FCC Reg. Ref. F11A/0290/E1) on lands at GA2, as designated in the LAP. FCC initially refused the application; however, ABP subsequently granted permission on appeal. The development entails 400 no. dwelling units, 3 no. retail units, a crèche, surface and basement level car parking, landscaping and all associated works.

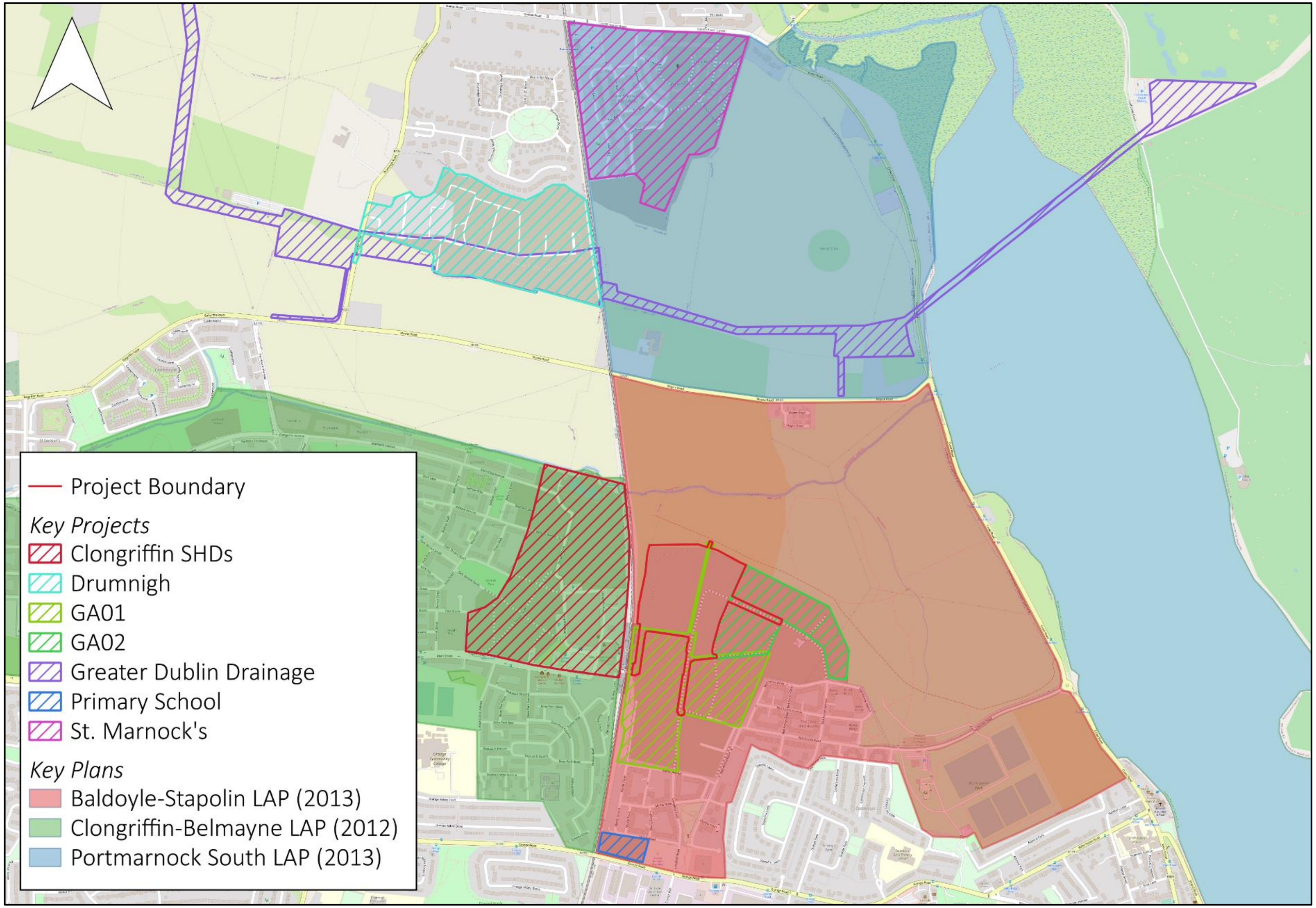
Plan / Project	Description
Clongriffin-Belmayne LAP (2012 – 2018)	Lands immediately to the west of the Dublin-Belfast / DART railway line are within the administrative area of DCC, and subject to the Clongriffin-Belmayne Local Area Plan (2012 – 2018). On these development lands, Gerard Gannon Properties were granted permission for three major developments, as follows: ▪ **Clongriffin SHD 1** (ABP ref.: 305316) Decision date 13 December 2019. Plots 6, 8, 11, 17, 25, 26, 27, 28 and 29 Clongriffin. Application was for 1,030 no. apartments - 916 no. permitted. ▪ **Clongriffin SHD 2** (ABP ref.: 305319) Decision date 13 December 2019. Plots 4, 5 and 14 Clongriffin. Application was for 500 no. apartments. ▪ **Clongriffin S34 Permission** (DCC Ref.: 3894/19) Decision date 20 March 2020. Plots 3, 13 and 15 Clongriffin. Application was for 420 no. apartments, 14 retail units, cinema, offices, etc. – 407 no. permitted. Development has yet to commence on the above permissions. Construction of c. 585 units is ongoing from previous permissions (DCC Refs.: 2903/16, 3776/15, 2478/17, 4266/16, 2610/16, 3117/16, 4101/16 and 2569/17).

Table 21.2: Key Plans & Projects for Consideration in Assessment of Cumulative Impacts – Wider Area

Plan / Project	Description
Portmarnock South LAP (2013)	The Baldoyle-Stapolin LAP area is linked in planning framework terms with the Portmarnock South LAP (2013), to which the lands to the immediate north are subject, and which will provide for up to c. 1200 residential units.
St. Marnock's Bay, Station Road, Portmarnock South (ABP Ref. 305619)	Development lands located to the north-west of the proposed Project, subject to the Portmarnock South LAP (2013). Phase 1A (c. 100 no. residential units) is complete. Phase 1B (c. 150 no. residential units) is nearing completion. Phase 1C (c. 153 no. residential units - including a small local centre) is commencing construction. Areas of ecological and landscape buffer (including a 'Bird Quiet Zone') to the south and east of the residential areas were delivered as part of Phase 1A.
Drumnigh (FCC Ref. F14A/0132;	Construction is ongoing of 270 no. terraced, semi-detached and detached dwelling houses (comprising of 84 no. 3-bed houses, 96 no. 4 bed houses, and 90 no. 5 bed houses); together with 556 no. ancillary car parking spaces

Plan / Project	Description
ABP Ref. PL06F.244401; as amended by FCC Ref. F17A/0412 (minor))	(comprising of 111 no. on-street car spaces and 445 no. on-curtilage spaces); and provision of a vehicular and pedestrian access via a new roundabout junction onto the Drumnigh Road.
Greater Dublin Drainage Project (ABP Ref. 301908)	Irish Water received permission for a major wastewater infrastructure project (the Greater Dublin Drainage Project) for north Dublin in November 2019. The decision was subsequently quashed by the High Court ([2020] IEHC 601) and has been remitted back to ABP. The project comprises construction of an underground sewer to the north of Moyne Road leading to a long-sea outfall under Baldoyle Bay and into the Irish Sea. One of the proposed construction compounds and tunnel launch sites is to be located to the north of Moyne Road.

Figure 21.1: Key Plans & Projects for Consideration in Assessment of Cumulative Impacts (© OpenStreetMap 2021)



18.1 Discussion of Potential Cumulative Impacts

All of the proposed residential developments listed in Tables 21.1 and 21.2 are located on lands zoned for residential use in the Dublin City and Fingal Development Plans, and, in the case of developments at Clongriffin, Baldoyle-Stapolin and Portmarnock South, in areas subject to the preparation of detailed Local Area Plans. Each of these Development Plans and Local Area Plans have been subject to Strategic Environmental Assessment (SEA) and Appropriate Assessments (AA), which have provided for the inclusion of specific measures to avoid and mitigate potential adverse impacts on the environment.

Developments at Portmarnock South (St. Marnock's Bay) and Drumnigh are located approximately 1 km north and north-west of the Site of the proposed Project and as such, in an urban context, are at a significant separation. While only separated by the Dublin-Belfast railway line, development at Clongriffin, as with the proposed Project, is located within the urban edge of existing and planned city development.

Development at Portmarnock South provides for independent and separate wastewater and surface water infrastructure, with the latter discharging directly to Baldoyle Bay via a project-specific constructed wetland on the Portmarnock South lands. All projects are also required to secure capacity and connection approval from Irish Water for provision of potable and wastewater services.

Potential cumulative impacts primarily arise through the ongoing planned urbanisation of the city's hinterland, as provided for by land use zoning and policy. In this context, the construction of multiple sites at the one time may result in cumulative impacts in terms of noise and vibration, air quality (dust), construction traffic and visual impact for human beings. However, such impacts would be ***temporary*** or ***short-term***, and corresponding mitigation measures have been prescribed herein – including coordination with the adjacent GA1 development – in order to ensure that significant cumulative impacts do not arise in relation to these aspects of the proposed works.

During operation, these residential and related developments will come to define the planned edge of city development in this area. These developments will expand existing and introduce new residential communities, which will increase population and population pressures in the area. In this regard the local area plans for Clongriffin, Portmarnock South and Baldoyle –

Stapolin also provide for delivery of significant areas of amenity, recreation and parklands, as well as for ecological and landscape buffer areas for the protection of sensitive habitats and environments in the surrounding area.

In delivering on planned and much needed residential development within an attractive amenity and public realm setting, the cumulative impact of the overall development on human beings and landscape (townscape) is expected to be ***positive***.

As stated above, each of the specialist environmental chapters of this EIAR have considered the potential for cumulative impacts to arise as a result of the proposed Project in combination with one or more of the above-listed plans and projects, as appropriate. Please refer to the various specialist chapters for a topic-specific discussion of potential cumulative impacts.

In short, ***no significant negative cumulative impacts*** are expected to arise during the construction or operation of the proposed Project.

22 Schedule of Environmental Commitments

22.1 Introduction

This Chapter collates the environmental commitments / mitigation measures identified in the various specialist Chapters of the EIAR. These mitigation measures, which are set out in Tables 22.1 – 22.22, below, are considered necessary to protect the environment prior to the commencement of works and during the construction and / or operational phases of the proposed Strategic Housing Development (SHD) at Baldoyle-Stapolin, Growth Area 3 (GA3) ('the proposed Project' hereafter) located at Baldoyle, Dublin 13.

The appointed Contractor (or other relevant responsible entity identified) will be required to adhere to these mitigation measures for the protection of the environment and to ensure sustainable development.

This Chapter constitutes the 'Schedule of Environmental Commitments' at the time of lodgement of the planning application for the proposed Project. The final Schedule of Environmental Commitments to be implemented by the appointed Contractor (and any other relevant responsible entity identified) will be supplemented with any conditions attached to a grant of planning permission for the proposed Project.

Note that this Chapter does not include 'mitigation by design', i.e. features already integrated into the proposed Project (as assessed) that mitigate negative environmental impacts.

22.2 General Mitigation Measures

Table 22.1: Mitigation Measures – General

No.	Mitigation Measure
Construction Phase	
GE01	A suite of construction phase plans will be implemented during the proposed works, including the following of relevance to the EIA: ▪ Construction Management Plan (CMP) ▪ Construction Environmental Management Plan (CEMP) ▪ Arboricultural Report ▪ Dust Management Plan ▪ Construction Traffic Management Plan (CTMP) ▪ Construction & Demolition Waste Management Plan (C&D WMP)

22.3 Mitigation & Monitoring for Population & Human Health

Table 22.2: Mitigation Measures – Population & Human Health

No.	Mitigation Measure
Construction Phase	
P01	An Outline Construction Management Plan (CMP) has been prepared by CS Consulting in respect of the proposed Project, and submitted under separate cover as part of the planning application. This CMP includes measures which seek to avoid / minimise negative impacts on the neighbouring population. For instance, the Outline CMP includes measures in relation to good housekeeping, hoarding, security, construction traffic management, pollution control and public safety. It will be a requirement of the successful Contractor that they finalise the CMP in advance of the commencement of any on-Site works, and implement it fully throughout the proposed works.
P02	Chapter 11 (Air Quality & Climate) includes a Dust Management Plan (Appendix 11.3) which sets out comprehensive measures to minimise dust generation during the construction phase of the proposed Project. The mitigation measures set out in Chapter 11 and Appendix 11.3 shall be implemented in full.
P03	Chapter 12 (Noise & Vibration) includes a suite of mitigation measures to minimise noise and vibration and associated impacts during the construction phase of the proposed Project. Mitigation measures are included in relation to selection of quiet plant, noise control at source, piling, screening, liaison with the public, coordination with the neighbouring construction site and adherence to standard working hours.The mitigation measures set out in Chapter 12 shall be implemented in full.
P04	Chapter 13 (Landscape & Visual) includes a number mitigation measures to minimise the impacts of the proposed works on townscape and visual amenity. These include measures in relation to Site hoarding, good housekeeping and traffic management; and shall be implemented in full.
P05	Chapter 17 (Traffic & Transportation) includes a suite of measures in relation to construction traffic management, good housekeeping and community liaison. The mitigation measures set out in Chapter 17 shall be implemented in full.
P06	Chapter 18 (Material Assets – Waste) and Appendix 18.1 (Construction & Demolition Waste Management Plan) include a suite of mitigation measures to promote best practice construction waste management and avoid / minimise waste-related impacts. The mitigation measures set out in Chapter 18 and Appendix 18.1 shall be implemented in full.
Operational Phase	
P07	Chapter 12 (Noise & Vibration) includes a suite of mitigation measures to minimise noise and vibration and associated impacts during the operational phase of the proposed Project. These include measures in relation to minimising the noise levels of operational plant and sound insulation of residential units to achieve recommended internal noise criteria. The mitigation measures set out in Chapter 12 shall be implemented in full.
P08	Chapter 17 (Traffic & Transportation) includes a number of mitigation measures to minimise the impacts of the proposed Project on the surrounding road network during the operational phase. It refers to the Residential Travel Plan (submitted under separate cover) and mandates the appointment of a Residential Travel Plan Coordinator, to ensure that sustainable transport

No.	Mitigation Measure
Construction Phase	
	options are promoted as alternatives to single-occupant car journeys among residents of the proposed Project. The mitigation measures set out in Chapter 17 and the Residential Travel Plan shall be implemented in full.
P09	Chapter 18 (Material Assets – Waste) and Appendix 18.2 (Operational Waste Management Plan (OWMP)) include a suite of mitigation measures to promote best practice on-Site waste management and avoid / minimise waste-related impacts during the operational phase of the proposed Project. The OWMP details the waste storage and collection provisions that the building management company will need to put in place for the use of residents and commercial tenants. The mitigation measures set out in Chapter 18 and Appendix 18.2 shall be implemented in full.

Table 22.3: Monitoring – Population & Human Health

Phase	Monitoring
Construction & Operation	Monitoring and maintenance recommended in Chapters 12, 17 and 18 shall be implemented in full during the construction and / or operational phases of the proposed Project, as specified in those respective Chapters. Beyond that which has been recommended elsewhere in this EIAR, no additional monitoring is considered necessary in respect of population and human health.

22.4 Mitigation & Monitoring for Biodiversity

Table 22.4: Mitigation Measures – Biodiversity

No.	Mitigation Measure
Construction Phase	
BIO1	Mitigation measures will be incorporated into the proposed Project to minimise the potential negative impacts on the ecology within the ZOI. These measures are outlined below in sequence, and incorporate elements outlined elsewhere in this EIAR and in the CEMP. It should be noted, however, that additional measures may be incorporated into the proposed Project following detailed discussions with Fingal County Council, including the Biodiversity Officer. As the main potential vector for impacts to designated sites and aquatic ecology outside the proposed Project Site would be via the direct pathway to the Mayne River via the existing attenuation pond, measures should be in place to protect the biodiversity downstream of the pond from in-stream pollution and dust. No additional mitigation measures are required besides those outlined below, during the construction phase of the proposed Project, to protect against potential negative impacts on designated conservation sites.
BIO2	An Ecologist will be appointed to oversee works and will be appointed prior to works commencing on-Site.
BIO3	A preliminary Construction Environmental Management Plan (CEMP) accompanies this planning application (under separate cover). The CEMP shall be finalised by the appointed

No.	Mitigation Measure
Construction Phase	
	Contractor (in agreement with FCC and the Project Ecologist) prior to the commencement of works, and shall be implemented throughout the proposed works. It shall include but not be limited to the following measures:
BI04	*Storm Water and Waste Management* Storm water and wastewater management will be constructed as per the conditions of the approved planning permission F16A/0412. Wetlands have been constructed under approved planning permission F16A/0412. The purpose of these procedures is to ensure that storm water and wastewater run-off is managed and that there is no off-Site environment impact caused by overland storm water flows. Refer to Chapter 10 (Hydrology) for further mitigation measures. The preliminary CEMP addresses the following: ■ Silt control on the roads; ■ Discharge of water from dewatering systems; ■ Diversion of clean water; ■ Treatment and disposal of wastewater from general clean-up of tools and equipment; ■ Spills control; ■ A buffer zone of at least 20 m separating working machinery from pathways to watercourses; ■ A prohibition on machinery entering watercourses; ■ Refuelling of machinery off-Site or at a designated bunded refuelling area; and ■ Silt trapping and oil interception (to be considered where surface water run-off may enter watercourses).
BI05	*Noise* During the construction phase works, the appointed Contactor shall comply with: ■ The mitigation measures in this Environmental Impact Assessment Report and as previously permitted application under planning reference F16A/0412. ■ Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 5 Noise and Vibration. Refer to Chapter 12 (Noise and Vibration) for further mitigation measures.
BI06	*Migrating Dust & Dirt Pollution* The appointed Contractor will ensure that all construction vehicles that exit the Site onto the public roads will not transport dust and dirt to pollute the external roadways. This will be achieved through a combination of the following measures: ■ Hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential Site traffic. ■ Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and / or windy conditions. ■ Vehicles exiting the Site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.

No.	Mitigation Measure
Construction Phase	
	▪ Vehicles using Site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any unsurfaced Site road, this will be 20 kph, and on hard surfaced roads as Site management dictates. ▪ Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust. ▪ Public roads outside the Site will be regularly inspected for cleanliness and cleaned as necessary. ▪ Material handling systems and Site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. ▪ During movement of materials both on and off-Site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. The use of appropriate water-based dust suppression systems will greatly reduce the amount of dust and windborne particulates as a result of the construction process. The main Contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan (refer to Appendix 11.3 in Volume 3). Refer to Chapter 11 (Air Quality and Climate) for further mitigation measures.
BI07	*Sediment and Water Pollution Control* All works carried out as part of these infrastructure works will comply with all relevant legislation including the Local Government (Water Pollution) Acts, 1977 and 1990 and the contractor will co-operate in full with the Environmental Section of Fingal County Council. Additional measures to be carried out to prevent impacts on habitats, plants and birds: ▪ Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will need be followed (i.e. do not remove trees or shrubs during the nesting season (1 March to 31 August, inclusive)). ▪ Boundary vegetation and hedgerows may serve as commuting corridors for bats (and other wildlife) and will remain unlit during the construction phase. ▪ Mitigation measures outlined in Section 11.5 and in the Dust Management Plan (Appendix 11.3) shall be implemented.
Operational Phase	
BI08	The proposed Project will have to comply with SUDS, legislative requirements in relation to pollution control and the provision of additional mitigation measures such as petrochemical interceptors and silt interception to comply with Water Pollution Acts.

Table 22.5: Monitoring – Biodiversity

Phase	Monitoring
Construction	An Ecologist will be appointed to monitor the Site during pre-construction surveys, construction phase and landscaping phase, This would include obtaining derogation licences, if necessary, from the NPWS.

22.5 Mitigation & Monitoring for Land, Soils, Geology & Hydrogeology

Table 22.6: Mitigation Measures – Land, Soils, Geology & Hydrogeology

No.	Mitigation Measure
Construction Phase	
GE01	*Construction Management Plan (CMP)* An Outline Construction Management Plan (CMP) has been prepared[71] for the proposed Project and is included (under separate cover) with this planning application. It is proposed that the CMP will be finalised and maintained by the appointed Contractors during the construction phase of the proposed Project to minimise the impact of all aspects of the construction works on the local environment. The final CMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction.
GE02	*Control of Soil Excavation* Subsoil will be excavated to facilitate the construction of foundations, access roads, car parking areas, expansion of drainage connections and other ancillary works. The proposed Project will incorporate the 'reduce, reuse and recycle' approach in terms of soil excavations on-Site. The construction will be carefully planned to ensure only material required to be excavated will be, with as much material left in situ as possible. Excavation arisings will be reused on-site where possible. It is unlikely that any contaminated material will be encountered during the construction phase of the proposed Project except for the hardcore containing pyrite which is present under the existing roadways, and which will be removed from the Site towards the end of the construction phase. Nonetheless, any excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean / inert soil. In the unlikely event that any potentially contaminated soils are encountered, they should be tested and classified as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous publication, HazWasteOnline* tool or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with EC Decision 2003/33/EC. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of an appropriate earthworks handling protocol during the construction phase. It is anticipated that any stockpiles will be formed within the boundary of the Site and there will be no direct link or pathway from this area to any surface waterbody. Dust suppression measures (e.g., damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are

[71] CS Consulting Engineers (2021).

<table>
<tr><th>No.</th><th>Mitigation Measure</th></tr>
<tr><td colspan="2">Construction Phase</td></tr>
<tr><td></td><td>free of nuisance dust and dirt on roads. Refer to the Dust Management Plan in Appendix 11.3, which shall be implemented in full during the proposed works.</td></tr>
<tr><td>GE03</td><td>Export of Material from Site
Suitable excavated material will be reused on-site, where possible, for site levelling, roads, car parking areas and other landscaping purposes. There will be waste materials generated from the excavation of soil and stones to facilitate site clearance, construction of new building foundations and installation of services. The volume of material to be excavated has been estimated by the project engineers at c. 31,966.6 m^3. It is envisaged that 21,870.0 m^3 of the excavated material will be required to be removed from site. It will also be necessary at this stage to remove pyrite-containing fill material from below existing roads. It is envisaged that the excavated material containing pyrite will be re-used during the works for haul road maintenance, temporary construction roads and site operative walkways, with this material being removed off-Site for appropriate disposal towards the end of the construction phase. It has been identified in GII Site Investigation report that some fill material around location TP-65 (refer to Figure 9.4) exceeds the S4ULs for future residential use. This shall be removed during Site preparation. All other suitable material excavated as part of the proposed Project works will be reused onsite. When material is to be removed off-site it will be taken for off-site reuse, recovery and / or disposal. Where material cannot be reused off-site it will be sent for recovery or disposal at an appropriately authorised facility. Refer to Chapter 18 (Material Assets – Waste) for further detail.

If any waste soil requires removal from the Site, it should be classified by an experienced and qualified environmental professional to ensure that the waste soil is correctly classified for transportation and recovery / disposal off-site. Refer to Chapter 18 (Material Assets - Waste) for further detail.</td></tr>
<tr><td>GE04</td><td>Sources of Fill and Aggregates
All fill and aggregate for the proposed Project will be sourced from reputable suppliers. All suppliers will be vetted for:
Aggregate compliance certificates / declarations of conformity for the classes of material specified for the proposed Project;
Environmental Management status; and
Regulatory and Legal Compliance status of the Company.
It is anticipated that approximately 64,117.6 m^3 of engineered fill will be required to facilitate construction. There will be no impact to mineral resources in the area as a result of the proposed Project.</td></tr>
<tr><td>GE05</td><td>Fuel and Chemical Handling
The following mitigation measures will take place at the Construction Phase in order to prevent any spillages to ground of fuels and prevent any resulting soil and / or groundwater quality impacts:
Designation of bunded refuelling areas on the Site;
Provision of spill kit facilities across the Site;
Where mobile fuel bowsers are used, the following measures will be taken:</td></tr>
</table>

<table>
<tr><th>No.</th><th>Mitigation Measure</th></tr>
<tr><td colspan="2">Construction Phase</td></tr>
<tr><td></td><td>

Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
The pump or valve will be fitted with a lock and will be secured when not in use;
All bowsers to carry a spill kit;
Operatives must have spill response training; and
Drip trays shall be used on any required mobile fuel units.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
All drums to be quality approved and manufactured to a recognised standard;
If drums are to be moved around the site, they will be secured and on spill pallets; and
Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

The aforementioned list of measures is non-exhaustive and will be included in the final CMP.
</td></tr>
<tr><td>GE06</td><td>
Control of Water During Construction
Run-off from excavations / earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management will ensure that there will be minimal inflow of shallow / perched groundwater into any excavation. Due to the very low permeability of the overburden and the relative shallow nature for foundation excavations, infiltration to the underlying aquifer is not anticipated.

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site, which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses / drainage ditches.

Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on-Site will include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks / ponds) and hydrocarbon interceptors. Active treatment systems such as siltbusters or similar may be required, depending on turbidity levels and discharge limits.
</td></tr>
</table>

Table 22.7: Monitoring – Land, Soils, Geology & Hydrogeology

Phase	Monitoring
Construction	Regular inspection of surface water run-off and any sediment control measures (e.g. silt traps) will be carried out during the construction phase. Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc.
Operation	Petrol interceptors will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

22.6 Mitigation & Monitoring for Hydrology

Table 22.8: Mitigation Measures – Hydrology

No.	Mitigation Measure
Construction Phase	
HY01	*Construction Management Plan (CMP)* An outline Construction Management Plan (CMP) accompanies this planning application. A final CMP will be prepared and maintained by the appointed Contractors during the construction phase of the proposed Project. The CMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the Site will be trained in the implementation of the CMP. At a minimum, the CMP will be formulated in consideration of the standard best international practice including but not limited to: ▪ CIRIA (2001). *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532).* ▪ CIRIA (2002). *Control of water pollution from construction sites: guidance for consultants and contractors (SPI56).* ▪ CIRIA (2005). *Environmental Good Practice on Site (C650).* ▪ *BPGCS005, Oil Storage Guidelines.* ▪ CIRIA (2007). *The SUDS Manual (697).* ▪ UK Environment Agency (2004). *UK Pollution Prevention Guidelines (PPG).*
HY02	*Surface Water Run-off* As there are no watercourses present on the Site, there will be no direct run-off to surface watercourses during the construction phase. It should also be noted that there are no surface water gulleys or drains currently on-site which would act as pathway to the nearby surface water features. Run-off water containing silt will be contained on-site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks / ponds). Should any discharge of construction water be required during the construction phase, the discharge will be treated using a sediment trap or 'siltbuster' as required.

<table>
<tr><th>No.</th><th>Mitigation Measure</th></tr>
<tr><td colspan="2">Construction Phase</td></tr>
<tr><td></td><td>The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce run-off and graded to aid in run-off collection, and materials will be stored away from any surface water drains. This will prevent any potential negative impact on the storm water drainage.

Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to avoid any potential impact.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the Site and the suitable distance of topsoil piles from surface water drains will be maintained. A Sediment and Water Pollution Control Plan has been drafted (Section 8 of the Outline CMP, submitted under separate cover). It states the following:

"… surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water run-off by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle run-off and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. All inlets to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet".</td></tr>
<tr><td>HY03</td><td>Fuel and Chemical Handling
The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground of fuels and prevent any resulting to surface water systems:
▪ Designation of bunded refuelling areas on the Site;
▪ Provision of spill kit facilities across the Site;
▪ Where mobile fuel bowsers are used, the following measures will be taken:
  □ Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  □ The pump or valve will be fitted with a lock and will be secured when not in use;
  □ All bowsers to carry a spill kit and operatives must have spill response training;
  □ Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:</td></tr>
</table>

No.	Mitigation Measure
Construction Phase	
	▪ Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area; ▪ Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage; ▪ All drums to be quality approved and manufactured to a recognised standard; ▪ If drums are to be moved around the Site, they will be secured and on spill pallets; and ▪ Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment. The aforementioned list of measures is non-exhaustive and will be included in the final CMP. All appointed Contractors will be required to implement the CMP. All ready-mixed concrete will be brought to the Site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out, which will include measures to prevent discharge of alkaline waste waters or contaminated storm water to the underlying subsoil. Wash-down and washout of concrete transporting vehicles will take place at an appropriate facility off-site.
HY04	*Accidental Releases* Emergency response procedures will be outlined in the finalised CMP. All personnel working on the Site will be suitably trained in the implementation of the procedures.
HY05	*Soil Removal and Compaction* Suitable excavated material will be reused on-site, where possible, for site levelling, roads, car parking areas and other landscaping purposes. There will be waste materials generated from the excavation of soil and stones to facilitate site clearance, construction of new building foundations and installation of services. The volume of material to be excavated has been estimated by the project engineers at c. 31,966.6 m^3. It is envisaged that 21,870.0 m^3 of the excavated material will be required to be removed from site. It will also be necessary at this stage to remove pyrite-containing fill material from below existing roads. It is envisaged that the excavated material containing pyrite will be re-used during the works for haul road maintenance, temporary construction roads and site operative walkways, with this material being removed off-Site for appropriate disposal towards the end of the construction phase. When material is to be removed off-site it will be taken for off-site reuse, recovery and / or disposal. Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (refer to Section 10.5.1.2). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

No.	Mitigation Measure
Construction Phase	
	All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted / licensed waste disposal contractor.

Table 22.9: Monitoring – Hydrology

Phase	Monitoring
Construction	Regular inspection of surface water run-off and any sediment control measures (e.g. silt traps) will be carried out during the construction phase. Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc.
Operation	No future surface water monitoring is proposed for the proposed Project due to the low hazard potential at the Site. Oil interceptors will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

22.7 Mitigation & Monitoring for Air Quality & Climate

Table 22.10: Mitigation Measures – Air Quality & Climate

No.	Mitigation Measure
Construction Phase	
AQ01	*Air Quality* The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan. The key aspects of controlling dust are listed below. Full details of the Dust Management Plan can be found in Appendix 11.3. These measures will be incorporated into the finalised Construction Environmental Management Plan (CEMP) prepared for the site. In summary the measures which will be implemented will include: ▪ Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic. ▪ Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions. ▪ Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads. ▪ Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.

No.	Mitigation Measure
Construction Phase	
	▪ Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
AQ02	*Climate* Construction stage traffic and embodied energy of construction materials are expected to be the dominant source of GHG emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term nature of these works, the impact on climate will not be significant. Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are reduced further: ▪ On-site or delivery vehicles will not be permitted to leave engines idling, even over short periods, unless strictly necessary. ▪ An efficient materials management system will be implemented in order to minimise wastage of materials due to poor timing / over-ordering or improper storage, reducing the embodied carbon footprint of the site.

Table 22.11: Monitoring – Air Quality & Climate

Phase	Monitoring
Construction	Beyond that which is inherent in the mitigation set out above and in Appendix 11.3, no monitoring is considered necessary.

22.8 Mitigation & Monitoring for Noise & Vibration

Table 22.12: Mitigation Measures – Noise & Vibration

No.	Mitigation Measure
Construction Phase	
NV01	With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) *Code of Practice for Noise*

No.	Mitigation Measure
Construction Phase	
	and Vibration Control on Construction and Open Sites Parts 1 and 2. Whist construction noise and vibration impacts are expected to vary during the construction phase, depending on the distance between the activities and noise sensitive buildings, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at off-site noise sensitive locations are minimised. The best practice measures set out in BS 5228-1 and BS 5228-2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to: ▪ Selection of quiet plant; ▪ Noise control at source; ▪ Piling; ▪ Screening; and ▪ Liaison with the public.
NV02	*Selection of Quiet Plant* The potential for any item of plant to generate noise should be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.
NV03	*Noise Control at Source* If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control 'at source'. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact. Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures will be implemented: ▪ The lifting of bulky items, dropping and loading of materials will be restricted to normal working hours. ▪ Mobile plant should be switched off when not in use and not left idling. ▪ For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. ▪ For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum. ▪ For all materials handling, ensure that materials are not dropped from excessive heights, and line drop chutes and dump trucks with resilient materials. ▪ Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.

No.	Mitigation Measure
Construction Phase	
	▪ All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.
NV04	*Piling* Piling is the construction activity which is most likely to cause disturbance. On typical piling sites, the major sources of noise are essentially mobile and the noise received at any control points will, therefore, vary from day to day as work proceeds. The duration of piling works is typically relatively short in relation to the length of construction work as a whole, and the amount of time spent working near to noise sensitive areas can represent only a part of the piling period. General mitigation in relation to piling shall be implemented as follows: ▪ Piling programmes will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time. ▪ Prior to construction, the planner, developer, architect and engineer, as well as the local authority, shall be made aware of the proposed method of working of the piling contractor. The piling contractor shall in turn have evaluated any practicable and more acceptable alternatives that would economically achieve, in the given ground conditions, equivalent structural results. ▪ Noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover. Impact noise when piling is being driven can be reduced by introducing a non-metallic dolly between the hammer and the driving helmet. ▪ Screening by barriers and hoardings is less effective than total enclosure but can be a useful adjunct to other noise control measures. For maximum benefit, screens should be close either to the source of noise (as with stationary plant) or to the listener. Removal of a direct line of sight between source and listener can be advantageous both physically and psychologically. In certain types of piling works, there will be ancillary mechanical plant and equipment that may be stationary, in which case, care should be taken in location, having due regard also for access routes. When appropriate, screens or enclosures should be provided for such equipment.
NV05	*Screening* Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. It is understood a standard site hoarding will be set in place during the construction process and provide a degree of screening.

No.	Mitigation Measure
Construction Phase	
	In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.
NV06	*Liaison with the Public* A designated Community Liaison Officer (CLO) shall be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the CLO. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours, etc., the CLO will inform residents / business owners at the nearest noise sensitive locations of the time and expected duration of the noisy works.
NV07	*Liaison with Neighbouring Site* Due to the proximity of the GA1 development within the Masterplan site it is recommended that liaison between both construction sites is on-going throughout the duration of the construction phase. Contractors should schedule work in a co-operative effort to limit the duration and magnitude of potential cumulative impacts on nearby sensitive receptors. Cumulative construction noise impacts have the potential to be negative, significant and short-term at times of high activity on both sites.
NV08	*Project Programme* The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation / piling or when other high noise generating works are in progress concurrent with other works that may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any one time.
NV09	*Working Hours* The proposed construction hours are 07:00 to 19:00 hrs, Monday to Friday, and 08:00 to 14:00 hrs on Saturdays. Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise.
Operational Phase	
NV10	As part of the detailed design of the proposed Project, plant items with appropriate noise ratings and, where necessary, appropriately selected remedial measures (e.g. enclosures, silencers, etc.) will be specified in order that the adopted plant noise criteria is achieved at the façades of noise sensitive properties, including those within the proposed Project itself.
NV11	The assessment outlined earlier in this Chapter has specified cumulative plant noise limits at the nearest noise sensitive properties that must be achieved in order to ensure the impact is acceptable. These are: ■ Daytime (07:00 to 23:00 hrs): 50 dB $L_{Aeq,1hr}$ ■ Night-time (23:00 to 07:00 hrs) 40 dB $L_{Aeq,15min}$ To achieve these noise limits, consideration will be given, at the detailed design stage, to a variety of mitigation measures and forms of noise control techniques. Some example of these measures are as follows: ■ Reduced / quiet modes;

<table>
<tr><th>No.</th><th>Mitigation Measure</th></tr>
<tr><td colspan="2">Construction Phase</td></tr>
<tr><td></td><td>Duct mounted attenuators on the atmosphere side of air moving plant;
Splitter attenuators or acoustic louvres providing free ventilation to internal plant areas;
Solid barriers screening any external plant; and
Anti-vibration mounts on reciprocating plant.</td></tr>
<tr><td>NV12</td><td>In addition to the above, it is proposed that the following practices are adopted to minimise potential noise disturbance for neighbours.
All mechanical plant items (e.g. motors, pumps, etc.) shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised;
Any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document.</td></tr>
<tr><td>NV13</td><td>Acoustic Design Statement – Part 2
As is the case in most buildings, the glazed elements, ventilation paths and roof of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

In this instance, the façades highlighted red in Figure 12.7 will be provided with glazing and ventilation that achieve the minimum sound insulation performance, as set out in Tables 12.20 and 12.21. Other façades in the proposed Project have no minimum requirement for sound insulation.

Table 12.20: Sound Insulation Performance Requirements for Glazing, SRI (dB)
<table>
<tr><th rowspan="2">Façade</th><th colspan="6">Octave Band Centre Frequency (Hz)</th><th rowspan="2">R_w</th></tr>
<tr><th>125</th><th>250</th><th>500</th><th>1000</th><th>2000</th><th>4000</th></tr>
<tr><td>Red</td><td>26</td><td>27</td><td>34</td><td>40</td><td>38</td><td>46</td><td>37</td></tr>
</table>

The overall R_w and $D_{ne,w}$ outlined in this section are provided for information purposes only. The overriding requirement is the Octave Band sound insulation performance values, which may also be achieved using alternative glazing and ventilation configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Tables 12.20 and 12.21 or greater.

The following performance requirements apply to all ventilation paths from outside the building. This can be achieved by passive acoustic wall or window vents or via mechanical ventilation systems.</td></tr>
</table>

No.	Mitigation Measure
Construction Phase	

Table 12.21: Sound Insulation Performance Requirements for Ventilation, $D_{n,e,w}$ (dB)

Façade	Octave Band Centre Frequency (Hz)						$D_{n,e,w}$
	125	250	500	1000	2000	4000	
Red	35	34	33	38	49	45	39

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing and ventilation systems. In the context of the acoustic performance specification, the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements, etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Figure 12.7: ProPg Stage 2 – Façade Sound Insulation Requirement

There is the potential for the roof structure to allow the passage of sound into the rooms. In order to control potential sound transmission via this route, the ceiling / roof construction will need to provide a sound reduction in excess of that required for the windows. In the case of the apartments, a reinforced concrete roof with thermal insulation and plasterboard ceiling below will also provide suitable sound insulation. Any penetrations through the ceiling constructions must be as small as possible and made good by fully filling with plaster or with an acoustic sealant.

Table 22.13: Monitoring – Noise & Vibration

Phase	Monitoring
Construction	Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*. Vibration monitoring stations should continually log vibration levels using the PPV parameter (mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: *Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures*.

22.9 Mitigation & Monitoring for Landscape & Visual

Table 22.14: Mitigation Measures – Landscape & Visual

No.	Mitigation Measure
Construction Phase	
LV01	The construction phase of the proposed Project will be completed expediently through careful construction planning and management prior to commencing on-Site and throughout the construction phase.
LV02	The Contractors' compounds, including Site offices and parking, will be located within the Site and away from nearby houses where possible, where it will have minimal visual impact.
LV03	Perimeter hoardings will be installed along the Site boundaries and maintained in good condition and free of unsolicited graffiti and fly-posting.
LV04	A construction materials and waste storage area will be located within the Site, screened from public view by intervening buildings as well as perimeter hoardings.
LV05	Visual impacts will increase and extend to a wider area with the installation of tower cranes across the Site and the gradual emergence of the building structures. The tower cranes will be the tallest and most visible elements, but are temporary structures for the duration of construction only. These will be 'parked' in an orderly manner when not in use (e.g. without overhanging neighbouring residential areas) and removed from the Site at the earliest opportunity.
LV06	Plant generally within the Site, especially during the early stages of construction, are likely to be partially visible from neighbouring streets and open spaces. When not in use, these will be parked in compound areas and / or away from the Site perimeter in order to minimise visibility outside of working hours.
LV07	A Construction Traffic Management Plan (CTMP) will be implemented, to minimise visual impacts and other impacts on neighbouring streets and residents, including the defined haul routes and times of operation; consolidation of vehicle movements for deliveries to site or removal of materials from site; and staggering of vehicle movements to minimise or avoid queuing on neighbouring streets.

Table 22.15: Monitoring – Landscape & Visual

Phase	Monitoring
Operation	Management and regular maintenance of the buildings and open spaces will be required to ensure the proposed Project maintains a positive impact on urban landscape character and public amenity.

22.10 Mitigation & Monitoring for Cultural Heritage, Archaeology & Architectural Heritage

Table 22.16: Mitigation Measures – Cultural Heritage, Archaeology & Architectural Heritage

No.	Mitigation Measure
Construction Phase	
CH01	Monitoring of topsoil-stripping across the entire Site of the proposed Project will be undertaken as an archaeological exercise, to determine whether there are any archaeological features or deposits present. Given the way that subsurface features and sites present in this landscape, this strategy will ensure comprehensive archaeological mitigation. This exercise will be undertaken by a suitably qualified archaeologist, and will include the area where testing of geophysical anomalies has already been undertaken.
CH02	Should any subsurface archaeological stratigraphy be encountered, an appropriate ameliorative strategy will be implemented. This will entail licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ.
CH03	Archaeological monitoring will be carried out under licence to the DHLGH and the NMI, and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface.
CH04	All archaeological issues will have to be resolved to the satisfaction of the DHLGH and the NMI.
CH05	The archaeologist will: ▪ Have provision to inspect all excavation to natural soil level and to temporarily halt excavation works, if and as necessary. ▪ Be given provision to ensure the temporary protection of any features of archaeological importance identified. ▪ Be afforded sufficient time and resources to record and remove any such features identified.
CH06	The developer will make provision to allow for, and to fund, the necessary archaeological monitoring, inspection and any excavation works that will be needed on the site during and prior to construction, either directly or indirectly via the contractor.

22.11 Mitigation & Monitoring for Traffic & Transportation

Table 22.17: Mitigation Measures – Traffic & Transportation

No.	Mitigation Measure
Construction Phase	
TT01	*Construction Management Plan (CMP)* The lead contractor appointed for the construction of the proposed Project will be required to prepare a site-specific Construction Management Plan (CMP), including a plan for the scheduling and management of construction traffic, which will set out measures to be taken to mitigate the effects of construction traffic on the surrounding road network. The final site-specific CMP will be based upon the Outline CMP prepared by CS Consulting and submitted under separate cover as part of this application. This includes (inter alia) the following measures for minimising construction traffic and mitigating its effects: ▪ Routing all construction traffic via a haulage road to / from the north, connecting to Mayne Road, avoiding Grange Road and Coast Road. ▪ Conducting all loading and unloading operations within the Site, away from the public roads. ▪ Scheduling deliveries outside of peak hour periods to avoid disturbance to surrounding pedestrian and vehicular traffic. ▪ Staggering HGV movement to / from Site to avoid queues. ▪ Preventing haulage vehicles travelling in convoys of more than two vehicles at any time and spacing haulage vehicles by a minimum of 250 m at all times. ▪ Installation of a wheel wash at exit from the Site to prevent any dirt being carried out into the public roads. ▪ Deployment of a road sweeper as necessary to keep the public roads around the Site clean.
TT02	A Designated Community Liaison Officer (CLO) will be nominated for the construction phase of the proposed Project, who will work with CLOs (or equivalent) on other active sites to coordinate construction activities. The CLO will also act as a point of contact for local residents, FCC, and An Garda Síochána.
TT03	Construction personnel will be encouraged to make use of the available high-quality public transport links to the area and / or to commute by bicycle, to minimise private car trips to and from the Site. To avoid problems of parking overspill on surrounding streets, however, limited essential staff parking shall be provided within the Site. In parallel with this, parking restrictions and management measures on surrounding streets will be reviewed and implemented as necessary in agreement with local residents and FCC.
Operational Phase	
TT04	As described in the Residential Travel Plan (RTP) framework document submitted under separate cover as part of this application, a RTP Coordinator shall be appointed for the proposed Project, with the remit to implement and oversee an ongoing RTP. This shall promote a modal shift among residents away from single-occupant car journeys in favour of more environmentally sustainable alternatives (e.g. rail, public bus, cycling, walking, etc.). The

No.	Mitigation Measure
Construction Phase	
	Site benefits from a highly advantageous location in proximity to high-frequency rail services and bus services. The RTP framework sets a suggested initial target of reducing the modal share of private car use from 33% to 28% over a 2-year period following completion of the Project. This equates to a reduction of approximately 15% in car journeys made to and from the Site.

Table 22.18: Monitoring – Traffic & Transportation

Phase	Monitoring
Operation	Within the scope of the Residential Travel Plan (RTP) to be implemented for the proposed Project, however, the RTP Coordinator shall be responsible for monitoring the travel habits of occupants and visitors. An RTP is a dynamic process whereby a package of measures and campaigns is identified, piloted, and then monitored on an ongoing basis. The RTP will identify specific targets against which the effectiveness of the plan can be assessed at each review; these will typically take the form of target modal splits for journeys to and from a site. The RTP Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of occupants.

22.12 Mitigation & Monitoring for Material Assets – Waste

Table 22.19: Mitigation Measures – Material Assets – Waste

No.	Mitigation Measure
Construction Phase	
W01	A project specific C&D WMP has been prepared in line with the requirements of the guidance document issued by the Department of Environment Heritage, Local Government (DEHLG) and is included as Appendix 18.1. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the proposed Project. Prior to commencement of on-site works, the appointed Contractor(s) will be required to refine / update the C&D WMP or submit an addendum to C&D WMP to FCC, to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.
W02	A quantity of topsoil, sub-soil and made ground which will need to be excavated to facilitate the proposed Project. Project Engineers have estimated that c. 21, 870.0 m^3 of excavated material will need to be removed off-site; however, it is envisaged that c. 10,096.0 m^3 of excavated material will be reused on-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers or on water or soil, both on and off-site.
W03	The following mitigation measures will be implemented: ▪ Building materials will be chosen with an aim to 'design out waste'.

<table>
<tr><th>No.</th><th>Mitigation Measure</th></tr>
<tr><td colspan="2">Construction Phase</td></tr>
<tr><td></td><td>

On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. It is anticipated that the following waste types, at a minimum, will be segregated:

Concrete rubble (including ceramics, tiles and bricks);
Plasterboard;
Metals;
Glass; and
Timber.

Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible.
All waste materials will be stored in skips or other suitable receptacles in designated areas of the site.
Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles in suitably bunded areas.
A Waste Manager will be appointed by the main Contractor to ensure effective management of waste during the excavation and construction works.
All construction staff will be provided with training regarding the waste management procedures.
All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal.
All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities.
All waste leaving the site will be recorded and copies of relevant documentation maintained.

</td></tr>
<tr><td>W04</td><td>Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.</td></tr>
<tr><td colspan="2">Operational Phase</td></tr>
<tr><td>W05</td><td>A project specific OWMP has been prepared and is included as Appendix 18.2. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the Site of the proposed Project. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021 and abiding by the FCC waste bye-laws.</td></tr>
<tr><td>W06</td><td>In addition, the following mitigation measures will be implemented:

On-site segregation of all waste materials into appropriate categories including (but not limited to):

</td></tr>
</table>

No.	Mitigation Measure
Construction Phase	
	□ Organic waste; □ Dry Mixed Recyclables; □ Mixed Non-Recyclable Waste; □ Glass; □ Waste electrical and electronic equipment (WEEE); □ Batteries (non-hazardous and hazardous); □ Cooking oil; □ Light bulbs; □ Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.); □ Furniture (and from time to time other bulky waste); □ Abandoned bicycles; and □ Healthcare waste from the medical centre and pharmacy. ■ All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross-contamination of waste materials. ■ All waste collected from the Site of the proposed Project will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available. ■ All waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

Table 22.20: Monitoring – Material Assets – Waste

Phase	Monitoring
Construction	The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the Excavation and Construction Phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The C&D WMP specifies the need for a Waste Manager to be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste, as required. Where targets are not being met, the Waste Manager will identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the construction phase of the proposed Project will enable better management of waste contractor requirements and identification of trends. The data collected should be maintained to inform future projects.
Operation	During the operational phase, waste generation volumes will be monitored against the predicted waste volumes outlined in the OWMP by the building management company (who will have the primary responsibility) and the nominated waste contractor(s). There may be opportunities to reduce the number of bins and equipment required in the WSAs, where estimates have been too conservative.

Phase	Monitoring
	Reductions in bin and equipment requirements will improve efficiency and reduce waste contactor costs.

22.13 Mitigation & Monitoring for Material Assets – Services

Table 22.21: Mitigation Measures – Material Assets – Services

No.	Mitigation Measure
Construction Phase	
SE01	The exact locations of all existing on-Site services (underground and overhead, where applicable) will be confirmed, e.g. using slit trenches at key areas, prior to the commencement of on-Site works.
SE02	In planning and executing the proposed works, due reference shall be had to the GNI *Guidelines for Designers and Builders – Industrial and Commercial (Non-Domestic) Sites* (2018) and the Health & Safety Authority (HSA) *Code of Practice for Avoiding Danger from Underground Services* (2016).
SE03	All possible precautions shall be taken to avoid unplanned disruptions to any services / utilities during the proposed works.
SE04	Consultation with all relevant service providers shall be undertaken in advance of works, ensuring all works are carried out to the relevant standards and in a safe manner. In particular, close liaison will be required with GNI in relation to works in proximity to the existing on-Site gas infrastructure.
SE05	There will be an interface established between the Contractor and the relevant utilities service providers / authorities during the construction phase of the proposed Project. This interface will be managed in order to ensure a smooth construction schedule with no / minimal disruption to the local residential and business community.
SE06	All new infrastructure will be installed in accordance with the applicable standards, guidelines and codes of practice.
SE07	All mitigation measures in relation to Site access / egress and construction traffic management set out in Chapter 17 of this EIAR (Traffic & Transportation) and in the finalised Construction Traffic Management Plan to be finalised by the Contractor in agreement with FCC, as stipulated in the Outline Construction Management Plan (submitted under separate cover as part of the planning application) shall be fully implemented by the Site contractors.
SE08	Prior to the operational phase of the proposed Project, utilities infrastructure connections will be tested by a suitably qualified person using an appropriate methodology, approved by the relevant service provide, and under the supervision of FCC. The proposed Project water supply will be tested to the satisfaction of FCC and Irish Water prior to the connection to the public potable water.
SE09	The successful contractor will ensure that the drainage and water supply networks are kept clear and free from materials which could cause diminished capacity or blockages. Routine visual inspections shall be carried out to this end.
Operational Phase	
SE10	Any necessary maintenance and / or upgrades of on-Site utilities infrastructure during the operational phase of the proposed Project, will be carried out in accordance with the

No.	Mitigation Measure
Construction Phase	
	specifications of the relevant service providers and facilitated by the buildings / estate manager.

Table 22.22: Monitoring – Material Assets – Services

Phase	Monitoring
Construction	Monitoring will be provided for by each utility company with an overseeing responsibly by the appointed Contractor during the construction phase.
Operation	Any monitoring of the built services required during the operational phase will be as advised by the relevant services provider and facilitated by the buildings / estate manager.

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