Strategic Housing Development, For Alterations to Shoreline GA1 Lands at Baldoyle, Dublin 13

Environmental Impact Assessment Report (EIAR)

Volume 2

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Environmental
Assessment
Built
Environment

Client: The Shoreline Partnership

Date: 03 June 2021

DOCUMENT CONTROL SHEET

6769_RP01_Environmental Impact Assessment Report (EIAR) Volume 2

Project No.	6769
Client:	The Shoreline Partnership
Project Name:	Strategic Housing Development at Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13
Report Name:	Environmental Impact Assessment Report (EIAR) Volume 2
Document No.	RP01
Issue No.	03
Date:	03/06/2021

This document has been issued and amended as follows:

Issue	Status	Date	Prepared	Checked
01	Draft _ Legal Review	22 Mar 2021	Rebecca Dunlea / Various	Thomas Burns
02	Draft _ Legal Review No. 2	17 May 2021	Rebecca Dunlea / Various	Thomas Burns
03	Final	03 Jun 2021	Various	Thomas Burns

Contents

1 Introduction

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) presents the assessment of environmental impacts and applicable mitigation measures associated with a proposed Strategic Housing Development (SHD) by The Shoreline Partnership for lands at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13 (hereafter referred to as "*the proposed Project*").

This EIAR has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by 97/11/EC, 2003/4/EC, 2011/92/EU and Directive 2014/52/EU and in accordance with the requirements of the Planning and Development Act 2000-92021, the Planning and Development Regulations 2001-2020, and relevant guidance documents, and it conforms to the requirements as specified therein.

This chapter was prepared by Rebecca Dunlea, Environmental Consultant, with Brady Shipman Martin. Rebecca holds a BA (Geography), MA (Geography) and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

1.2 The Applicant

The applicant for the proposed Project is The Shoreline Partnership, owners of the subject lands.

1.3 The Site of the Proposed Project

The Site of the proposed Project is located in Baldoyle, Dublin 13, c. 10km north-east of the City centre, see Figure 1.1 below. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89 ha. The vast majority of the Site consists of areas 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 had been cleared with areas of construction activity, roads and bare 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.

The Site is bound by the Dublin-Belfast / DART train line and Clongriffin train station to the west. The Site is also bounded by existing residential areas at Myrtle and Red Arches to the south and east.

The undeveloped lands of Baldoyle-Stapolin Growth Area No. 2 (GA2) and Growth Area No. 3 (GA3), as set out in the Baldoyle-Stapolin Local Area Plan, lie directly to the north and northeast of the subject lands. Baldoyle Racecourse Park is located to the north and east of the Site and Baldoyle Estuary is further east beyond the R106 Coast Road.

The lands surrounding the western, southern and eastern boundaries of the Site are predominately residential in nature. To the north and northeast are areas designated as 'high amenity' comprising partially of open fields and areas associated with the Baldoyle Estuary. FCC will deliver 'Baldoyle Racecourse' Regional Park as part of the stated objectives of the Development Plan and Baldoyle - Stapolin Local Area Plan.

1.4 The Proposed Project

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), 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 (Refer to Figure 5.3 in Chapter 5 (Description of the Proposed Project). 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 (99 no.) units in permitted Blocks C4, C5 and D1 (identified as Block C6 under amendments F20A/0258 and F21A/0046) for the purpose of the subject application);
- 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).

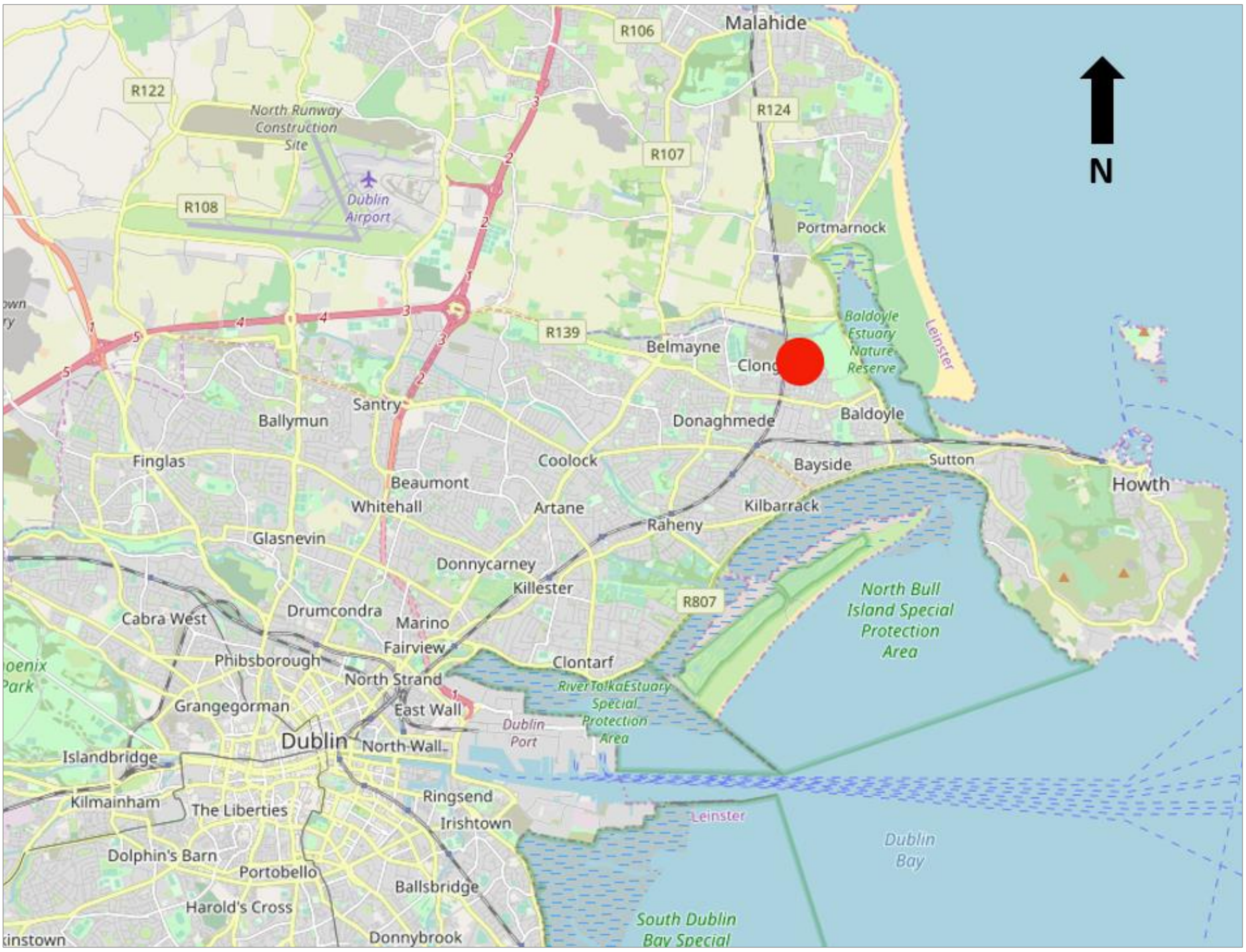
Given that they are already constructed or are under construction, the area of the surface water wetlands and associated upstream surface water network, and the area of Blocks C4, C5, C6 (latter formerly D1 in parent application) are excluded from the subject planning application. The Haggard Open Space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

The proposed Project 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. 8.89 ha. (Refer to Figure 5.4 in Chapter 5 (Description of the Proposed Project) 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 train station through the Square, new apartment blocks D1, D2, D3 to the north of Stapolin Square, and a bus ramp to Clongriffin train station. The red line boundary of this application also extends north to provide for a 300mm watermain connection to the existing watermain in the parklands to the north.

Therefore, the permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area.

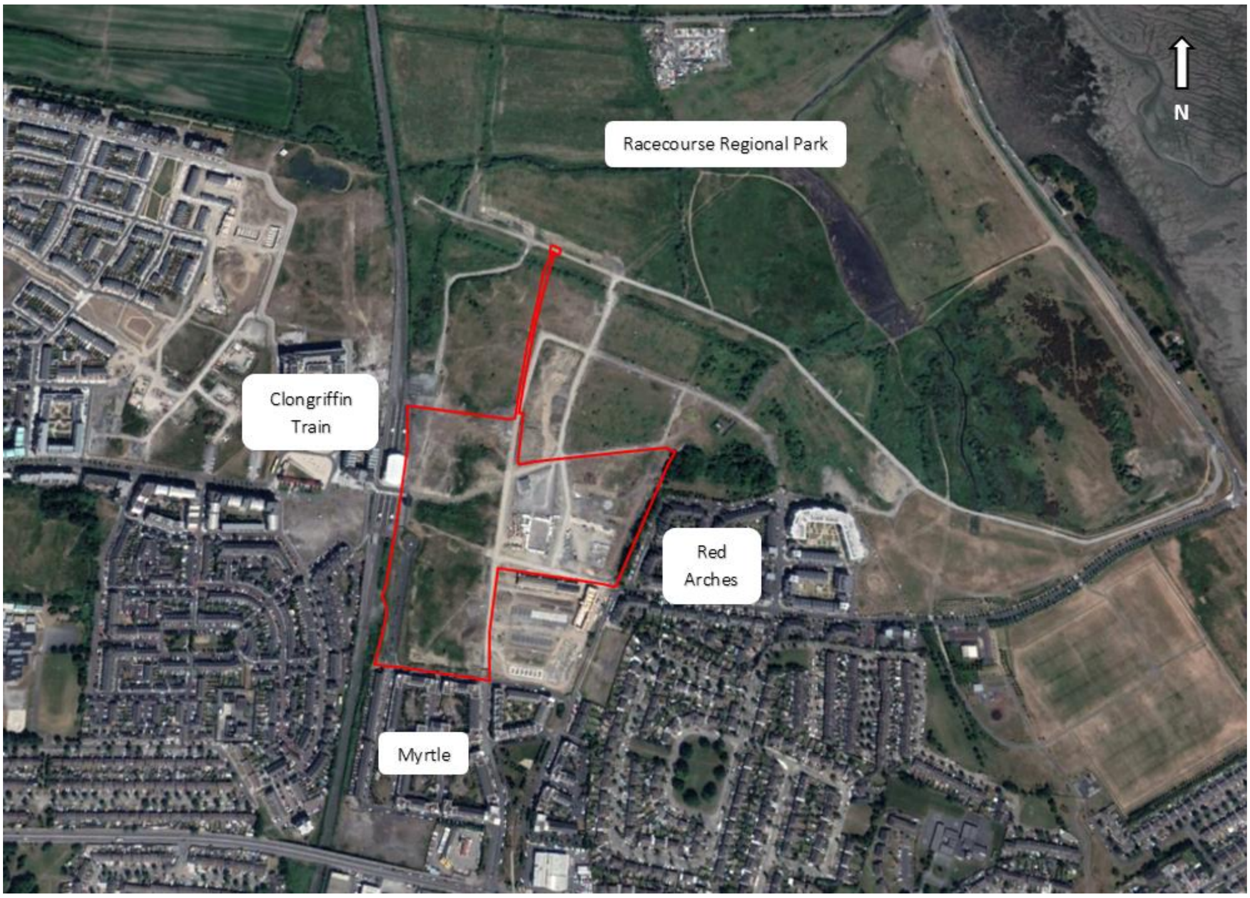
Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project) and the *Architectural Design Statement* submitted with this planning application.

Figure 1.1: Location of Site within Dublin[1] (Site location in red)



[1] EPA Maps (2021). *OpenStreet Maps.*

Figure 1.2: Proposed Red Line Boundary[2]



1.5 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 development or 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 Environmental Impact Assessment Report (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. The EIAR describes the existing environment (baseline); identifies potential impacts of the proposed Project; details any mitigation measures required to reduce or eliminate potential impacts; and predicts any residual impacts. An overview of the EIA process and the steps involved are set out in Table 1.1 below. Further information on the approach to EIA are presented in Chapter 2 (The EIA Process).

[2] Google Earth (2020).

Table 1.1: Overview of the EIA Process

Stage	Description	Status
1. Screening	Is an EIA required? EIA is mandatory for projects of more than 500 residential units in accordance with Class 10b (i) of Part 2 of Schedule 5 of the Planning and Development Regulations 2001-2020. The proposed Project provides for 882 no. residential dwellings (747 no. apartments, 135 no. houses). Thus, the proposed Project requires EIA and the preparation of an EIAR.	Yes
2. Scoping	Informal scoping was carried out through the S247 consultation with Fingal County Council and the SHD pre-application consultation process with Fingal County Council and An Bord Pleanála.	Completed
3. Environmental Impact Assessment	The assessment stage includes: ▪ Collection of the baseline information. ▪ Analysis of the proposed Project. ▪ Assessment of impacts. ▪ Developing mitigation measures. ▪ Setting our requirements for monitoring.	**Current Stage**
4. Review & Decision	The EIAR accompanies the planning application to the competent authority (*i.e.* An Bord Pleanála) for determination of the application.	
5. Monitoring	Implementation and monitoring of the proposed Mitigation Measures.	Next Stage

1.6 Format & Structure of the EIAR

Table 1.2 below sets out the format and structure of this Environmental Impact Assessment Report (EIAR) that has been prepared to allow for ease of presentation and consistency when considering the various environmental factors considered, a systematic structure is used for the main body of this EIAR. A Non-Technical Summary (NTS) of the EIAR accompanies the planning application, refer to Volume 1. 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*[3], which sets out that:

[3] EPA (2017).

'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 (3 no.) 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: NTS	
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 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 Management
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 No.	Description
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 Document for ease of reference.
Volume 3: Appendices	
A8.1 – A18.2	Technical reference information supporting the EIAR chapters.

1.6.1 EIAR Project Team

The EIA was project managed, co-ordinated and produced by Brady Shipman Martin (BSM) with input from the Shoreline Partnership Design Team and various environmental specialist consultants.

The environmental specialists were commissioned for specialist environmental chapters of the EIAR document as required of 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 Directive 2014/52/EU (2014 EIA Directive), expressly requires that the developer must ensure that the EIAR is prepared by competent experts, stating:

> *'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'.*

In compliance with this requirement, and in line with emerging best practice, including with the 2018 *EIA Guidelines for Planning Authorities* and An Bord Pleanála, Table 1.3 provides the names of the competent experts who have prepared each element of the EIAR and lists their qualifications and relevant experience.

Table 1.3: EIAR Project Team and Environmental Specialist

Name	Role	Company	Qualification / Experience
Thomas Burns	EIAR Project Manager	Brady Shipman Martin	**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' experience in EIA.
Pauline Byrne	Planner and Planning Policy	Brady Shipman Martin	**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' experience.
Rebecca Dunlea	EIAR Co-ordination. Population & Human Health and Material Assets Assessment	Brady Shipman Martin	**BA (Hons) MA, MSc (Environmental Consultancy and Project Management)** ▪ Environmental Consultant. ▪ Member of the Chartered Institute of Water and Environmental Management – MCIWEM. ▪ Over 6 years' experience.
Bryan Deegan	Biodiversity Assessment	Altemar Ltd.	**BSc (Hons) in Applied Marine Biology** **MSc in 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' experience.
Paul Conaghan	Soil / Lands / Hydrogeology and Water Assessment	AWN Consulting Ltd.	**BSc MSc** ▪ Member of the International Association of Hydrogeologists. ▪ Over 9 years' experience.
Niamh Nolan	Air Quality and Climate Assessment	AWN Consulting Ltd.	**BSocSci (Hons) in Social Policy and Geography** ▪ Associate Member of both the Institute of Air Quality Management (IAQM) and the Institution of Environmental Science. ▪ Over 4 years' experience.

<table>
<tr><th>Name</th><th>Role</th><th>Company</th><th>Qualification / Experience</th></tr>
<tr><td>Leo Williams</td><td>Noise and Vibration Assessment</td><td>AWN Consulting Ltd.</td><td>BAI MAI PgDip
▪ Member of Institute of Acoustics (MIOA).
▪ Over 5 years' experience.</td></tr>
<tr><td>Chris Kennett</td><td>Landscape and Visual Assessment</td><td>Kennett Consulting Ltd.</td><td>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.</td></tr>
<tr><td>Dr. Clare Crowley</td><td>Cultural Heritage Assessment</td><td>Courtney Deery</td><td>BA (Hons) in 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' experience.</td></tr>
<tr><td>Carlota Álvarez</td><td>Microclimate - Daylight and Sunlight Assessment</td><td>O'Connor Sutton Cronin (OCSC)</td><td>B.Eng. (Hons) in Marine Engineering
▪ Worked on a range of projects from Part L, Overheating and now concentrates on leading the Daylight and Sunlight section of OCSC.
▪ Over 4 years' experience.</td></tr>
<tr><td>Dr. Cristina Paduano</td><td rowspan="2">Microclimate - Wind Assessment</td><td rowspan="2">B-Fluid</td><td>PhD in Mechanical Engineering, with M.Eng and B.Eng in Aerospace Engineering
▪ Chartered Engineer (CEng).
▪ Member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry.
▪ Over 15 years of experience.</td></tr>
<tr><td>Dr. Eleonora Neri</td><td>PhD in Aeroacoustics with M.Sc. and B.Sc. in Aeronautical Engineering
▪ Chartered Engineer (CEng).
▪ Member of Engineers Ireland who specialises in computational fluid dynamics applications for the urban environment and in wind tunnel measurements for the aerospace industry.</td></tr>
</table>

Name	Role	Company	Qualification / Experience
Dr. Arman Safdari			**PhD in Mechanical Engineering, with M.Sc. and B.Sc. in Mechanical Engineering** ▪ CFD Modelling Engineer who specialises in computational fluid dynamics applications. ▪ Expert in airflow modelling, heat and mass transfer and multi-phase flow simulations.
Gordon Finn	Traffic and Transport Assessment	Cronin & Sutton Consulting Engineers	**BA, BAI, MAI, MIEI** ▪ Roads and Traffic Engineer. ▪ Over 7 years' experience.
Chonaill Bradley	Waste Management Assessment	AWN Consulting Ltd.	**BSc (Environmental Science)** ▪ Associate Member of the Institute of Waste Management (AssocCIWM) ▪ Over 7 years' experience.

1.6.2 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.

2 The Environmental Impact Assessment (EIA) Process

2.1 EIA Legislation

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Rebecca Dunlea, Environmental Consultant with Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants. Rebecca holds a BA, MA (Geography) and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

The European EIA Directive 85/337/EEC was introduced in 1985. The Directive along with its three subsequent amendments was eventually codified by Directive 2011/92/EU. The 2011 Directive was further amended by Directive 2014/52/EU. The amending Directive took effect in Ireland on the 16 May 2017, and transposing legalisation[4] came into effect on 1 September 2018.

The EIA Directive aims to provide a high level of protection to the environment and ensures that environmental considerations are taken into account in the preparation of a proposed development or project, with the view to reducing environmental impacts. EIA also includes for public participation in decision-making and thereby strengthens the quality of decisions.

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 Environmental Impact Assessment Report (EIAR). An EIAR is defined in the EIA regulations (Directive 2011/92/EU as amended by Directive 2014/52/EU) as: '*a statement of the effects, if any, which proposed development, if carried out, would have on the environment*'.

In August 2018, the Department of Housing, Planning and Local Government issued the 'G*uidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment'*[5], 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 *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*[6] which sets out that: '*A systematic approach, standard descriptive methods and the use of replicable assessment techniques and*

[4] EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).
[5] DHPLG (2018b).
[6] EPA (2017).

standardised impact descriptions must be adopted to ensure that all likely significant effects are adequately considered and clearly communicated.'

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 during the pre-consenting stage of the Environmental Impact Assessment (EIA) process, that:

- 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 within the EIAR?;
- baseline data collection - establishing a robust baseline of the existing environment on / around the proposed Site. 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 and/or factors that reduce or eliminate any significant environmental impacts identified, which cannot be avoided practically through design;
- consultation - with Statutory Stakeholders, the public and other bodies;
- decision - the competent authority, in this case An Bord Pleanála, decides, taking into consideration the results of consultations, if the proposed Project can be authorised; and
- monitoring - implementation and monitoring of mitigation measures.

In accordance with the requirements of Article 3 of the 2014 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; and

(e) the interaction between the factors referred to in points (a) to (d).

The EIAR has been prepared in accordance with Article 5(1) and Annex IV of Directive 2014/52/EU which stipulates that:

'*A description of the likely significant effect of the project on the environment resulting from, inter alia:*

(a) *the construction and existence of the project, including, where relevant, demolition works;*

(b) the use of natural resources, in particular land, soil. Water and biodiversity , considering as far as possible the sustainable availability of these resources;

(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

(g) the technologies and the substances uses.

The description of the likely significant effects on the [environmental] factors should cover the direct effects and any indirect, secondary, cumulative, transboundary, short- term, medium-term and long-term, permanent and temporary, positive and negative effects of the project'.

Furthermore, Annex III (3) of the amended Directive stipulates:

(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);

(b) the nature of the impact;

(c) the transboundary nature of the impact;

(d) the intensity and complexity of the impact;

(e) the probability of the impact;

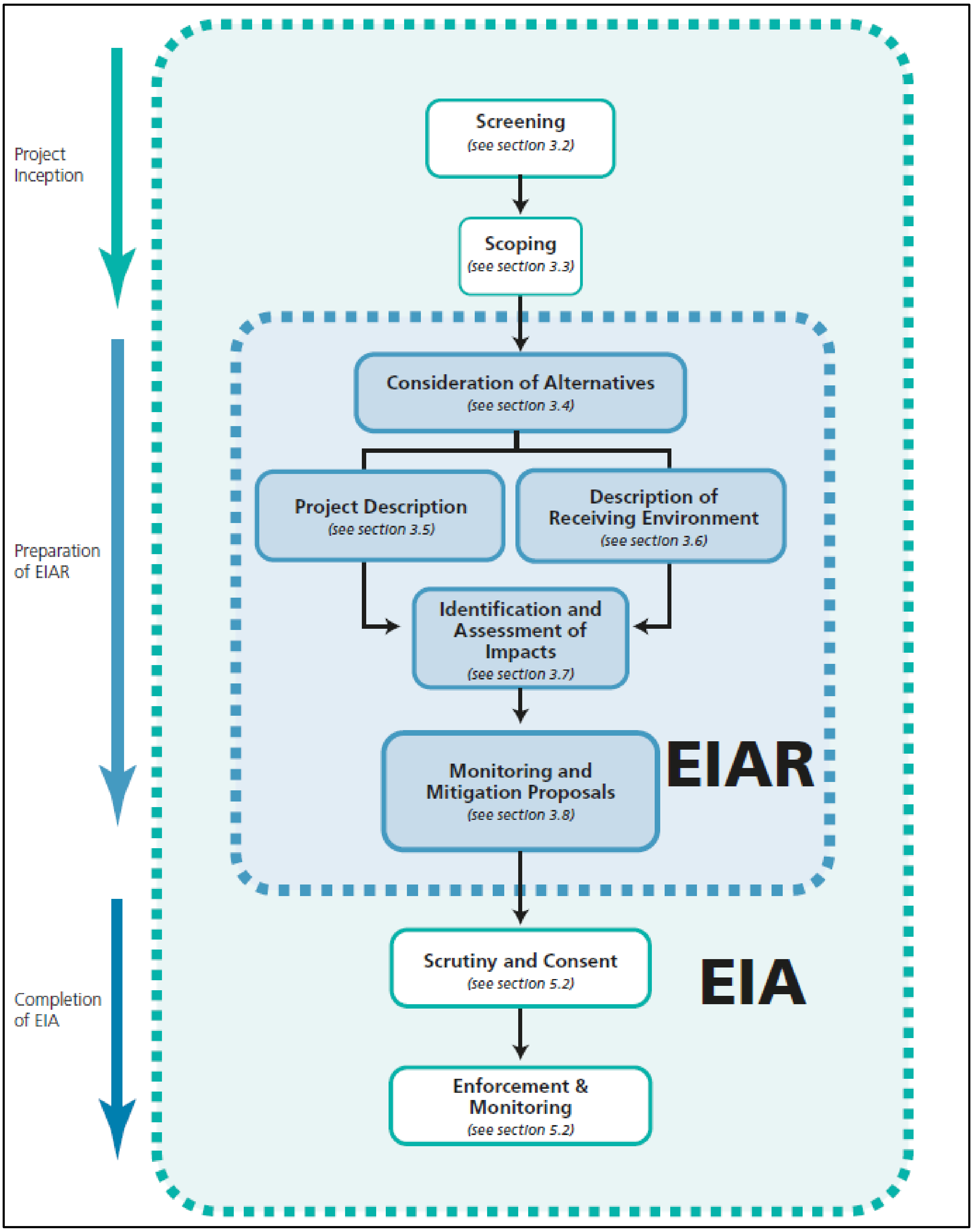
(f) the expected onset, duration, frequency and reversibility of the impact;

(g) the cumulation of the impact with the impact of other existing and/or approved projects;

(h) the possibility of effectively reducing the impact."

This EIAR has been completed fully in accordance with Article 5(1) and Annex IV of Directive 2014/52/EU. The EIA process is summarised in Figure 2.1.

Figure 2.1: The Position of an EIAR within the EIA Process[7]



[7] 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 (2017a). *Environmental Impact Assessment of Projects. Guidance on Scoping*.
- EC (2017b). *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*.
- EU (2014). Directive 2014/52/EC, amending Directive 2011/92/EU on the *Assessment of the Effects of Certain Public and Private Projects on the Environme*nt.
- Planning and Development Act 2000, as amended.
- Planning and Development Regulations 2001, as amended.

In addition to these guidance documents, EU Directives and national legislation relating to the specialist areas (*e.g.* Biodiversity, Surface Water, *etc*.) have been considered under each relevant environmental aspect. Specific guidance are addressed in the individual chapters of this EIAR.

2.3.2 EIA Screening

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

The 2014 Directive specifies the classes of project for which an EIA is required and the information which must be contained within the EIAR. In accordance with *Article 4(1)* of the 2014 Directive, all 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, the national authorities may determine whether an EIA is needed, either on the basis of thresholds / criteria or on a case by case examination.

These Annexes have been transposed into Irish law by the provisions of the *Planning and Development Act 2000-2021* and the *Planning and Development Regulations 2001-2020*. Specifically projects requiring EIA are listed in Part 1 and Part 2 of Schedule 5 of the Planning and Development Regulations 2001-2020.

Schedule 5 (Part 1) of the Planning & Development Regulations 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 development set out in this Part and therefore, EIA is not a mandatory requirement under this provision.

Schedule 5 (Part 2) of the Planning & Development Regulations 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) addresses '*infrastructure projects'* referring to housing and urban developments, and require that the following classes of project, relevant to this 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 882 no. new residential dwellings (747 no. apartments, 135 no. houses) on a total Site area of c. 9.1 hectares (ha), development area is c. 8.89ha, and exceeds the stated threshold set out at Class 10(b)(i) and therefore, EIA is required and an EIAR (this report) accompanies the planning application.

2.3.2.1 Appropriate Assessment (AA)

European sites, also known as the Natura 2000 network, includes Special Areas of Conservation (SAC) and Special Protection Areas (SPA). 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 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[8] (the "*Birds and Natural Habitats Regulations*") and the Planning and Development Act, 2000-2021 (the "*Planning Acts*").

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

> *(3) 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, appropriate assessment is required. Sections 177U of the Planning Acts and Regulation 42 of the Birds and Natural Habitats Regulations require that the AA screening test must be applied to the 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
- an Appropriate Assessment 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.

[8] 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.

A Screening for Appropriate Assessment (AA) Report has been prepared in accordance with the requirements of the Birds Directive, the Habitats Directive, the Planning Acts and the Birds and Natural Habitats Regulations. The screening identified potential for impact on European sites and therefore, an Appropriate Assessment of the proposed Project is required. The findings of the AA are presented in the Natura Impact Statement (NIS) which accompanies 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[9] 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 (FCC) and An Bord Pleanála where key issues to be considered were identified and discussed.

The Scoping process is an iterative process and is an ongoing phase throughout the preparation of the EIAR.

2.4 EIA Consultation

The EIAR document enables the competent / consent authorities to reach a decision on the acceptability of the proposed Project in the full knowledge of the project's *likely significant impacts* on the environment, if any.

Decisions are taken by the competent / consent authorities 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[10] and in the *Strategic Housing Development Pre-Application Consultation (Guidance for Prospective Applicants)*[11]. Further information on the Consultation Process is provided in Chapter 6 (Consultation).

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[9] EC (2001).
[10] *Planning and Development (Strategic Housing Development) Regulations 2017. S.I. No. 271 of 2017.*
[11] An Bord Pleanála (2017).

3 Planning and Development Context

3.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Rebecca Dunlea, Environmental Consultant of Brady Shipman Martin (BSM), with assistance from Pauline Byrne, Head of Planning and Partner of Brady Shipman Martin, Planning, Landscape and Environmental Consultants.

Rebecca holds a BA, MA (Geography) and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

Pauline holds a BSc (Mgmt.), Adv. Dip Marketing and Master Regional & Urban Planning (MRUP), and has over 20 years' experience.

This chapter sets out the legislative context governing the planning and development of the proposed Project. This includes a review of the planning policy context at a national, regional and local level and other relevant statutory and non-statutory planning documents.

National and regional plans and policies inform the policies and objectives of local authority Development Plans and of Local Area Plans (LAP), which set the local statutory planning context.

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 involves the alteration of an existing Section 34 planning permission (FCC Reg. Ref.: 16A/0412, ABP Reg. Ref.: PL06F.248970 (and as amended under F20A/0258 and F21A/0046), within the meaning of section 3(d) of the SHD 2016 Act, which complies with section 3(a) of the Act in that it relates to the development of over 100 residential units (*i.e.* 882 no. units) on land zoned for a mixture of residential and other uses, which also meets the requirements of sections 3(i) and 3(ii) of the Act, whereby the total non-residential gross floor area is 3,314sqm).

3.2 National Planning Context

3.2.1 National Planning Framework - Project Ireland 2040

The *National Planning Framework (NPF) - Project Ireland 2040*[12] 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. As a result 112,000 households are expected to have their housing needs met in a social housing home

[12] DHPLG (2018a).

over the next decade. To achieve the objective of compact growth, 40% of future housing delivery is to be delivered within and close to the existing footprint of built-up areas.

The NPF - Project Ireland 2040 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. The NPF 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.'*

National Policy **Objective 4** in this regards states:

> *'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.'*

National Policy **Objective 11** in this regards states:

> *'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.'*

National Policy **Objective 13** in this regards states:

> *'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 also responding to the existing strong demand in the area and in a location that is highly accessible to both existing local facilities and public transport routes to the Dublin City and as such development as proposed with height and density in exceedance of the Local Area Plan.

The proposed Project is well aligned with the NPFs policies, in that the proposed Project will provide a large number of additional well-designed, high quality and liveable residential units within the Dublin Metropolitan Area.

Table 3.1 below provides a working list of some of the other key plans / planning documents of relevance to the future development of the Site, which have been considered by the relevant EIA specialist. The proposed Project complies with the relevant objectives in the key planning documents listed below.

Table 3.1: Key Plans / Planning Documents

Plan Name	Description
Eastern and Midland Regional Assembly - Regional Spatial & Economic Strategy (RSES)	The Regional Spatial and Economic Strategy is a strategic plan and investment framework to shape the future development of the Eastern & Midland Region to 2031 and beyond. The Site is located with the Dublin Metropolitan Area, as designated by the RSES. The Metropolitan Area Strategic Plan (MASP) which is part of the RSES seeks to focus on a number of large scale strategic sites, based on key corridors that will deliver significant development in an integrated and sustainable fashion. Refer to Section 3.3.1.
Rebuilding Ireland - Action Plan for Housing and Homelessness (2016)	*Rebuilding Ireland- Action Plan for Housing and Homelessness* (2016), with the objective to double the annual level of residential construction to 25,000 homes and deliver 47,000 units of social housing in the period to 2021, while at the same time making the best use of the existing stock and laying the foundation for a more vibrant and responsive private rented sector.
Urban Development and Building Heights - Guidelines for Planning Authorities (2018)	The *Urban Development and Building Height Guidelines - Guidelines for Planning Authorities* (2018) set out the national planning policy guidelines on building heights in urban areas in response to specific policy objectives set out in the National Planning Framework and Project Ireland 2040. These Guidelines state that it is Government policy to promote increased building height in locations with high quality public transport services.
Sustainable Urban Housing: Design Standards for New Apartments; Guidelines for Planning Authorities (2018, & updated 2020)	The *Sustainable Urban Housing Design Standards for New Apartment* (2018 and updated 2020) provides for guidance on apartment developments in response to the National Planning Framework and Rebuilding Ireland. A key component of the guidelines is the acknowledgement of the importance of strategic sites in existing urban areas in close proximity to existing public transport facilities.
Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009)	The *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas* aim to ensure the sustainable delivery of new development throughout the country. These Guidelines also provide guidance on the core principles of urban design when creating places of high quality and distinct identity. These Guidelines recommend that planning authorities should promote high

Plan Name	Description
	quality design in their policy documents and in their development management process. In this regard, these Guidelines are accompanied by the *Urban Design Manual*, discussed below.
Urban Design Manual - A Best Practice Guide (2009)	The *Urban Design Manual - A Best Practice Guide* sets out a series of 12 criteria which it recommends should be used in the assessment of planning applications and appeals.
Delivering Homes, Sustaining Communities (2007)	The Department of Environment, Heritage and Local Government (DEHLG) policy statement, *Delivering Homes Sustaining Communities – Statement on Housing Policy'*, provides the overarching policy framework for an integrated approach to housing and planning. The statement 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. Sustainable neighbourhoods are areas where an efficient use of land, high quality design, and effective integration in the provision of people want to live in.
Design Manual for Urban Roads and Streets (DMURS) (2013)	The *Design Manual for Urban Roads and Streets*, sets out design guidance and standards for constructing new and reconfiguring existing urban roads and streets in Ireland. It also outlines practical design measures to encourage more sustainable travel patterns in urban areas.
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: reduce overall travel demand; maximise the efficiency of the transport network; and reduce reliance on fossil fuels. 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%.

Plan Name	Description
	▪ 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.
Guidelines for Planning Authorities on The Planning System and Flood Risk Management (including the associated 'Technical Appendices') (2009)	The *Planning System and Flood Risk Management Guidelines* (2009), were published by the Minister for the Environment, Heritage & Local Government under Section 28 of the Planning & Development Act 2000 (as amended). These Guidelines require the planning system at all levels to avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level without increasing flood risk elsewhere.
Childcare Facilities - Guidelines for Planning Authorities (2001)	*Childcare Facilities Guidelines for Planning Authorities* (2001) provide a framework to guide both local authorities in preparing development plans and assessing applications for planning permission, and developers and childcare providers in formulating development proposals. These Guidelines state that the 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.*"
Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (2009)	The Department of Environment, Heritage and Local Government (DEHLG) guidance *National Guidance for Planning Authorities on Appropriate Assessment plans and projects in Ireland* (2009) is intended to assist and guide planning authorities in the application of Article 6(3) and 6(4) of the Habitats Directive as it relates to their roles, functions and responsibilities in undertaking Appropriate Assessment of plans and projects. It applies to plans and projects for which public authorities receive an application for consent, and to plans or projects which a public authority wishes to undertake or adopt.

Plan Name	Description
Climate Action Plan (2019)	The *Climate Action Plan* (2019), outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlines the various broad-scale measures required for each sector to achieve ambitious decarbonisation targets. The *Climate Action Plan* 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.

3.3 Regional Planning Context

3.3.1 Eastern and Midland Regional Assembly - Regional Spatial and Economic Strategy (RSES)

The Regional Spatial and Economic Strategy is a strategic plan and investment framework to shape the future development of the Eastern and Midland Region to 2031 and beyond. The region is the smallest in terms of land area but the largest in population size and is identified as the primary economic engine of the state.

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'*.

The RSES is underpinned by key cross-cutting principles that reflect the three pillars of sustainability; *Social, Environmental and Economic*, and expressed in a manner which best reflects the challenges and opportunities of the Region. The Plan identifies that the central need is for the RSES to be people focussed, as '*quality of life*' encapsulates strong economic output and stability, good environmental performance and a good standard of living for all.

The Site is located with the Dublin Metropolitan Area, as designated by the RSES. The Metropolitan Area Strategic Plan (MASP), which is part of the RSES seeks to focus on a number of large scale strategic sites, based on key corridors that will deliver significant development in an integrated and sustainable fashion.

The key RSES Regional Policy Objectives (RPOs) relating to the proposed Project include:

> RPO 5.3: *Future development in the Dublin Metropolitan Area 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.*

> RPO 5.4: *Future development of strategic residential development areas within the Dublin Metropolitan area 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'.

RPO 5.5: *Future residential development supporting the right housing and tenure mix within the Dublin Metropolitan Area 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.*

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.*

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.*

RPO 9.4: *Design standards for new apartment developments should encourage a wider demographic profile which actively includes families and an ageing population.*

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)'.*

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.*

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.

It is submitted that the proposed Project on existing zoned lands will adhere with the policies and objectives of the RSES. Furthermore, the proposed Project will contribute to the provision of additional high-quality and high-density residential units and employment opportunities within the Dublin City and suburbs area.

3.4 Local Level

3.4.1 Fingal Development Plan 2017-2023

The Site is located within the administrative area of Fingal County Council (FCC) and subject to the Fingal Development Plan 2017-2023 (the '*Development Plan*') (including Variations to the Development Plan), and the Baldoyle-Stapolin Local Area Plan (LAP) 2013 (as extended).

The Development Plan sets out the Council's policies and objectives for the development of the county over the Plan period. It seeks to develop and improve, in a sustainable manner the social, economic, environmental and cultural assets of the county.

The Development Plan has been informed by the former Regional Planning Guidelines (RPGs), the RSES, and the environmental sensitivities of the county.

3.4.1.1 Core Strategy

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 Fingal 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.*

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 DCC and FCC areas, at the northern edge of Dublin City).

In the Development Plan, Baldoyle is considered a *Consolidation Areas within the Metropolitan Area.* 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*.'

> Objective SS16*: 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.*

Under the Development Plan, one of the Baldoyle Development Plan Objectives is:

> ***Objective BALDOYLE 3*** - *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).*

In this regard, it is noted that the proposed Project will provide a well-designed, high quality and a higher density mixed-use development on appropriately zoned lands which is highly accessible and well served by public transport (bus and DART), thus further supporting the delivery of planned sustainable mixed-use residential development in Baldoyle.

3.4.1.2 Zoning Objective

The Site is zoned RA '*new residential*'. The objective of RA zoned lands is to '*provide for new residential communities subject to the provision of the necessary social and physical infrastructure,* with a central area in the lands with a development objective of LC – *to provide for a local centre*.' Given the primary purpose of the subject application is to provide for residential uses the proposed Project is clearly consistent with the land-use zoning.

Further detail provided by the Development Plan states:

> *'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.'*

3.4.2 Baldoyle-Stapolin Local Area Plan (LAP) 2013 (as Extended)

Adopted in May 2013 by FCC, the County Council Members, having considered the Chief Executive's Report at a Council meeting on the 12 March 2018 decided to approve the extension of the life of the Baldoyle-Stapolin LAP 2013 for a further period of 5 years from the 12 May 2018 to the 11 May 2023[13].

The LAP sets out a detailed strategy for the lands, the key consideration in relation to this development proposal include:

- Zoning and Objectives.
- Vision, Themes and Objectives.
- Green Infrastructure.
- Transportation and Movement.
- Residential Development & Density: including Residential density range.
- Heights, Urban Design.
- Sequencing and Phasing of Development.

Refer to the *Architectural Design Statement* and the Planning Report submitted with this planning application.

[13] FCC (2018).

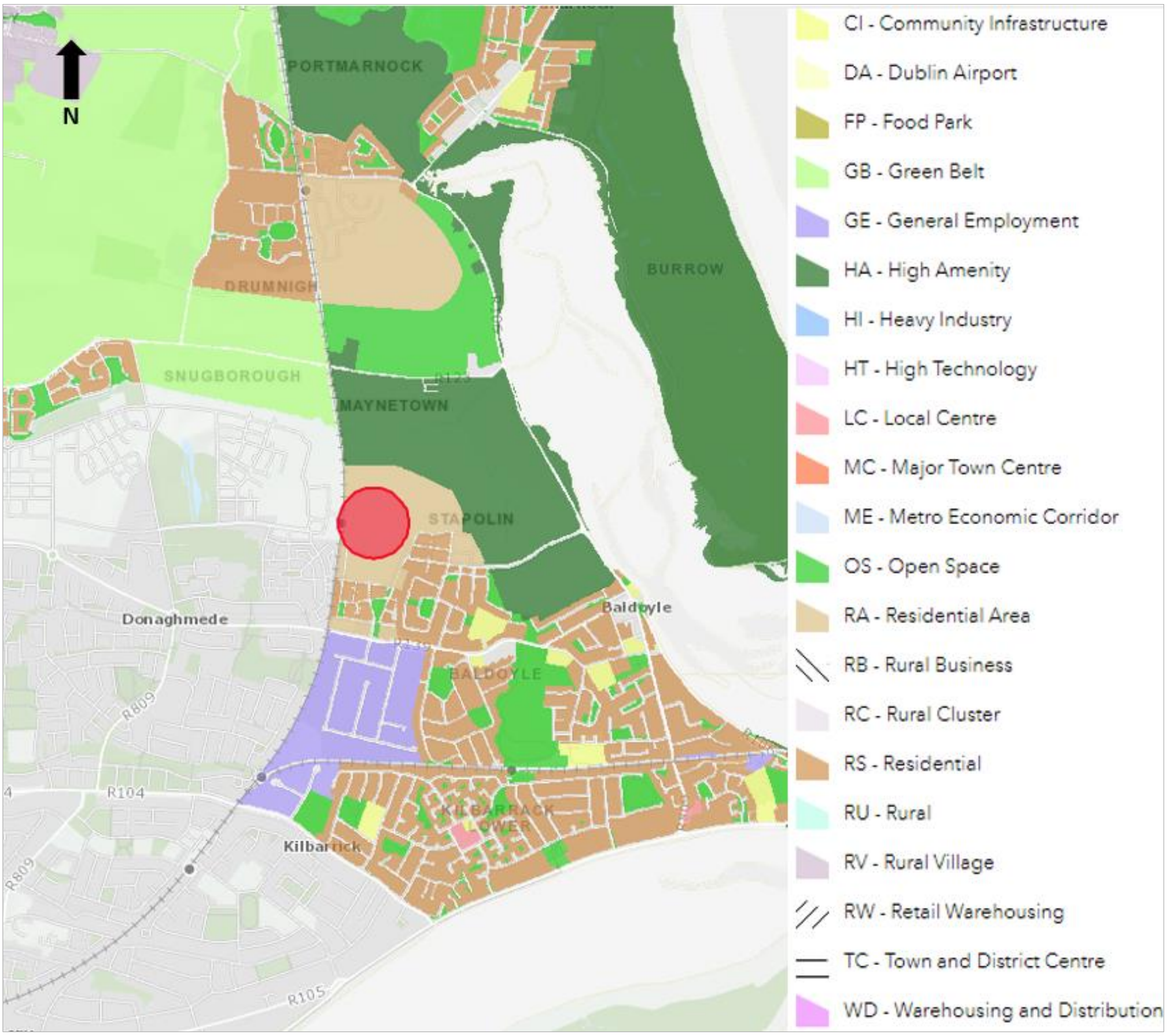
3.4.2.1 Zoning and Objectives

The lands are zoned Objective RA in the Fingal 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,* with a central area in the lands with a development objective of LC – *to provide for a local centre.* This zoning and objective is reflected in the Baldoyle-Stapolin Local Area Plan, where this central area is designated 'Village Centre' with '*Village Centre - Civic Space'* designated within the 'Village Centre' area.

The LAP zoning is consistent with the Development Plan. The proposed Project which comprises residential units, residential tenant amenity, retail / café / restaurant, pharmacy, medical centre, crèche, gym and public realm are permitted in principle on the Site. Refer to Chapter 5 (Description of the Proposed Project) for further details.

Given the primary purpose of the subject application is to provide for residential uses, with the objective to provide a 'Local Centre' or 'Village Centre', the proposed Project is clearly consistent with the land-use zoning.

Figure 3.1: Zoning Objectives as part of the Fingal Development Plan 2017-2023 - Extract from Sheet No. 10[14] (Site location in red)



The LAP sets out the following objectives for the lands:

Map Based Objectives:

1. *Facilitate and encourage community facilities which allow for shared and multi-purpose use and adaptability within the village centre, or for non-commercial or small scale community facilities other agreed locations may be considered subject to demand and resources.*
2. *Provide for at least one crèche facility within the village centre area as part of the phasing requirements set out in Section 6 and as required by Section 4E of the Local Area Plan.*

[14] FCC (2017).

3. *Require high quality design and finish to any development at these important gateway nodes to the LAP lands.*
4. *Provide for a public park and sensitively designed retirement village subject to screening for assessment under the Habitats Directive as per Local Objective 469 in the 2011-2017 Fingal Development Plan or as may be revised in any future Development Plan.*
5. *Ensure that key services such as local and primary health care facilities, public house, and crèche are provided within the village centre to ensure the appropriate mix of community services and facilities, the vitality of the village centre, and to encourage the use of sustainable modes of transport.*
6. *Facilitate an alternative site readily accessible from Grange Road for a medical/primary care centre, in line with HSE requirements. Such a site should only be considered where it can be demonstrated that a medical / primary care centre cannot be delivered in the village centre within a reasonable timeframe (not to exceed 3 years from date of adoption of this LAP).*
7. *Facilitate the provision of changing facilities for clubs and teams using the pitches in Racecourse Park and meeting space for community use within this existing building without any undue delay.*
8. *Facilitate an alternative site to the Grange Road site for an urban type school as part of the village centre's mixed-use development on the northern section of the village centre, subject to the requirement for such being indicated by the Department of Education and Skills within the next Capital Programme for Schools (i.e. the successor document to the 2012-2016 Capital Investment Programme for Schools).*
9. *Provide for a Multi-Use Games Area (MUGA) or a small all-weather training facility similar in scale to a MUGA in the vicinity of the changing rooms at the existing active recreational facilities within Racecourse Park subject to screening for Appropriate Assessment.*

3.5 Relevant Planning History

3.5.1 Overall Site

There is an extant permission on the subject lands, referenced further below, and an extant permission for development on the adjacent Growth Area No. 2 (GA2) lands, also referenced further below.

In addition, the wider Clongriffin area has had a significant amount of planning activity. Notably this includes two large scale recently permitted SHDs to the west of the Site within the administrative area of Dublin City Council, set out further below.

FCC Reg. Ref. F16A/0412 (An Bord Pleanála Ref. PL06F.248970)

The extant permission on the subject lands comprises approximately 546 no. residential units (385 no. apartments and 161 no. houses) c. 63 units / ha and a village centre comprising c. 1,917sqm 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 1.5ha would be provided at The Haggard to the north-east of the main part of the site. The permission was granted on appeal 7 July, 2017 and has a ten year duration.

This permission has been further amended as per Planning Reg. Ref. F20A/0258 and Reg. Ref. F21A/0046 for minor alterations to permitted residential units. These amendments resulted in a reduction of 2 no. residential units to an overall 544 no. residential units (385 no. apartments and 159 no. houses).

3.5.2 Applications of Note

FCC Reg. Ref. F11A/0290 (/E1), 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 to 25 May 2023 (FCC Reg. Ref. F11A/0290/E1) on lands at Growth Area No. 2, as per Local Area Plan. FCC initially refused the application however An Bord Pleanála subsequently granted permission following appeal. The development entailed 400 no. 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. The development vary from 3-5 storeys in height (in sectors 42 and 43) rising to between 3 and 7 storeys (in sectors along the northern boundary) and an 8 storey feature (in sector 56).

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.

SHD ABP-305319-19

A planning permission for a strategic housing development at Clongriffin, Dublin 13, on plots known as 4, 5, and 14. The development consists of 500 no. apartments (235 no. residential, 265 no. build to rent), c. 200 units / ha, crèche and all associated site works in blocks of 2-8 storeys in height. Application included EIAR. Screened out for AA.

4 Consideration of Alternatives

4.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Rebeca Dunlea, Environmental Consultant of Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants and with input from the project architects - Henry J Lyons (Architecture and Interiors).

Rebecca holds a BA (Geography), MA (Geography) and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

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, pursuant to Article 5(1)(d) of the 2014 EIAR Directive and Annex IV.

This chapter provides an overview of alternative designs that have been considered for the Site at Baldoyle, Dublin 13. This chapter also sets out the reasons why the proposed design and layout was chosen and provides details of alternative schemes considered throughout the design process. In addition, this chapter discusses alternative locations, alternative processes and alternative mitigation measures associated with the proposed Project.

It is noted that the proposed Project will consist of alterations to the development previously permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

4.2 Legislative Context

Annex IV (2) of the amended EIA Directive (2014/52/EU) 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) that;

> *'Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least':*

And Article 5 (1) (d):

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

Schedule 6 of the Planning and Development Regulations, 2001 (as amended) sets out the information which is to be contained in an EIAR and Part 1 (d) of Schedule 6 states that the following shall be included:

> *'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 Draft EPA 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 Draft EPA Guidelines states;

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

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

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 as outlined in this EIAR. Refer to Chapter 5 (Description of the Proposed Project) for the full project description.

Alternatives may be described at various levels:

1. 'Do-Nothing' Alternative.

2. Alternative Locations.
3. Alternative Designs / Layouts.
4. Alternative Processes.

It should be noted, that the Site of the proposed Project is on land which is zoned Objective RA '*new residential'*, in the Fingal Development Plan 2017-2023 (the '*Development Plan'*). Objective RA 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*.

The land use zoning in the Baldoyle-Stapolin Local Area Plan 2013 (as extended) is consistent with the Development Plan.

The proposed Project will provide an appropriate form of high quality residential development for this zoned Site (partly undeveloped and historically greenfield in nature and partly a temporary construction compound associated with on-going development further south).

The Site does not contain any Protected Structures or any conservation designations. Given the primary purpose of this planning application is to provide for residential uses (in addition to Local Centre mixed uses) the proposed Project is clearly consistent with the land-use zoning.

The Planning Report[15] submitted with this planning demonstrated that the proposed Project is fully in accordance with recent Government guidance in relation to the delivery of apartment developments, *Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities*[16], Fingal Development Plan 2017-2023, the Baldoyle-Stapolin Local Area Plan 2013 (as extended), and with the intent of the *Urban Development & Building Heights Guidelines*[17], and with the proper planning and sustainable development of the area.

Pursuant to Section 3.4.1 of the Draft Environmental Protection Agency (EPA) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017), the consideration of alternatives also needs to be cognisant of the fact that *'in some instances some of the alternatives described below will not be applicable - e.g. there may be no relevant 'alternative location'*.

[15] BSM (2021).
[16] DHPLG (2020).
[17] DHLGH (2018c).

4.3.1 ‘*Do*-Nothing’ Alternative

It is considered that a ‘*do-nothing’* scenario represents an unsustainable and inefficient use of these strategically located in the RA ‘*new residential’* zoned lands. The Site would continue to remain partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development further south) and would represent an inefficient use of scarce urban zoned land.

A ‘*do-nothing’* scenario would mean that Objective SS01 and Objective SS16 of the Development Plan would not be achieved. Refer to Chapter 3 (Planning & Development Context) for full details on the planning context and zoning objectives.

The suitability of the lands for development, *i.e.* located on the edge of the urban extent of Dublin City and adjacent to frequent public transport and good quality road infrastructure, were also key considerations.

The suitability of the lands for development as proposed (RA zoned - ‘*provide for new residential communities subject to the provision of the necessary social and physical infrastructure*’) within an area which has capacity for SHD.

Given the primary purpose of the subject application is to provide for residential uses, the proposed Project is clearly consistent with the land-use zoning.

4.3.2 Alternative Locations

The lands are zoned Objective RA 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. This area, known as The Coast, includes the existing residential communities of Myrtle and Red Arches.*

In addition the proposed Project consists of alterations to residential development previously permitted on the lands at this location under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The overarching vision of the Applicant (the landowner) and Shoreline Partnership Design Team since the outset of this project was to develop a high quality residential scheme on appropriately zoned lands. Having regard to the zoning objectives of the Site (*provide for new residential communities subject to the provision of the necessary social and physical infrastructure)*, and the fact that the

Development Plan facilitates high-density development at this location, which accords with national policy, alternative locations were not considered further.

4.3.3 Alternative Designs & Layouts

During the design process for the proposed Project a range of design / layout iterations were considered for the Site and the lands already have permission for a residential scheme of 544 no. residential units and related development.

The design, layout, density and scale of the proposed Project has had regard to its setting on the edge of the urban extent of Dublin City, close to Clongriffin and in an area well served by public transport.

The proposed layout and design have also been positively influenced by the Baldoyle-Stapolin LAP 2013 (as extended), the permitted development[18] and the existing boundary conditions including the DART / railway line to the west and existing residential areas (Myrtle and Red Arches) to the south and east.

The key considerations which influenced the design of the proposed Project were as follows:

- The opportunity to connect the adjoining fragmented housing developments (The Myrtles and Red Arches) in the Baldoyle - Stapolin LAP area to each other and to existing services and proposed amenities.
- The need to promote sustainable development and to consider higher density proposals that consider different types and sizes of residential units, to cater for a range of people and households types.
- To create character areas which are diverse yet coherent in line with the Baldoyle - Stapolin LAP.
- The need to provide sustainable neighbourhoods, by including residential tenant amenities, crèche and public amenity and open space.
- The need to provide suitable social infrastructure and other support facilities in the neighbourhood.

The development proposals for the Site were the subject of detailed discussions with Fingal County Council and formal Section 247[19] consultations with Fingal County Council including with Planning,

[18] under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).
[19] Planning and Development Act 2000, as amended

Roads & Traffic, Water and Drainage, Parks departments, prior to the finalisation of the proposed Project.

Development proposals for the Site were also subject to separate SHD pre-application tri-partite consultations with An Bord Pleanála and Fingal County Council (Sept. 2020), where the design and layout of the proposed Project was reviewed and comments issued including in relation to height and density noting "*need to develop at a sufficiently high density to provide for an acceptable efficiency in serviceable land usage given the location of the site within the Dublin Metropolitan area, its proximity to Clongriffin DART station and to Baldoyle with its established social and community services*" (ABP-307288-20, Opinion, Oct. 2020).

The following alternative layouts and designs have been considered.

4.3.3.1 Alternative Design 1 - the Permitted Development

The development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan (LAP) 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The density of the permitted development is 63 units per hectare.

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). Ninety-nine residential units in Blocks c4, C5 and Block C6 (as identified in amendments F20A/0258 and F21A/0046) from the permitted development are already constructed or are under construction and these have been excluded from the current application area, refer to Figure 4.1. Therefore, of the 544 no. permitted units, only 445 no. are located within the subject application area.

Figure 4.1: Alternative Design Layout 1 - Permitted (area within approx. application boundary)

4.3.3.2 Alternative Design 2 - Pre-Application Design / Layout

Alternative Design 2 will provide for 748 no. new residential dwellings (597 no. apartments, 151 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, 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, refer to Figure 4.2. The density proposed is 85 units per hectare.

Figure 4.2: Pre-Application Design / Layout with Height Strategy

4.3.3.3 Alternative Design 3 - Proposed Project (as being submitted to An Bord Pleanála)

The proposed Project 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 refer to Figure 4.2. The density proposed is 99 units per hectare.

The application area extends beyond the area of the previously permitted development to provide the full extent of Stapolin Square, new access to Clongriffin train station through the Square, new apartment blocks D1, D2, D3 to the north of the Square, and a bus ramp to the train station.

Figure 4.3 Alternative Design 3 - Application Design / Layout

4.3.4 Alternative Process

The proposed Project provides in excess of 100 no. residential units, therefore it is mandatory that the planning application is lodged as a Strategic Housing Development Planning Application to An Bord Pleanála, under the *Planning and Development (Housing) and Residential Tenancies Act 2016*.

Therefore, alternative processes are not relevant to this EIAR and excluded from further consideration.

4.3.5 Alternative Mitigation Measures

The mitigation measures outlined throughout the various EIAR chapters relate to the proposed Project and are appropriate for the proposed Project, therefore alternative mitigation measures excluded from further consideration in this chapter.

4.4 Assessment of Alternatives

Alternatives 2 and 3 increase the proposed Project height, and hence density in areas of the scheme, particularly around Stapolin Square adjoining Clongriffin train station. This increase in height and density is more localised in Alternative 2 and more transitional in Alternative 3. While the permitted scheme delivers 445 no. (within application area) at a density of 63 units / hectare, this increases to 748 no. units at 85 units / hectare in Alternative 2 and to 882 no. units at 99 units / hectare in Alternative 3.

It is considered that Alternative 3 best achieves the objectives of the Government guidelines - *Urban Developments and Building Heights, Guidelines for Planning Authorities*20 and the *Sustainable Urban Housing: Design Standards for New Apartments; Guidelines for Planning Authorities*[21], in maximising delivery of residential units at an appropriate location and in a sustainable manner.

Given the emerging city location and high quality transport connectivity it is considered that Alternative 2 and 3 are also appropriate in terms of height and positively respond to Government guidelines - *Urban Developments and Building Heights, Guidelines for Planning Authorities* and the height aspirations as set out in the LAP for the Site. Alternative 3 provides for an improved transition of height from the 2, 3 and 4 storey surrounds to the higher core around Stapolin Square. It is noted that similar or higher densities and heights are also permitted and under construction at Clongriffin to the immediate west of the railway and the site.

4.4.1 Environmental Effects

Given that there is no material increase in site development area, it is considered that all three alternative designs / layouts have similar potential environmental effects on **human health, biodiversity, soils, geology, hydrogeology, surface water, noise and vibration, air quality, cultural heritage**, **waste** and **interactions**, and therefore all of the alternatives are considered *neutral* in terms of consideration of alternatives.

[20] DHPLG (2018c, updated 2020).
[21] DHPLG (2018d, updated 2020).

Similarly, Irish Water has confirmed that there is existing capacity in terms of **potable water** and **wastewater infrastructure** to serve Alternative 3 (the greatest number of units), and as such these environmental aspects are also considered *neutral* in terms of consideration of alternatives.

Given national, regional and local planning policy and need for the delivery of residential units Alternative 3 is considered the be the *most positive / preferred option* in terms of maximising delivery of residential units, whilst maintaining a high quality of amenity and open space provision in an appropriate location for delivery of such development. Maximising units on appropriately located, zoned and connected lands also reduces pressure for such development on other potentially less appropriately located lands and therefore, provides for enhanced sustainable development as a whole. Therefore, Alternative 3 is considered to be the *most positive / preferred option* in terms of **population** and **climate.**

All three alternatives utilise the same site area and therefore Alternative 3 is considered to be the *most positive / preferred option* in terms of maximising use of **land** (and **material assets (utilities)**) that is appropriately located, serviced and zoned for development.

Given the location of the site adjacent to the railway corridor, there is no material change in proposed overall number of parking spaces between the 3 alternatives. There is increased provision of cycle parking in Alternative 2 and Alternative 3, however, the alternatives are considered *neutral* in terms of **traffic and transportation**.

Alternatives 2 and 3 provide for increased height at the site, however previously permitted development at Clongriffin (ABP 305316) also provides for higher 10 to 14 storey development, and the area has the visual capacity to successfully integrate such development. Carefully located taller buildings also have the potential to define and enhance the development edge of the city in this area and to define the context of Clongriffin rail station. As such Alternatives and 3 and are considered, the *most positive / preferred option* in terms of **landscape and visual aspects**, however, Alternative 3 provides for better transition between different development heights.

4.5 Conclusion

As a result of a detailed design process involving a number of design iterations, a significant number of design team meetings and subsequent feedback from FCC and An Bord Pleanála, it is considered that Alternative 3 presents the optimum arrangement in terms of design, layout and height whilst also protecting the residential amenity of the neighbouring developments. Alternative 3 has been selected as the preferred development alternative for the Site.

5 Description of the Proposed Project

5.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Rebecca Dunlea, Environmental Consultant with Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants. Rebecca holds a BA, MA (Geography) and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

This chapter describes the Site and surrounds, the need for the Project, and the characteristics of the proposed Project, together with the proposed design parameters. In accordance with Article 5(1)(a) of the 2011 Directive as amended by Directive 2014/52/EU the description of the proposal should comprise

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

This description sets the basis against which the specialist assessments presented in this EIAR have been undertaken.

5.2 Background to the Site

5.2.1 Site History & Current Site Use

There is an extant permission on the Site, and an extant permission for development on the adjacent Growth Area No. 2 (GA2) lands. Refer to Section 3.5.

The Site would continue to remain partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development further south), with the exception of a network of access roads traversing the land. Refer to Figure 5.1.

5.2.2 Site Location & Surrounding Area

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha.

The Site is on the edge of the urban extent of Dublin City, but is within the administrative area of Fingal County Council (FCC) adjacent to the Dublin City Council (DCC) administrative boundary at Clongriffin to the west.

The Site is bound by the Dublin-Belfast / DART train line to the west and Clongriffin train station. The Site is also bound by existing residential areas at Myrtle and Red Arches to the south and east respectively.

The undeveloped lands of Baldoyle-Stapolin Growth Area No. 2 (GA2) and Growth Area No. 3 (GA3) lie directly to the north and north-east of the Site. Baldoyle Racecourse Park is located further to the north and east of the Site and the Baldoyle Estuary is further east beyond the R106 Coast Road.

Figure 5.1: Proposed Red Line Boundary[22]

The lands surrounding the western, southern and eastern boundaries of the Site are predominately residential in nature. To the north and north-east of GA2 and GA3 is an area designated as 'high amenity' comprising partially of open fields and areas associated with the Baldoyle Estuary. FCC will deliver 'Baldoyle Racecourse' regional park as part of the stated objectives of the Development Plan and Baldoyle-Stapolin Local Area Plan (LAP) 2013 (as extended).

[22] Google Earth (2020).

The Site is located immediately adjacent to a high frequency public transport hub enabling connections with the wider Dublin Area. The Site is within a 5-minute walk of Clongriffin train station on the DART Line. Rail services operating to and from this stop connect the proposed Project directly to Howth and Malahide (and beyond to north county Dublin) in 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, are served by two bus routes (29A and 15) operated by Dublin Bus. It is also planned that Clongriffin will be served by a future upgraded BusConnects route[23].

The Site is within a short walking distance of the Baldoyle Industrial Estate providing a large amount of employment and commercial activity.

5.2.3 Site Specific Flood Risk Assessment (SSFRA)

A *Site Specific Flood Risk Assessment (SSFRA)* was prepared by Cronin & Sutton (CS) Consulting Engineers for the proposed Project to comply with current planning legislation and forms part of this planning application. The Flood Risk Management (FRM) Guidelines require a SSFRA to '*gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposal*'.

The objectives of the SSFRA is to inform the planning authority regarding flood risk for the Site. The SSFRA relates only to the Site located at Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13. The SSFRA report follows the requirements of *'The Planning System & Flood Risk Management - Guidelines for Planning Authorities'*[24]*.* The FRM Guidelines propose that a *Justification Test* be applied to assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk.

The 'Study Area' is subject to a number of potential flood risk mechanisms described below (as an inland Site, the Study Area is not subject to coastal flood risk).

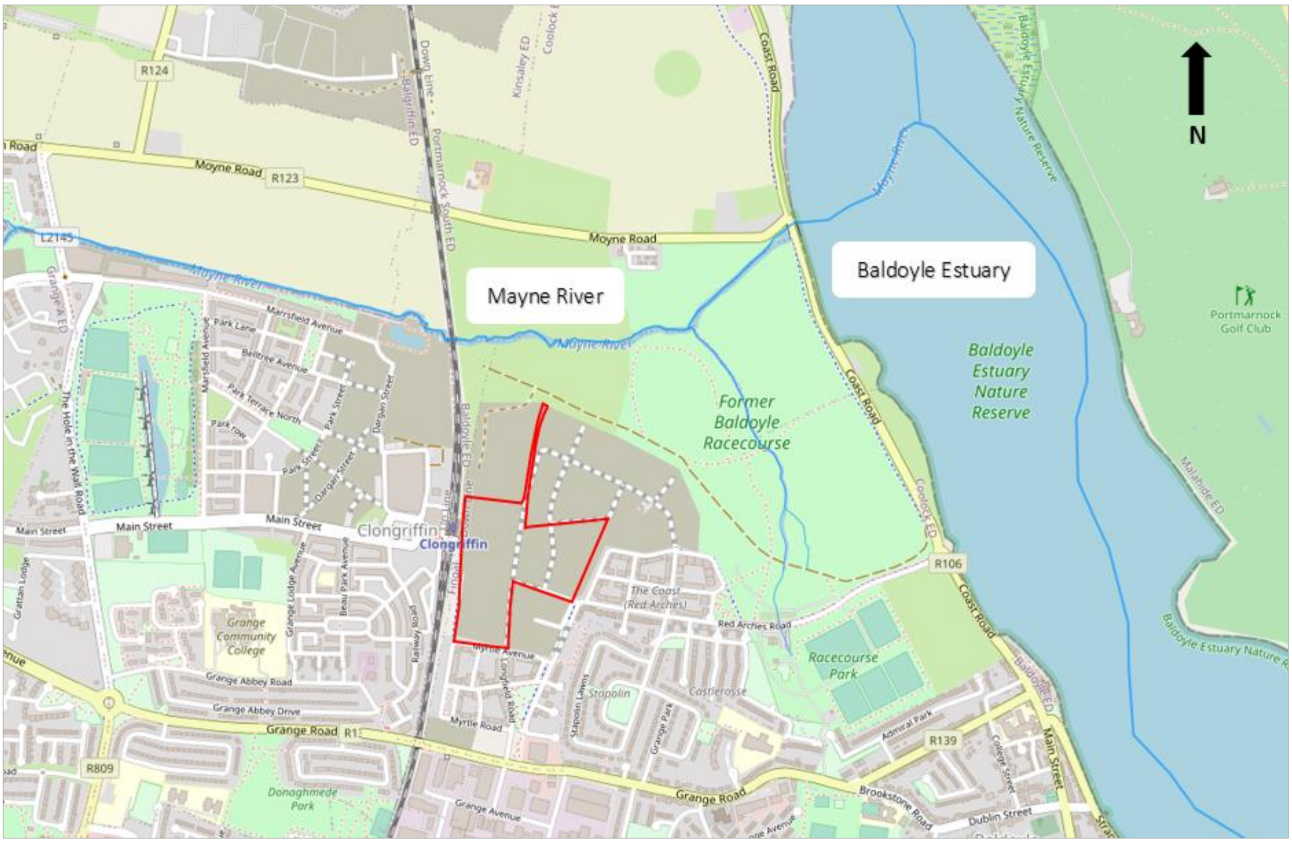
- Fluvial: flooding caused by overtopping of rivers and streams.
- Tidal: flooding caused by coastal sea level rises.

[23] NTA (2020).
[24] DEHLG (2009).

- **Pluvial**: flooding caused when the intensity of rainfall events is such that the ground cannot absorb rainfall run-off effectively or urban drainage systems cannot carry the run off generated.
- **Groundwater**: flooding caused by a rise in the level of the water table.

The Mayne River is located to the north of the Site. The Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS) 2017, conducted by the OPW, indicates that the Site is deemed to be located outside of the 0.1% AEP fluvial floodplain, based on the current available maps. The location of the Site is such that it is not affected by **fluvial** flooding from the Mayne River. Refer to Figure 5.2.

Figure 5.2: Waterbodies in the Vicinity of the Site [25] (in red)



The proposed Project shall change rainfall run-off patterns within the Site. This has the potential to alter the existing flow regime in watercourses to which run-off from the undeveloped site discharges. In particular, it has the potential to increase the rate of run-off during more extreme rainfall events. The surface water drainage mechanisms proposed for the proposed Project are consistent with best practice for the sustainable urban drainage and the design has been carried out in accordance with

[25] EPA Maps (2021). *Openstreet Maps*

the *Greater Dublin Strategic Drainage Study* (GDSDS). Therefore, the surface water drainage system shall not cause an increase in fluvial flood risk.

The OPW maintains the *National Flood Hazard Mapping* website contains information about locations that may be at risk from flooding. As the Site is in close proximity to the coast, there is potential for on-site flooding due to **tidal** action, which must be considered. There is no evidence of any recorded flood events at the Site. However, following a review of the available data, there is no indication that the Site is at risk of tidal flooding.

Pluvial flooding is flooding which has originated from overland flow resulting from high intensity rainfall. The historical and predicted flooding information does not indicate that the Site is at risk from pluvial flood events. Therefore, there is no indication of pluvial flood risk to the Site.

According to the Geological Survey of Ireland (GSI) interactive maps, the Site indicates no karst features are in the area, that **groundwater** vulnerability is *low*, and the aquifer is *poor*. The proposed alteration to the existing site shall not increase the potential for groundwater flooding as such the risk is deemed acceptable.

The Site was subject to SSFRA in accordance with *Flood Risk Management Guidelines*. This SSFRA did not find any indicators of the proposed Project being at risk from fluvial, tidal, pluvial or groundwater flooding; also, the SSFRA did not find any indicators that the proposed Project shall give rise to flood risk elsewhere.

5.3 The Need for the Proposed Project

5.3.1 Introduction

The development of the proposed Project is supported by both national and regional policy and guidance documents which are outlined in Chapter 3 (Planning & Development Context), refer to Table 3.1 and the Planning Report, which accompanies the planning application.

5.4 Main Features of the Proposed Project

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), 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 15.89ha (Refer to Figure 5.3). 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 (99 no.) 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 in parent application) 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 Project 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. (Refer to Figure 5.4) 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 train station through the

Square, new apartment blocks D1, D2, D3 to the north of Stapolin Square, and a bus ramp to Clongriffin train station. The red line boundary of this application also extends north to provide for a 300mm watermain connection to the existing watermain in the parklands to the north.

Therefore, the permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, albeit on a slightly extended developable area. The principal changes in the proposed Project relate to changes to the layout and design of the residential elements of the previously permitted development as follows:

- Alteration of Blocks A1, A2 and A3 from permitted six-storey buildings providing 195 no. residential units; to proposed four to eight-storey buildings providing 288 no. residential units;
- Alteration of Block B1 altered from permitted four-storey building providing 80 no. residential units; to three to five-storey building providing 49 no. residential units;
- Alteration of Block B2 altered from 3 no. three-storey terraces providing 24 no. residential units; to three to five-storey building providing 39 no. residential units;
- Alteration of Block B3 altered from 1 no. two-storey terrace and 3 no. three-storey terraces providing 33 no. houses; to two-storey buildings providing 38 no. houses;
- Alteration of Block B4 altered from 2 no. two-storey terraces and 1 no. three-storey terrace providing 25 no. houses; to two-storey buildings providing 36 no. houses;
- Alteration of Block C1 altered from 3 no. three-storey terraces providing 34 no. residential units; to C1 as two-storey buildings providing 15 no. houses & C1A as four to six-storey buildings providing 43 no. residential units;
- Alteration of Block C2 altered from 1 no. two-storey terrace and 2 no. three-storey terraces providing 26 no. residential units; to C2 as two and three-storey buildings providing 17 no. houses & C2A as four to five-storey buildings providing 33 no. residential units;
- Alteration of Block C3 altered from 1 no. two-storey terrace and 2 no. three-storey terraces providing 28 no. residential units; to C3 as two-storey buildings providing 29 no. residential units;
- Provision of new Block D1 ranging in height from six to nine-storey building providing 118 no. residential units;

- Provision of new Block D2 ranging in height from six to eight-storey building providing 81 no. residential units;
- Provision of new Block D3 ranging in height from six to fifteen-storey building providing 96 no. residential units;
- Provision of commercial development (total of 3,314sqm) in the ground floor of Blocks A1-A3 (convenience retail unit, medical centre, pharmacy and crèche) and Blocks D1-D3 (gym, storage units, and two retail units / restaurant);
- Provision of residential tenant amenities in Blocks A1-A3 and D1-D3 (total of 1,577sqm); and
- Provision of 818 no. car parking spaces and 1,542 no. bike parking spaces.

Refer also to the *Architectural Design Statement*[26] submitted with this planning application further details on the proposed Project.

[26] Henry J Lyons (2021).

Figure 5.3: Permitted Development[27] (under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970)[28]

[27] RPS (2016). *EIS. Volume 2. Growth Area 1, Baldoyle-Stapolin, Baldoyle, Dublin 13*.
[28] as amended by F20A/0258 and F21A/0046

Figure 5.4: Proposed Site Masterplan showing Red Line Boundary[29]

5.4.1 Landscape Strategy and Design

The Site is located within close proximity to public transport including bus routes and the DART. Within a 5km radius of the Site, there are a number of green amenity spaces such as Father Collins Park and Seagrange Park. The Site also border the extensive landscape of Baldoyle Racecourse Park and has view stretching to the sea.

[29] Henry J Lyons (2021). *Site Masterplan. Drawing No. STP0011 GA1.*

The landscape design for the Site proposes a variety of open spaces for its residents, both public open spaces and communal open spaces. Public spaces include the Stapolin Square, two linear parks and a public park; known as the Haggard (as previously permitted). The public spaces are designed to provide its users with opportunities to recreate, play and relax. Walking routes, play areas, outdoor exercise equipment and a variety of seating.

The main concept of the landscape design is having open spaces within close proximity to all residents. From the heart of the development, Stapolin Square, all the green spaces are within a distance of c. 200m which is on average a four-minute walk. Since Stapolin Square is the core of the development, it will potentially be an active space with pedestrians moving towards the train station, residents over spilling from the neighbouring apartment blocks and people engaging with the various facilities (cafés, restaurants, *etc.*). Different types of trees are selected in order to create different sceneries throughout the seasons.

The courtyards will receive good sunlight, as a result these spaces have great potential to become usable by the residents.

A similar planting strategy to the Stapolin Square is adopted for the parks. Locally appropriate, durable planting that will require minimal maintenance. The planting in the linear parks will have added plant species to boost the wildlife around the Site. The linear parks are biodiversity pockets in the wider suburban context and they will attract insects, birds and small mammals.

Full details of the landscape design for the proposed Project are provided in the *Landscape Strategy*[30] and refer to Chapter 13 (Landscape and Visual).

5.4.2 Site Utilities

5.4.2.1 Gas and Electricity Infrastructure

A review of **Gas Network Ireland** (GNI) maps show an existing 250mm diameter gas main passes through the Site. However, natural gas will not be used for the proposed Project and the existing gas main will remain in situ. Based on information received from **ESB Networks** (ESBN), there are no existing electrical infrastructure on-site that require diversionary works. New ESB electricity connections will be required.

[30] Bernard Seymour Landscape Architects (2021).

5.4.2.2 Water Supply

An existing 300mm watermain runs along the eastern (Stapolin Avenue) and part of the southern (Myrtle Avenue) side of the development. This infrastructure was installed to serve future developments within the LAP.

In addition, there is existing watermain infrastructure located within the Site, however due to the condition and system layout it is not intended to make use of the existing network and these shall be removed and replaced to current Irish Water Specifications.

5.4.2.3 Telecommunications

There are no existing electrical IT services on-site that require diversionary works. The proposed Project will tie into the existing network.

5.4.3 Site Infrastructure

5.4.3.1 Wastewater Services (Surface Water / Foul Drainage)

At present there is an existing 1350mm **storm water** 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 Site.

In addition, there is an existing 1050mm storm water 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 Site (FCC 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 c. 200m north of the proposed Project. The depth of this outfall is c. 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.

There is an existing storm water 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 is proposed to be removed and a new network constructed in its place.

There is an existing 375mm 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 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 c. 150m away from the pump station. The pump station currently serves the existing Myrtle and Red Arches Developments.

In addition to the 375mm foul sewer referred to above, there is already an existing foul 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 is proposed to remove the existing foul sewers within the Site.

5.4.3.2 Existing Site Access

The Site is accessible from the east by the Red Arches Road. The Red Arches Road is a local road with an east-west alignment, leading to the Site in the east and connecting to the Coast Road (R106) in the west. There are no cycle or bus lanes along this road.

The Longfield Road is a local road running in a north-south alignment. Longfield Road connects to the Site in the north and to the Grange Road (R809) in the south.

Grange Road (R809), is a regional road, running in an east-west alignment to the south of the Site. The Grange Road links Baldoyle village centre in the east to Clarehall Avenue in the west.

The two (2no.) primary vehicular access points are:

- the northward continuation of Longfield Road, which originates at Grange Road c. 280m to the south; and
- the westward continuation of Red Arches Road, which originates at Coast Road c. 930m to the east.

A further three (3 no.) vehicular access points shall be located on the western and southern boundaries of the Site.

The Site's internal road network shall tie into the existing surrounding road network at a total of five locations to give vehicular access to the proposed Project, with two primary vehicular access points.

5.4.3.3 Car & Bicycle Parking

The total **car parking** provision for the development will consist of 818 no. car parking spaces. The proposed Project shall include a total of 671 no. residential car parking spaces associated with the 882 no. residential units, equating to an overall provision of 0.76 spaces per residential unit. Of these, six (6 no.) internal parking spaces shall be reserved for shared vehicles. A total of 147 no. car parking spaces shall be reserved for commercial uses, the crèche and visitor car parking spaces.

The development will also include disabled parking bays, parking for shared cars and EV charging facilities. See the *Traffic Impact Assessment* (TIA)[31] Report submitted with this planning application for full details.

The proposed Project **bike** storage areas will accommodate:

- 1,316 no. long-term bicycle parking spaces for apartment residents.
- 194 no. short-stay bicycle parking spaces for visitors.
- 32 no. bicycle parking spaces to serve the proposed retail units, medical centre, café / restaurant and gym.

5.4.4 Daylight and Sunlight

The overall configuration and design of the proposed Project has been influenced by the need to achieve the best possible levels of sunlight and daylight penetration into the development. The proposed orientation of the blocks represents the best response to the Site context in terms of day light and sunlight availability as a result of the density and height proposed.

The *Architectural Design Statement* prepared by Henry J Lyons accompanying this planning application, sets out how the internal elevations are designed to address sunlight and daylight optimisation in terms of reflectivity and lightness of materials proposed.

A detailed Daylight and Sunlight assessment[32] has been carried out on the proposed Project, and is outlined in greater detail in the accompanying *Daylight Sunlight Report*. Refer to Chapter 15 (Daylight / Sunlight).

5.4.5 Wind

A *Wind Microclimate Study* prepared by B-Fluid is included as part of this planning application. Through the wind assessment it has been possible to highlight, at design stage, areas of potential concern in terms of downwash / funnelling / downdraft / and to identify critical flow accelerations that could potentially occur. Results of the wind analysis have been discussed with the Shoreline Partnership Design Team so as to configure the optimal layout for the proposed Project for the

[31] CS Consulting Engineers (2021d).
[32] O' Conor Sutton Cronin (OCSC) (2021).

objective of achieving a high-quality environment for the scope of use intended of each areas / building (*i.e.* comfortable and pleasant for potential pedestrian) and without compromising the wind impact on the surrounding areas and on the existing buildings.

The *Wind Microclimate Study* shows that the proposed Project has been designed to be a high-quality environment for the scope of use intended of each areas / building, and from a quantitative point of view, it does not introduce any major or critical impact on the surrounding areas and on the existing buildings.

5.5 Construction Phase & Construction Works

5.5.1 Construction Phase

A ten (10) year planning permission is being sought from An Bord Pleanála. It is expected that the Construction Phase will last for c. 95 month period (7 years 11mths). The Construction Phase will commence in Q4 2021 with the projected completion of the mixed-use residential development by Q4 2029. A determination on the application is expected from An Bord Pleanála in Q3 2021.

Allowing a reasonable period for mobilisation and Site setup, it is expected that demolition works[33] and Site set-up will commence in Q4 2021 subject to permission and the discharge of any pre-commencement planning conditions.

An outline Construction Environmental Management Plan[34] (CEMP) and Construction & Demolition Waste Management Plan[35] (C&D WMP), which are included with this planning application, should be referred to for more detail on the Construction Phasing. The appointed Contractor will be required to prepare a site-specific Construction Environmental Management Plan (CEMP), including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network.

5.5.2 Proposed Construction Works and Methods

Immediately after access to the Site is made, the Site will be secured with hoarding on all open sides and accessible approaches. The proposed location of the Contractor Compound, for the infrastructure works, will be entirely within the site boundary, although in some instances located outside the phase being constructed. The Contractor Compound will accommodate employee and

[33] To include the removal of temporary access to Clongriffin train station.
[34] Altemar Ltd. (2021a).
[35] AWN Consulting Ltd. (2021a).

visitor parking throughout the construction period with construction of temporary hardstanding areas. Site accommodation will include suitable washing / dry room facilities for construction staff, canteen, sanitary facilities, first aid room, office accommodation etc. Access to the Contractor Compound will be security controlled and all Site visitors will be required to sign in on arrival and sign out on departure.

The appointed Contractor will provide protection to existing surrounding building elements potentially impacted by the works. Protection may be in the form of screened hoardings, scaffolding and fencing, taped drop sheets and the like, all installed prior to commencement of any works on-site.

There are a number of construction works involved in a development of this nature. These activities (which are independent of phasing) can be divided into the general categories as set out in Table 5.1.

Table 5.1: Proposed Project General Construction Phase Activities

Activity	Description of Activity
Site Setup	Immediately after access to the Site is made and it is secure, the Site Compound will be established. The Site will be secured with hoarding on all open sides and accessible approaches.
Earthworks	Earthworks will consist of reducing existing levels for the structure and foundations. Suitable material such as rock will be crushed and used on-site where possible. Excess material will be disposed offsite to a suitably licensed facility in accordance with the project's Construction and Demolition Waste Management Plan (C&D WMP).
Structure	Structure includes the foundations and the physical frame of the blocks.
Enclosures	The enclosures for the building will be formed from brick, block work, timber, and glass, with all the required levels of insulation and water proof membrane.
Services	The requisite services will be provided including drainage and lighting.
Landscaping	The landscaping works include some hard landscaping, roads, footpaths, cycle-paths, bed and tree planting, and significant open spaces.

The appointed Contractor will be required to prepare a final Construction Environmental Management Plan (CEMP) for the duration of the works which will include the following aspects:

- construction working hours;
- site access / egress;

- air quality (air and dust);
- noise and vibration;
- traffic management;
- health and safety; and
- construction waste.

5.5.3 Construction Working Hours

The final CEMP will outline the construction hours for the proposed Project. The expected construction hours will be 07:00-19:00 Monday to Friday and 08:00-14:00 on Saturdays. There will be no works on Sundays or bank / public holidays in accordance with the Environmental Noise Regulations (S.I. No. 140 of 2006 Environmental Noise Regulations) and subject to final agreement with FCC. From time to time, in exceptional instances, works may be required outside of these hours. However, written approval will be sought by the Contractor from the Local Authority, prior to any works taking place.

Deliveries of material to the Site will be planned to avoid high volume periods. There may be occasions where it is necessary to have deliveries within these times. The appointed Contractor will be required to prepare a final CEMP, including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network.

5.5.4 Site Access and Egress

Construction Phase site access will be via a haul route running in a north-south direction from an existing entrance at Moyne Road via an existing road bridge over the Mayne River. This route will keep construction traffic away from any potential conflict with users of the proposed public park and two-way cycle (by Fingal County Council) to the north-east of the proposed Project. There is an existing field entrance which will be improved as outlined below, to ensure safe access and egress of Site vehicles.

- Entrance will be widened to ensure two rigid body vehicles can pass each other, *i.e*. one can enter while another waits to leave.
- Entrance gate will be set back a minimum of 18m from the road edge to ensure all vehicles leave the road before stopping.

- Appropriate sight lines will be provided by cutting and trimming existing hedge growth and removing existing earth embankments at the entrance.
- Advanced warning provided to all users on the road and directional signage for site traffic.

Revised measures will be developed further as part of the final CEMP, which will include a plan for the scheduling and management of construction traffic in agreement with the Shoreline Partnership Design Team and FCC.

It should be noted that all Construction Phase traffic would be utilising the haul route to the north, however later phases will utilise Longfield Road only to access incomplete phases and only via the haul 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 the local authority.

Site security - access to Site will be controlled by means of an electronic access control system and camera remote monitoring system for out of hours use. During working hours, a gateman will control traffic movements and deliveries.

Pedestrian access will be strictly controlled. All personnel working on-site will be required to have a valid Safe Pass card. Only accredited personnel will be permitted on to the Site and a daily record (access / egress) of Site personnel will be maintained. No pedestrian access points will be provided during the Construction Phase.

5.5.5 Air Quality - Dust and Dirt

The appointed Contractor shall put in place a regime for monitoring dust levels in the vicinity of the Site during the Construction Phase. The level of monitoring and adoptions of mitigation measures will vary throughout the Construction Phase depending on the type of activities being undertaken and the prevailing weather conditions at the time.

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 15-20kmph, 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.
- Restrict un-surfaced roads to essential Site traffic.
- Construction techniques shall minimise dust release into the air.

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 A11.3 in Volume 3).

5.5.6 Noise and Vibration

It is not envisaged that any significant prolonged noise and vibration producing activities will be carried out on-site. The most likely generator will be construction activities and mobile plant. The appointed Contractor will ensure that all best practice noise and vibration control methods will be used as necessary in order to ensure impacts to nearby residential noise sensitive locations are *not significant*. The total noise (LAeq) which should not be exceeded during daytime is therefore 65dB.

All works on site shall comply with *BS 5228-1:2009+A1 2014* which gives detailed guidance on the control of noise and vibration from construction activities. In general, the contractor shall implement the following mitigation measures during the proposed infrastructure works:

- Avoid unnecessary revving of engines and switch off equipment when not required.
- Keep internal haul roads well maintained and avoid steep gradients.
- Minimise drop height of materials.
- Start-up plant sequentially rather than all together.

More specifically the appointed Contractor shall ensure that:

- A Construction Noise and Vibration Management Plan is prepared.
- In accordance with Best Practicable Means, plant and activities to be employed on-site are reviewed to ensure that they are the quietest available for the required purpose.
- Hoarding to be provided and where required, improved sound reduction methods are used *e.g.* enclosures.
- Site equipment is located away from noise sensitive areas, as much as physically possible.
- Regular and effective maintenance by trained personnel is carried out to reduce noise and / or vibration from plant and machinery.
- Hours are limited during which site activities likely to create high levels of noise and vibration are carried out.

A Site representative responsible for matters relating to noise and vibration will be appointed prior to construction on-site.

A noise and vibration monitoring specialist will be appointed to carry out independent monitoring of noise and vibration during critical periods at sensitive locations for comparison with limits and background levels. It is proposed that noise and vibration levels be maintained below those outlined above as part of these infrastructure works.

All vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order.

In addition, all diesel engine powered plant shall be fitted with effective air intake silencers. All compressors shall be *"sound reduced"* models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silences of the type recommended by the manufacturers, and where commercially available, dampened tools and accessories shall be used.

All ancillary plant, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance. If operating outside the normal working week acoustic enclosures shall be provided.

Where construction activities are required in close proximity to neighbouring noise sensitive properties, a solid hoarding of approximately 2.4m in height should be erected to provide a degree of acoustic screening to the lower storeys.

Local screening should be provided for stationary plant such as generators and compressors.

An acoustically screened area should be provided on the site specifically for noisy operations such as grinding and cutting metal.

Further details on noise and vibration mitigation measures are outlined in the outline Construction Environmental Management Plan[36] (CEMP) submitted with this planning application.

The potential impacts associated with noise and vibration during the Construction Phase, are addressed in Chapter 12 (Noise and Vibration).

5.5.7 Construction Traffic Management

The appointed Contractor will be required to prepare a final CEMP, including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network.

There is an existing field entrance which will be improved as outlined in Section 5.5.4, to ensure safe access and egress of Site vehicles.

The principal objective of the traffic management plan is to ensure that the impacts of all building activities generated during the construction of the proposed Project upon both the public (off-site) and internal (on-site) workers environments, are fully considered and proactively managed / programmed respecting key stakeholders requirements thereby ensuring that both the public's and construction workers safety is maintained at all times, disruptions minimised and undertaken within a controlled hazard free / minimised environment. It is noted that the impact of the construction works will be *temporary* in nature. In order to ensure satisfactory operation of the Construction Phase the following is proposed:

[36] Altemar Ltd. (2021a).

- Construction traffic will not be permitted to use Red Arches Road to the east or Grange Road to the south unless agreed with the Local Authority.
- Provision of sufficient on-site parking and compounding to ensure no potential overflow onto the local network.

Truck wheel washes will be installed at Construction Phase entrances and any specific recommendations regarding construction traffic management made by the Local Authority will be adhered to. The following mitigation measures will be incorporated into the final CEMP detailing the management of construction traffic:

- 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 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’s 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.

5.5.8 Health and Safety

A detailed Construction Phase Health and Safety (H&S) Plan will be prepared by the appointed Contractor in advance of any works commencing on-site. This Plan will operate in line with ISO 18001 & ISO 14001[37].

The Construction Phase H&S Plan will apply to any persons working on the Site and in respect of passing pedestrians, motorists or other transport carriers.

[37] ISO 18001-*Occupational Health and Safety Management System (OHSMS*) and ISO 14001-*Environmental Management System (EMS*).

A suitably qualified and competent Project Supervisor Design Process (PSDP) has been appointed (with OLM Consultancy) and a suitably qualified and competent Project Supervisor (Construction Phase) will be appointed in line with those requirements laid down in the *Safety, Health and Welfare at Work Construction Regulations 2013* (S.I. No. 291 of 2013 Safety, Health and Welfare at Work (Construction)).

First Aid facilities for the use of all Construction Phase staff in the form of a fully provisioned first aid area within the Site office with life-saving and safety equipment as required by relevant statues, authorities and awards will be maintained at all times by the contractor.

The proposed Project will comply with all Health & Safety Regulations during the Construction Phase. Where possible, potential risks will be omitted from the design so that the impact on the Construction Phase will be reduced.

5.5.9 Construction Waste

Waste is defined as any substances or object belonging to a category of waste specified in the First Schedule (of the Waste Management Act 1996) or included in the European Waste Catalogue and Hazardous Waste List[38], which the holder discards or intends or is required to discard and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved.

Construction and Demolition (C&D) waste is the largest '*municipal*' waste stream contributing to the current pressure on landfills in Ireland. There are a number of waste permitted and licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources.

During the Construction Phase, 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.

The appointed Contractor will endeavour to ensure that material is reused or recovered offsite insofar as is reasonably practicable or disposed of at authorised facility. Wastes arising will need to

[38] EPA (2002).

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 Eastern Midlands Region which can accept hazardous and non-hazardous waste materials. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&DWMP (see Appendix A18.1 in Volume 3).

There are two main types of C&D waste, hazardous and non-hazardous, see Table 5.2 below. Hazardous waste is defined as waste which can have a harmful effect on the environment and on human health and as such they can be ignitable, reactive, corrosive and / or toxic and / or are listed as hazardous by the European Waste Catalogue. See Chapter 18 (Material Assets - Waste) for further information regarding Waste Management.

Table 5.2: Main Type of Construction Waste

Non-Hazardous Waste	Hazardous Waste
Timber	Adhesives and Sealants
Scrap Metal	Asbestos
Paper/Cardboard	Aerosols
Canteen Waste	Batteries
Litter	Chemicals
Glass	Cleaning
Plasterboard	Products
	Oil (Contaminated absorbent Material or debris)
	Paints and Thinner
	Fuels (hydrocarbons such as diesel)

5.6 Description of the Operational Phase of the Proposed Project

The proposed Project 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, in addition to a mix of uses at the proposed Village Centre.

The primary direct significant environmental effects will arise during the Construction Phase. As a result, the Operational Phase of the proposed Project is therefore relatively benign and not likely to give rise to any significant additional impacts in terms of activities, materials or natural resources used or effects, residues or emissions which are likely to have a significant impact on human beings, flora and fauna, soils, water, air and climate.

The primary *likely significant* environmental impacts of the Operational Phase as a result of the proposed Project are fully addressed in the relevant specialist chapters of this EIAR. These impacts relate to Population and Human Health, Landscape and Visual, Noise and Air Quality and Climate associated with the traffic generated.

The Operational Phase of the proposed Project is unlikely to give rise to any significant impacts in terms of health and safety.

The proposed Project also has the potential for *cumulative, secondary and indirect impacts* (*i.e.* traffic) however, all interactions and cumulative impacts are *unlikely to be significant*, are addressed in Chapter 20 (Interactions) and Chapter 21 (Cumulative Impacts) of this EIAR.

5.7 Risk Management

5.7.1 Methodology

Statutory Instrument (S.I.). No. 296/2018 - *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 and in particular Schedule 6* - Information to be contained in EIAR requires that a risk management assessment be prepared. Schedule 6, Paragraph 2(e)(i)(IV), specifically refers to: 'a *description of the likely significant effects on the environment of the proposed development resulting from…the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)'.*

Cognisance has been taken of the EPA Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*[39]. Though this document predates the 2018 legislation it follows the requirements laid out in the Directive 2014/52/EU. Specifically, the EPA Guidelines state that the EIAR must take account of *'the vulnerability of the project to risk of major accidents and / or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and I or disasters are examined in the EIAR should*

[39] EPA (2017).

be guided by an assessment of the likelihood of their occurrence (risk)'. Reference has also been made to the Department of Defence Publication *'A National Risk Assessment for Ireland 2017[40]'*. A consolidated list of national hazards for Ireland identified in the National Risk Assessment are identified in Table 5.3.

Table 5.3: Consolidated List of National Hazards[41]

Hazard: Civil	Hazard: Natural
▪ Infectious Disease ▪ Terrorist Incident ▪ Animal Disease ▪ Foodborne Outbreaks ▪ Crowd Safety ▪ Civil Disorder ▪ Loss of Critical Infrastructure	▪ Storm ▪ Flooding ▪ Snow ▪ Low temperatures ▪ High temperatures ▪ Volcanic Ash ▪ Drought ▪ Tsunami ▪ Space weather
Hazard: Transportation	**Hazard: Technological**
▪ Road ▪ Rail ▪ Air ▪ Maritime ▪ Transport Hub	▪ Industrial Incident ▪ Hazmat ▪ Fire ▪ Nuclear Incident (Abroad) ▪ Radiation Incident (Domestic) ▪ Disruption to electricity / gas supply ▪ Disruption to oil supply ▪ Network and Information Security / Cyber ▪ Incident

5.7.2 Predicted Impacts

In order to understand the potential consequences and predicted impacts of any major accident or disaster due to the proposed Project and the vulnerability of the project a desk study was undertaken. The assessment reviewed:

- The vulnerability of the proposed Project to major accidents or disasters.
- The potential for the proposed Project to cause risks to human health, cultural heritage and the environment, as a result of that identified vulnerability.

[40] Department of Defence (2017).
[41] Department of Defence (2017).

A methodology has been used including the following assessment:

- **Phase 1**: Identifying and screening the hazards;
- **Phase 2**: Assessing the likelihood of the major accident or disaster occurring; and
- **Phase 3:** proposing mitigation, and assessing any risks that remain.

The *Consolidated List of National Hazards* was used to identify a preliminary list of potential major accident and disasters.

It is noted that the application relates to amendments to an existing permitted primarily residential development located on appropriately zoned lands adjacent to the similarly developed / emerging edge of the city. Given such context the risk of major accidents, disasters is expected to be very unlikely.

5.7.2.1 Phase 1: Screening of Hazards

Civil - The list was screened and risks such as terrorist incidents, animal disease, foodborne outbreaks, crowd safety, civil disorder, could be readily excluded / screened out. Given the presence of COVID-19, infectious disease was screened in, as was critical infrastructure given the proximity of the Dublin - Belfast rail corridor.

Natural - The list was screened and given the local, regional and national context all natural hazards with the exception of flooding, could be readily excluded / screened out. Given the low-lying nature of the lands and the proximity to the coast, flooding was screened in.

Transportation - The list was screened and given the local, regional and national context transportation hazards involving road, maritime, and transport hub, could be readily excluded / screened out. Given the location of the lands, rail and air were screened in.

Technological - The list was screened and given the local context, which has no upper or lower tier Seveso establishments[42] within consultation distance, and the primarily residential nature of the proposed Project, all technological hazards with the exception of fire, could be readily excluded / screened out. Given the primarily residential nature of the proposed Project, technological hazard involving fire is screened in.

[42] HSA 2021).

5.7.2.2 Phase 2 and 3: Assessing the Likelihood of Occurrence, Mitigation Measures and Residual Risk

COVID-19 is a new illness that can affect your lungs and airways. It is caused by a virus called coronavirus[43]. At present occurrence is considered *very likely* and the Government and Health Service Executive (HSE) have issued restrictions and guidelines to ensure public safety. Construction and occupation will adhere to protocols and guidance in place at the relevant time. The development itself poses no additional risk to COVID-19 nevertheless, as for the national population generally, *some residual risk remains as of this time*.

The proposed Project is located adjacent to the Dublin – Belfast railway corridor and proposes a new civic plaza and access to Clongriffin train station. Consideration of proximity to the rail corridor is specifically addressed in Chapters 12 (Noise & Vibration) and 17 (Traffic & Transportation). The likelihood of an occurrence is *unlikely*, however, specific methodologies and programmes will be developed to address construction of the proposed Project where it is proximate to the rail corridor so as to ensure no disruption or risk to the railway or its users. While construction of similar residential development along the rail corridor is commonplace in this emerging suburb of the city, works adjoining the railway corridor, Iarnród Éireann will be consulted prior to such works commencing. *Slight residual risk remains*.

The lands are low-lying and close to the coast and a *Site Specific Flood Risk Assessment* (SSFRA)[44] in accordance with OPW *Flood Risk Management Guidelines* was carried out and is included with this planning application. The Site is located in Flood Zone C (low probability for coastal or pluvial flooding). The SSFRA concluded that the proposed Project is not at risk from fluvial, pluvial or groundwater flooding; also, the SSFRA did not find any indicators that the proposed Project shall give rise to flood risk elsewhere, refer to Chapter 10 (Hydrology) of this EIAR. *No residual risk remains.*

The Site is located south of the Public Safety Zones associated with either the existing or proposed Northern Runway (under construction) at Dublin Airport. The Site is also located south of the 55 to 59Lden / 50 to 54dB Lnight noise contour zones associated with Dublin Airport. Consideration of noise is specifically addressed in Chapters 12 (Noise & Vibration). *No residual risk remains*.

In relation to fire a legislative framework exists for all development under the Fire Services Acts 1981 and 2003. As a residential development, the proposed Project is subject to the requirement to obtain

[43] HSE (2021).
[44] CS Consulting Engineers.

a fire certificate based on the proposed fire safety design prior to commencement of construction. This is granted after the plans and specifications for a new building are assessed by the fire officer for compliance with Part B (Fire Safety) of the Building Regulations[45]. *No residual risk remains.*

5.7.3 Residual Impacts

Control measures will put in place for health and safety and environmental management as per the requirements of this EIAR, the Natura Impact Statement (NIS), the Construction and Environmental Management Plan (CEMP), as well as through any conditions of planning, and application of relevant code of practices and legislation. Residual impacts will be negligible once control, mitigation and monitoring measures have been implemented.

5.7.4 Monitoring

Other than normal construction management, specific monitoring is not required with regards to risk management.

5.7.5 Conclusion

The design has considered the potential for flooding, road accidents or fire within the design methodology. The vulnerability of the proposed Project to major accidents and / or disasters *is not considered significant.*

[45] Link available at: https://www.gov.ie/en/organisation/department-of-housing-local-government-and-heritage/?referrer=http://www.housing.gov.ie/housing/building-standards/tgd-part-b-fire-safety/technical-guidance-document-b-fire-safety

6 Consultation

6.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Rebecca Dunlea, Environmental Consultant with Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants. Rebecca holds a BA (Geography), MA (Geography) and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

This chapter describes the consultation process of the proposed Project. The 2014 Directive places emphasis on effective public participation in the decision-making procedures for EIA cases. Early involvement of the public and other stakeholders ensured that the views of groups and individuals were taken into consideration throughout the preparation of the EIAR.

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

Informal scoping of potential environmental impacts was undertaken with the 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.

Consultation was undertaken which identified the issues that needed to be taken into consideration in designing the proposed Project.

Section 4(1) of the Planning and Development Act of 2016 provides that an application for permission for a SHD shall be made directly to An Bord Pleanála 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[46]

Stage	Description
Stage 1	**Consultation** with the Planning Authority (under *Section 247 of the Planning & Development Act, 2000, as amended*).
Stage 2	**Pre-Application Consultation** with An Bord Pleanála (under *Section 6 of the Planning & Development (Housing) and Residential Tenancies Act, 2016*).
Stage 3	**Planning Application** to be submitted directly to An Bord Pleanála.

6.2 Consultation - Stage 1

Pre-application Consultation is a new and mandatory step required prior to making an application for a SHD to An Bord Pleanála.

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 Department 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. In addition meetings and consultation took place with officials from the Roads & Traffic Section, Drainage and Housing Departments.

Table 6.2: List of Consultation Meetings

Date	Attendees
12 Nov 2019	Kathy Tuck / Colm McCoy (FCC Planning) Hans Visser (Biodiversity) Kevin Halpenny (Parks)
17 Dec 2019	Kathy Tuck / Sean Walsh (FCC Planning) Linda Lally (Transport) Mark Finnegan (Parks) Damien Cox (Water)
29 Jan 2020	Kathy Tuck / Sean Walsh (FCC Planning) Niall Thornton (Transport)
15 April 2020	Kathy Tuck / Sean Walsh (Planning)

[46] An Bord Pleanála (2017).

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

6.3.1 Other Consultation

Following pre-application consultations an Opinion was received from An Bord Pleanála. This provided details of the prescribed bodies to be notified in the SHD planning application, which are as follows:

- Irish Water.
- Department of Culture, Heritage and the Gaeltacht.
- National Transport Authority (NTA).
- Irish Rail.
- Inland Fisheries Ireland.
- Transport Infrastructure Ireland (TII).
- Irish Aviation Authority.
- Department of Education and Skills.

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

6.4 Planning Application - Stage 3

The planning application is submitted directly to An Bord Pleanála, 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 Environmental Impact Assessment Report (EIAR) was prepared by Rebecca Dunlea, Environmental Consultant with Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants. Rebecca holds a BA (Geography), MA and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

This chapter provides a description of the local population / community in the vicinity of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

This chapter 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. Potential impacts of the proposed Project on *Population and Human Health* can arise from traffic, air quality, climate change, noise and vibration, landscape and visual, biodiversity, material assets (utilities) and the risk of unplanned events. These aspects are dealt with in the relevant specialist chapters of this EIAR. This chapter entitled 'Population and Human Health' will predominately cover any potential impacts not specifically covered in the other chapters of this EIAR.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

The 2014 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 Directive, however the European Commission (EC) Guidance relating to the implementation of the 2014 Directive, states:

> *'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[47]'.*

The Draft EPA Guidelines[48] 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.'*

This chapter also meets the requirement for assessment of '*Human Beings*' as per Schedule 6 of the Planning and Development Regulations 2001-2018.

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. The design team carried out a number of site visits at different stages throughout the design process, in addition extensive desk based research was conducted.

The assessment was carried out in accordance with the following guidance and tailored accordingly based on professional judgement:

- 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*.

[47] EC (2017b).
[48] EPA (2017).

A 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 used for this assessment:

- Central Statistics Office (CSO) (2011 & 2016). Census data from 2011 and 2016;
- CSO (2020). *Quarterly Labour Force Survey Q4 2020;*
- CSO Small Area Population (SAP) Statistics: http://census.cso.ie/sapmap/;
- ESRI (2020). *Quarterly Economic Commentary for Winter 2020;*
- Eastern & Regional Assembly (2019). *Regional Spatial and Economic Strategy 2019-2031*;
- FCC (2017). *Fingal Development Plan 2017-2023*;
- FCC (2013). *Baldoyle-Stapolin Local Area Plan (LAP) 2013 (as extended);*
- Department of Housing, Planning & Local Government (2020). My Plan map-viewer; and
- World Health Organisation (WHO) (2021): https://www.who.int/

This assessment is a study of the potential indirect and direct socio-economic impacts of the development of the Site as well as the operations of the proposed Project.

Receptors were 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. The characteristics of this impact assessment are defined in Table 7.1 to Table 7.3, as per the Draft EPA Guidelines[49].

Table 7.1 defines the *quality of effects* from *positive* to *negative* on the environment.

[49] EPA (2017).

Table 7.1: Quality of Effects

Quality of Effect	Description of Effect
Positive Effects	A change which improves the quality of the environment (for example, by increasing species diversity or improving the reproductive capacity of an ecosystem; or removing nuisances; or improving amenities).
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative / Adverse Effects	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing a nuisance.

Table 7.2 outlines the definitions of *significance of effects* which range from *imperceptible* to *profound* effects.

Table 7.2: Definitions of Significance of Effect

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

Table 7.3 describes the *duration of effects*. Momentary effects lasting from *seconds* to *minutes* will often be less concerning than long-term and permanent effects, depending on their severity.

Table 7.3: Describing Duration of Effects

Duration of Effects	Description of Duration of Effects
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.

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 baseline environment is considered in this section under the following headings:

- social patterns (population);
- land use and settlement patterns;
- economic and employment activity;
- tourism, community infrastructure and amenity / recreation; 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 level, 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.

The CSO data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.8%, bringing the total population of the Irish State to 4,761,865, see Table 7.4 below. The rate of growth slowed from 8.1% in the previous Census (2011), 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.

The Site is located in the Local Electoral Area (LEA) of Howth - Malahide, and the Electoral Division (ED) of 004 Baldoyle. Baldoyle ED saw an increase in population in the 2016 census to 7,538 from 7,050 in the previous 2011 Census. This represents a c. 6.9% increase in population which is slightly below the Fingal average population change of c. 8.0%, but exceeds the Dublin City average population change of c. 5.8%. This can be attributed to the redevelopment of many lands in areas from greenfield (or brownfield) to residential and mixed-use development. The total population for Baldoyle (ED) consists of 3,630 males and 3,894 female. The CSO population statistics relevant to this EIAR are set out in Table 7.4.

Table 7.4: Population Change in the State, Local Authority, LEA and ED between 2011 and 2016[50]

Area	Number of Persons		
	2011	2016	% change between 2011 - 2016
Ireland - State	4,588,252	4,761,865	3.8 %
Fingal County Council	273,991	296,020	8.0 %
Howth - Malahide (LEA)	52,091	55,761	7.1 %
004 Baldoyle (ED)	7,050	7,538	6.9 %

7.3.1.1 Household Size

Table 7.5 illustrates there is a total of 1,122 no. households in the nearby area with a population of 3,145. The average household size in this area is 2.8 people.

[50] AIRO CENSUS 2016 Viewer (2016).

Table 7.5: Household Size in Nearby SAPs by Apartment and Houses[51]

SAP Reference	Households	Persons	Households	Persons	Households	Persons
	Total		Houses		Apartments / flats	
267004011	94	250	32	100	59	142
267004012	78	201	28	85	50	116
267004010	133	376	75	251	58	125
267004014	82	265	47	100	35	85
267004013	89	220	14	49	75	220
267004009	96	281	26	116	70	165
267004015	127	345	127	345	-	-
267004016	92	236	92	236	-	-
267004006	116	407	116	407	-	-
267004023	108	343	108	343	-	-
267004007	107	221	67	177	40	44
Total	1122	3145	732	2209	387	897
Average HH size	2.8		3.0		2.3	

7.3.2 Land Use and Settlement Patterns

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha. The Site is on the edge of the urban extent of Dublin City, but is within the administrative area of Fingal County Council (FCC), adjacent to the Dublin City Council (DCC) administrative boundary at Clongriffin to the west.

The Site is partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development further south), with the exception of a network of access roads traversing the land.

The undeveloped lands of Baldoyle-Stapolin Growth Areas No. 2 (GA2) and No.3 (GA3) lie directly to the north and north-east of the Site. Baldoyle Racecourse Park is located further to the north and east of the Site and the Baldoyle Estuary is further east beyond the R106 Coast Road.

The lands surrounding the western, southern and eastern boundaries of the Site are predominately residential in nature. To the north and north-east of GA2 and GA3 is an area designated as 'high amenity' comprising partially of open fields and areas associated with the Baldoyle Estuary. The Site

[51] CSO (2016).

is highly accessible and benefits from a range of transport connections. The Site is within a short walking distance of the Baldoyle Industrial Estate providing employment and commercial activity.

As the Site lies within the administrative area of FCC, it is therefore subject to the land use policies and objectives of the Fingal Development Plan 2017-2023 (the '*Development Plan*') (including Variations to the Development of the Plan). In addition, the Baldoyle-Stapolin LAP 2013-2023 (as extended) provides specific detail in relation to the lands. Under the CDP, one of the Baldoyle Development Plan Objectives is:

> ***Objective BALDOYLE 3*** *- 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).*

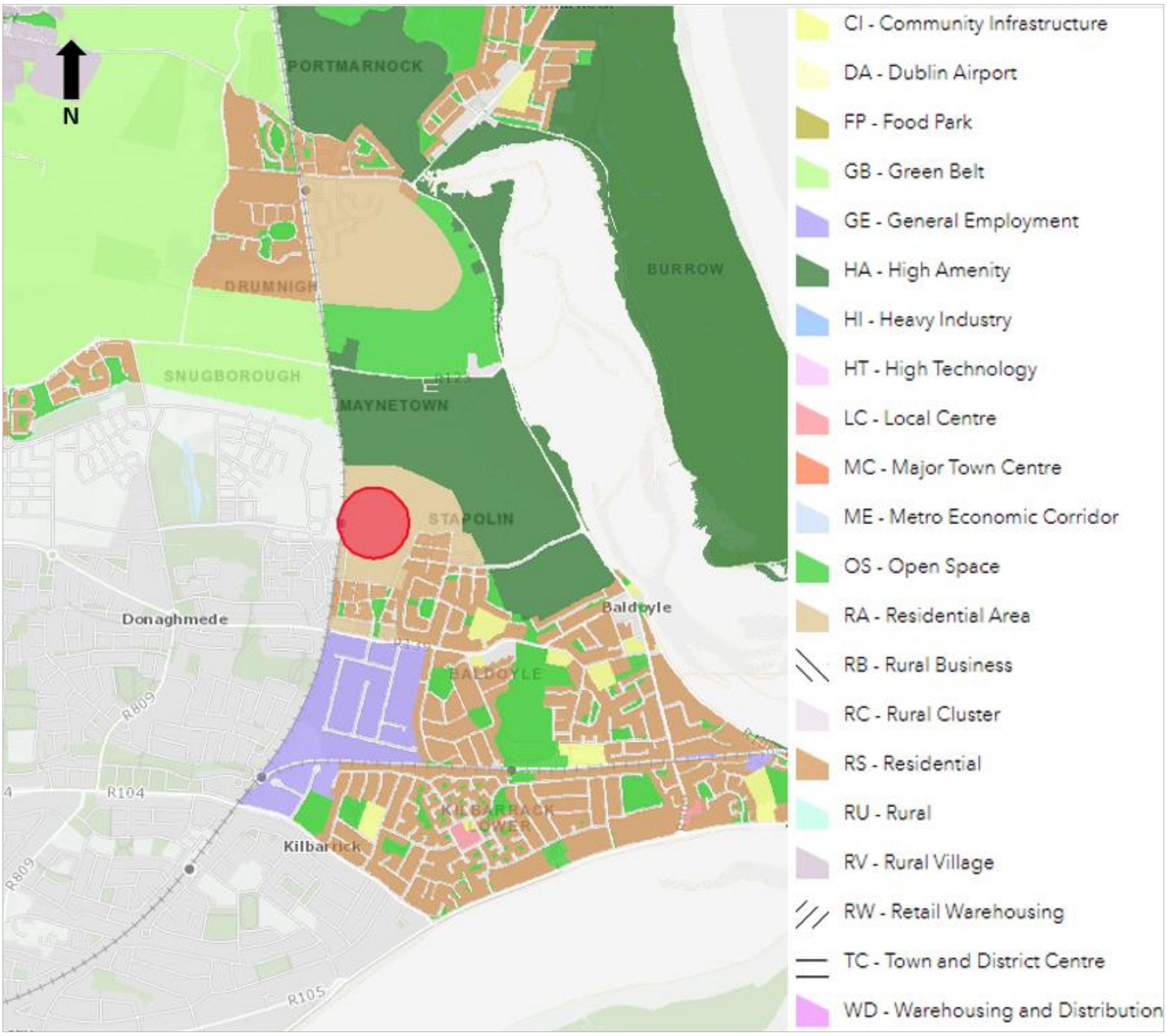
The lands are zoned Objective RA in the Development Plan, which has the stated objective to: *Provide for new residential communities in accordance with approved local area plans and subject to the provision of the necessary social and physical infrastructure,* with a central area in the lands with a development objective of LC – *to provide for a local centre.* This zoning and objective is reflected in the Baldoyle-Stapolin Local Area Plan 2013, where this central area is designated 'Village Centre' with '*Village Centre - Civic Space'* designated within the 'Village Centre' area.

The Zoning Vision for the Site 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.'*

The proposed Project comprises 135 no. houses and 15 no. blocks, ranging in height from two-storeys to 15 storeys, accommodating 747 no. apartments, totalling 882 no. dwellings in total, in addition to a mix of uses at the proposed Village Centre. The proposed mix of uses is compatible with the zoning objective on the Site. Refer to Figure 7.1.

Figure 7.1: Zoning Objectives as part of the Fingal Development Plan 2017-2023 – Extract from Sheet No. 10[52] (Site location in red)



7.3.3 Economic and Employment Activity

Note: *The CSO's Labour Force release has been compiled during the COVID-19 crisis. The results contained in this release reflect some of the economic impacts of the COVID-19 situation*.

The CSO's Labour Force Survey (LFS) (which has now replaced the Quarterly Household Survey) for Q4 of 2020[53] identified that there was an annual decrease in employment of -2.3% (55,000) in the year to the fourth quarter of 2020, with total employment at 2,306,200. This compares with an annual decrease of -1.4% (31,700) in employment in the previous quarter an increase of 3.5% or

[52] FCC (2017).
[53] CSO (2020).

79,900 in the year to Q4 2019. Up until and including Q4 2019, unemployment rates had decreased for 30 successive quarters.

The decrease in total employment of 55,000 in the year to Q4 2020 was represented by an increase in full-time employment of +0.2% (2,900) and a decrease in part-time employment of -11.8% (58,000).

The overall employment rate among persons aged 15-64 was 67.8% in Q4 2020 compared to 70.2% in Q4 2019[54].

The Economic and Social Research Institute (ESRI) Quarterly Economic Commentary for Winter 2020, outlines that the Irish economy is now in the midst of a substantial downturn prompted by COVID-19. The impact of the COVID-19 downturn on the Irish labour market has been unprecedented. It is estimated that employment fell by 2.3% over 2020.

While COVID-19 continues to impact the Irish domestic economy, it is clear that most sectors registered a significant recovery in output in Q3 of 2020[55]. Consumption and investment experienced a rebound in activity after the impacts of the general lockdown in Q2 of 2020 while exports continued to grow through the third quarter.

The scale of the employment shock can be seen in the number of people either on the Live Register or availing of the Pandemic Unemployment Payment (PUP). The number of individuals in receipt of the PUP peaked at just over 600,000 individuals in early May. As the restrictions were eased, so did the number of those in receipt of the PUP between the end of May and the beginning of October. The number in receipt of the PUP fell by 65.9% (396,500 people) between the peak during the week ending 3 May and the week ending 4 October. When Level 5 restrictions were reintroduced in late October, the number in receipt of the PUP increased, and by 24 November approximately 352,100 people were in receipt of the payment[56].

The path for the labour market for 2021 will be dependent on the performance of the underlying economy. As the rollout of the COVID-19 vaccine continues and public health restrictions are eased, positive trends in economic activity and employment are forecast for 2021.

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[54] CSO (2020).
[55] ESRI (2020).
[56] ESRI (2020).

Fingal is a key administrative area within the Eastern and Midland Regional Assembly (EMRA), and plays a strong supporting role to the Dublin City Gateway, which is the country's economic growth centre. The County is home to a diverse range of employers, varying in scale from major multi-national companies, Irish small and medium enterprises (SMEs) and Fingal based start-ups with small numbers of employees.

Baldoyle has two key employment centres, at Baldoyle Industrial Estate and Kilbarrack Industrial Estate, both providing significant employment for the wider area. The key employment area for commercial activity in Malahide is Broomfield Business Park.

7.3.4 Tourism, Community Infrastructure and Amenity / Recreation

7.3.4.1 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.

7.3.4.2 Community Facilities

The Development Plan identifies good community facilities and services, as '*education, training, libraries, childcare facilities, places of worship, health and community centres, in appropriate accessible locations is important as they contribute positively to an enhanced quality of life*'.

Sustainable communities require a range of facilities and services such as state or local authority provided services such as credit unions, post offices, retail centres and general community services.

The Baldoyle area possesses a range of ancillary services varying in scale including the following:

- post offices;
- recycling facilities;
- retail locations such as Donaghmede and Clare Hall Shopping Centres; and
- credit unions.

Dublin's north side is served by established **healthcare** facilities, the nearest large scale hospital is Beaumont Hospital located 5km to the south-west in Beaumont. In addition there is a range of GP clinics, pharmacies, dentists in the area to address everyday needs.

A survey of the number and distribution of **childcare** facilities in the area was conducted by Brady Shipman Martin[57]. The results of this survey show that within 2km of the Site there are a 34 no. childcare facilities, all of varying scales of operation providing a total capacity of 1,762 no. places. Given the relatively low population density of the surrounding neighbourhoods there is a high number of childcare facilities in the area.

As part of this survey, other significant permitted schemes in the area were considered which include the provision of a childcare facility thus contributing to the overall quantum of childcare places available. (Refer to the *Schools Demand and Childcare Facilities Assessment,* submitted with this planning application).

The conclusion of the survey states:

> *"…it is considered that the provision of a crèche of 539sqm (gross) (equating to approx. 100 no. child spaces), in combination with planned, recently permitted and existing childcare*

[57] BSM (2021a).

facilities in the area, meets the requirements of delivering this proposed scheme of development."

As part of this survey, a **schools** demand assessment was carried out to identify the provision of Primary and Post-Primary Schools in the area, within a catchment of both 2km and 5km.

Within 2km of the Site there are 12 no. **primary schools** with a capacity for 3,350 no. pupils, and within 5km there are 41 no. primary schools with a capacity with a capacity for 11,322 no. pupils.

Within 2km of the Site there are five (5 no.) **post-primary schools** with a capacity for 1,988 no. pupils, and within 5km there are 18 no. post-primary schools with a capacity for 9,074 no. pupils.

Refer to the *Schools Demand and Childcare Facilities Assessment*[58], submitted with the planning application for the full assessment.

7.3.4.3 Transport Infrastructure

Chapter 17 (Traffic & Transportation) of this EIAR and the *Residential Travel Plan*[59] submitted with the subject application identify the existing transport network in the vicinity of the proposed Project.

The Site is located immediately adjacent to a high frequency public transport hub enabling connections with the wider Dublin Area. The Site is within a 5-minute walk of Clongriffin train station on the DART Line. Rail services operating to and from this stop connect the proposed Project directly to Howth and Malahide (and beyond to north county Dublin) in 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, are served by two bus routes (29A and 15) operated by Dublin Bus.

Future planned / proposed public transport projects, including BusConnects[60] and the DART expansion project, are expected to improve public transport service provision further in the area.

7.3.4.4 Amenity / Recreation

Quality recreation, leisure and amenity facilities have a fundamental impact on the quality of life in a town / area. It can improve social integration and cohesiveness.

[58] BSM (2021a).
[59] CS (2021e)
[60] NTA (2020).

Surrounding uses to the west, south and east of the proposed Project are predominately residential in nature. To the north and north-east is an area designated as '*high amenity'* comprising partially of open fields and areas associated with the Baldoyle Estuary. FCC will deliver '*Baldoyle Racecourse'* Regional Park as part of the Development Plan and Baldoyle-Stapolin Local Area Plan objectives at this location.

The proposed Project will benefit from its adjacency to the significant amenity of Racecourse Park, a c. 80ha regional park which includes cycle and walking trails, play spaces and sports pitches, to be delivered by Fingal County Council.

The immediate area has large range of open space areas suitable for cycling, running and walking. There are a number of publicly accessible parks within 1.5km including Seagrange Park, Donaghmede Park, and Father Collins Park, in addition to the coastal amenity recently opened cycle and pedestrian coastal route.

7.3.5 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. Healthy people contribute to the health and quality of the society in which they live, work and play'*. This Framework also states that health is much more than an absence of disease or disability, and that individual health, and the health of a country, affects the quality of everyone's living experience.

Human health has the potential to be impacted upon by environmental factors such as air, water or soil through which contaminants could accumulate and have potential to cause harm through contact with human beings. Hazards or nuisances to human health can arise due to exposure to these vectors, for example arising from incompatible adjacent land uses. The impact of development on human health is also influenced by the extent to which new development is accompanied by appropriate infrastructure and the maintenance of the quality of water, air and soil. It is also appreciated that new development or environmental change can elevated stress and effect mental health of local populations.

There are strong links between income and health, as it is recognised that the sustainability of current and future economic activity is an important element in protecting and promoting population health and in reducing poverty and deprivation. However, emphasising economic growth without due regard for social and environmental consequences of such growth can have negative impacts on health both for the population as a whole and for groups within the population.

There needs to be particular attention to the environmental issues and sustainability endeavours to protect human health as the local economy develops. While employment is generally good for health, there can be negative impacts, usually related to the quality of the working environment and nature of work undertaken.

External factors*, e.g.* coronavirus (Covid-19), can also have a major impact on human health - both physical and mental. In public mental health terms, the main psychological impact to date is elevated rates of stress or anxiety and its effects on many people's usual activities, routines or livelihoods[61] (*i.e.* quarantine / cocooning / lockdown, loss of employment, travel / movement restrictions, lack of physical contact with other family members, friends and colleagues and working from home / home-schooling children to mention a few).

7.3.5.1 Health and Safety

The surrounding context consists of recreational and amenity related land uses. The Construction Environmental Management Plan[62] (CEMP) submitted with this application sets out the health and safety measures that will be put in place on-site to ensure the appropriate health and safety measures are in place throughout the construction of the proposed Project.

7.4 Potential Impact 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 both the Construction and Operational Phases.

Potential Impacts are considered under the following headings: social patterns (population); land use and settlement patterns; economy and employment; tourism and amenity and human health. The primary direct significant environmental effects will arise during the Construction Phase.

[61] WHO (2021a).
[62] Altemar Ltd. (2021a).

7.4.1 Construction Phase

7.4.1.1 Social Patterns (Population)

The Construction Phase of the proposed Project is unlikely to have any significant impact on social patterns within the surrounding area. It is expected that the construction workers will travel from their existing residence rather than taking temporary accommodation in the local area. Impacts to the local population are considered to be *neutral, not significant* and *temporary* in nature and therefore not considered *significant.*

It is acknowledged that the Construction Phase of the proposed Project may have some *short-term negative* impacts on local residents. Such impacts are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These impacts are dealt with separately and assessed elsewhere in the EIAR, including Chapter 10 (Water), Chapter 11 (Air Quality and Climate), Chapter 12 (Noise and Vibration) and Chapter 17 (Traffic and Transportation). Such impacts will be *short-term* in duration. Any disturbance is predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently, sensitively and properly managed having regard to neighbouring activities. The construction methods employed and the hours of construction proposed will be designed to minimise potential impacts to nearby residents. An outline CEMP has been prepared and is submitted with this planning application.

7.4.1.2 Land Use and Settlement Patterns

The Construction Phase of the proposed Project will consist of site clearance, excavation and construction works. The proposed Project will comply with the statutory land use zoning policies and objectives of the Fingal Development Plan and the NPF. Development of the Site will align with the NPF to achieve a greater proportion of the growth within its metropolitan boundaries and to offer improved housing choices.

Construction works are likely to take place over a c. 95 month period (7 years 11 months). During this time, there will be no severance of land, loss of rights of way or amenities as a result of the proposed Project. However the Construction Phase has the potential to impact *negatively* and result of the *temporary* degradation of the local visual environment for a *short-term*. See Chapter 13 (Landscape and Visual) for more detail on the visual impact.

It is considered that the overall potential impacts are *negative,* of *slight significance* and are anticipated to be *short-term* in duration. The potential effect overall is considered to be *not significant*.

Landscape & Visual - During the Construction Phase, machinery and materials will be located on-site in addition to ancillary storage, facilities for workers and hoarding *etc*. There may be potential for a *slight, negative* impact on the visual appearance of the Site. It is anticipated that the impact will be *temporary* in nature. Refer to Chapter 13 (Landscape & Visual).

7.4.1.3 Economic and Employment Activity

The Construction Phase of the proposed Project is likely to result in a *positive* net improvement in economic activity in the area of the Site particularly in the construction sector and in associated and secondary building services industries.

The construction of a mixed-use development to accommodate 882 no. new residential dwellings (747 no. apartments, 135 no. houses), residential tenant amenity, retail / café / restaurant, pharmacy, medical centre, crèche, gym and public realm and all associated infrastructure will precipitate a *positive* impact on construction-related employment for the duration of the Construction Phase.

It is estimated that c. 85 no. personal will be employed on the Site, peaking at c. 300 persons. A portion of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction period. Where practicable, a local labour will be employed.

The Construction Phase will also have indirect '*spin-off*' impacts on ancillary support services in the area of the site, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions *etc*. These beneficial impacts on economic activity will be largely *temporary* but will contribute to the overall future viability of the construction sector and related services and professions over the phased construction period.

The Construction Phase could have a *slight negative* impact on the surrounding area due to traffic and associated nuisance, dust and noise. These issues and appropriate mitigation measures are addressed in the relevant chapters of this EIAR, in the Traffic Impact Assessment, the outline Construction Environmental Management Plan (CEMP) and the Contraction and Demolition Waste

Management Plan[63] (C&DWMP) which accompany the application. The appointed Contractor for the construction of the proposed Project will be required to prepare a final CEMP, including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network.

7.4.1.4 Tourism, Community Infrastructure and Amenity / Recreation

Construction related activity has the potential to increase baseline noise, which could cause disturbance to the local residents and the recreational facilities.

Construction traffic could cause disturbance from possible odour releases / air and dust emissions from the movement of materials to and from / around the Site. Such activities will result in *negative, short-term* impacts, however these impacts are addressed further in the relevant specialist chapters of this EIAR.

Construction of new residential structures will impact the existing views of surrounding properties, public roads and industries.

At the local scale, there will be views of the construction activity and emerging structures from open vantage points, including the open areas to the north and north-east which is designated as '*high amenity'* (open fields and Baldoyle Estuary). Visual effects will range from *slight / not significant* and *negative*, to *significant* / *moderate* and *negative*.

Effects on views during the Construction Phase will be *temporary* to *short-term*, and will also vary considerably from the wider scale to the more local context of the Site.

There is not anticipated to be any direct socio-economic impacts on the parks / racecourse and the Baldoyle Estuary during the Construction Phase, due to their distance from the Site.

As a result, the potential effects are *adverse*, of *slight significance* and of *short-term* duration.

7.4.1.5 Human Health

The Draft EPA Guidelines[64] states that human health is to be considered through assessment of the environmental pathways through which health could be affected.

[63] AWN Consulting Ltd. (2021a).
[64] EPA (2017).

During the Construction Phase of the proposed Project, the key pathways in relation to human health are air quality, noise and vibration, water, and soil. The Draft EPA Guidelines state that potential effects are best measured by referencing accepted standards in exposure or risk.

There is the potential for dust deposition (both dust and smaller particles) during the Construction Phase. However, Construction Phase activities will be confined within the Site. The expected **air quality** effects and air quality legislative limit values which are based on the protection of human health are discussed in Section 11.1 in Chapter 11 (Air Quality and Climate).

The **noise** prediction for the Construction Phase activities and site establishment, is discussed in Section 12.5.1 of Chapter 12 (Noise and Vibration).

There is potential to impact local **surface water**, **groundwater** sources and **soil** during the initial Construction Phase, due to accidental leaking of fuels, storage of topsoil with sediment run-off, which have the potential to impact human health. These impact are discussed in Chapter 9 (Land, Soils, Geology and Hydrogeology) and Chapter 10 (Water).

Health and Safety

The construction methods employed and the hours of construction proposed will be designed to minimise potential impacts. The proposed Project will comply with all Health & Safety Regulations during the Construction Phase. Where possible, potential risks will be omitted from the design so that the impact on the Construction Phase will be reduced.

7.4.2 Operational Phase

7.4.2.1 Social Patterns (Population)

The Operational Phase of the proposed Project will result in the provision a mixed-use residential development of 882 no. new residential dwellings (747 no. apartments, 135 no. houses), residential tenant amenity, retail / café / restaurant, pharmacy, medical centre, crèche, gym and public realm.

The proposed Project will provide much needed homes to this area of the county, which will help cater for the considerable and consistent demand in the Dublin area, which is not being met at present. The amenity facilities will help to support existing community and social infrastructure.

The increase in residents to the area will also result in improving the vibrancy and vitality of the area and in the growth of the community. The proposed Project includes a mix of residential units, community and recreational uses. The proposed Project includes proposals for communal facilities such as gym, retail, crèche, medical centre and café / restaurant.

While within Fingal County Council, the proposed Project forms part of the wider Dublin City area and has excellent transport connections to and from the city. Refer to the Residential Travel Plan[65] submitted with this planning application and Chapter 17 (Traffic and Transportation) of this EIAR.

Therefore, the proposed Project will have a *positive, significant* and *permanent* impact on the population of Baldoyle.

7.4.2.2 Land Use and Settlement Patterns

The Site is partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development further south), with the exception of a network of access roads traversing the land.

The land uses surrounding the Site to the west, south and eastern boundary is predominately residential in nature. To the north and north-east is an area designated as '*high amenity*' comprising partially of open fields and areas associated with the Baldoyle Estuary.

The Operational Phase of the proposed Project will result in the introduction of a residential land use to the Site which will provide much needed housing for the growing population in the Dublin area. The provision of open space consisting of recreational and amenity space is also provided.

The Operational Phase of the proposed Project will have *no long-term significant adverse* impacts on pre-existing zoning at this Site or neighbouring land-uses or zoning.

Landscape & Visual - The proposed Project will undoubtedly change the view of this large Site when viewed by the surrounding residents, however the layout of the proposed Project has appropriately considered the existing environment as discussed in Chapter 13 (Landscape & Visual). A Landscape and Visual Impact Assessment is included as Chapter 13 of this EIAR.

7.4.2.3 Economic and Employment Activity

The Operational Phase of the proposed Project will result in the provision of 882 no. residential units and associated open space. This will provide accommodation for c. 1,701 no. persons, based upon the maximum number of bed spaces per unit. This increase in occupancy in the area will enhance local spending power and will assist with the delivery of a critical mass of population which will

[65] CS (2021e).

support a wide range of additional local businesses, services, transport infrastructure and employment opportunities. The provision of the retail units and crèche will also generate some local employment opportunities in the area.

The impact of the proposed Project are assessed as *positive,* of *slight significance* and anticipated to have a *medium* to *long-term* duration.

7.4.2.4 Tourism, Community Infrastructure and Amenity / Recreation

The proposed Project has provisions for the retail units and crèche and residential tenant amenity. These facilities will benefit future residents and existing residents in the local environs.

The development of the Site from a partly undeveloped[66] site to a mixed-use residential development will improve the vitality and vibrancy of Baldoyle and will help support existing community and social infrastructure. The new residents of the will be able to avail of the existing range of community facilities and local amenities.

As set out in the *BSLA Landscape Report*, Stapolin Square will be the focus of the landscape design strategy for the scheme. This central public space provides for informal amenity, public realm, seating and tree planting while the shared residential courtyards adjacent provide for amenity and recreation and sense of place.

The proposed Project will benefit from its adjacency to the significant amenity of Racecourse Park, a c. 80ha regional park which includes cycle and walking trails, play spaces and sports pitches, to be delivered by Fingal County Council.

The impact of the proposed Project are assessed as *positive,* of *slight significance* and of *long-term duration.*

7.4.2.5 Human Health

A lack of physical activity[67], (identified by the WHO), is the 4th leading risk factor for global mortality[68]. The location of the proposed Project promotes the use of public transport and walking / cycling thus promotes active movements for future residents. Health benefits of physical activity (walking and cycling combined with public transport) can prevent many of these deaths from physical inactivity.

[66] Currently, partly a temporary construction compound associated with on-going development further south, historically greenfield in nature.
[67] Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities.
[68] WHO (2021b).

The location of the proposed Project in the immediately adjacent to public transport has the potential to positively impact on human health.

The *Residential Travel Plan*[69] submitted with the subject application is developed for the purpose of promoting and enhancing travel via more sustainable modes of transport. The travel plan serve to identify travel demand strategies that reduce single occupancy private car travel, which in turn reduces traffic congestion, noise pollution and environmental impacts.

The Operational Phase will result in an *adverse, slight* and *permanent* impact on local air quality, as a result of heating requirements for buildings and with the increase in traffic movements.

The subject application is accompanied by a *Daylight and Sunlight Report*[70] that concludes that across the entire development excellent levels of internal daylight are achieved and the majority of apartments and all houses not only meet but greatly exceed the average daylight factor (ADF) target set out. In terms of sunlight access, excellent levels of sunlight are experienced across the development.

The annual probable sunlight hour's assessment has shown that even though some windows are slightly under the *Building Research Establishment (BRE) Guidelines*[71] recommendations, acceptable levels of sunlight will still be achieved within the proposed Project. Refer to Chapter 15 (Daylight / Sunlight) of this EIAR.

A *Wind and Microclimate Assessment*[72] is also submitted with this application. The Computational Fluid Dynamics model predicts the wind patterns around the Site. It concludes that the proposed Project will produce a high quality environmental that would be attractive and comfortable for pedestrians of all categories. Refer to Chapter 16 (Microclimate) of this EIAR.

Health and Safety

The Operational Phase of the proposed Project is unlikely to precipitate any significant impacts in terms of health and safety. The design of the proposed Project has been formulated to provide for a safe environment for future residents and visitors alike.

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[69] CS (2021e)
[70] OCSC (2021).
[71] *Building Research Establishment (BRE) Guidelines on Site Layout Planning for Daylight and Sunlight* (the BRE Guide).
[72] B-Fluid (2021).

During the Operational Phase traffic safety is the most significant concern when considering health and safety. However, the paths, roadways and public areas have all been designed in accordance with best practice and the applicable guidelines. Likewise the proposed residential units accord with the relevant guidelines and will meet all relevant safety and building standards and regulations, ensuring a development which promotes a high standard of health and safety for all occupants and visitors.

The will not result in any significant impacts on human health and safety once completed and operational.

7.5 Mitigation Measures

7.5.1 Construction Phase

The potential impacts on the human environment relate to other environmental aspects such as air quality, noise and vibration, water quality and traffic and where required, the related mitigation measures are dealt with in the corresponding chapters of this EIAR.

In the short-term the local area will be impacted during the Construction Phase due the influx of construction traffic, noise and dust. There will be a *neutral* impact on population trends and profile for the area as no additional persons will be accommodated at the Site during construction.

Otherwise *no adverse effects* will arise on the population either during Construction or Operational Phases.

All construction works will proceed in line with the recommendations and guidance provided in the outline CEMP[73] for the proposed Project, which is included with this planning application pack. The key measure for controlling dust are set out in the Dust Management Plan (refer to Appendix A11.3 in Volume 3) and the *Residential Travel Plan*[74] included with the subject application.

A final CEMP will be prepared by the appointed Contractor prior to work commencing on the 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 in the impact assessment.

[73] Altemar Ltd (2021a).
[74] CS Consulting Engineers (2021e).

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

A preliminary **Health and Safety** (H&S) Plan has been prepared and this Plan addresses health and safety issues from the design stage. The appointed Contractor will be required to prepare a final Construction Phase H&S Plan and any employed subcontractors will also be required adhere to this Plan. This Plan will operate in line with the requirements of ISO 18001 & ISO 14001.

The design of the final proposal will be subject to safety design reviews to ensure that all requirements of the proposed Project are safe. A Project Supervisor for the Design Process (PSDP) has been appointed as part of the design stage. Where issues are identified, corrective actions will be implemented to amend design issues prior to issuance of final design for construction. A Project Supervisor for the Construction Stage (PSCS) will be appointed as part of the Construction Phase.

The proposed Project will look to procure material and services from local providers, where reasonably practicable, and within the requirements of the procurement process. In doing so, this would encourage additional economic activity in the local economy which may subsequently result in indirect employment opportunities being created.

Adherence to the mitigation measures outlined in this EIAR will ensure that the construction works will an *imperceptible* and *neutral* impact in terms of health and safety.

The mitigation measures, proposed throughout this EIAR, are likely to result in any *significant and likely adverse* environmental impacts on Population and Human Health during the Construction Phase being avoided.

7.5.2 Operational Phase

The Operational Phase is considered to have likely *positive* impacts on human beings in relation to the provision of additional residential units and increase amenity spaces to cater for the demands of the local population in accordance with the principles of sustainable development and residential zoning objectives pertaining to the Site.

The layout and design of the proposed Project has been designed to take advantage of the opportunities afforded by the natural landscape and significant views from and through the Site to the regional park and the coastline.

The delivery of high quality units will be attractive to the proportion of the population seeking suitably sized accommodation in an urban and sustainable location. The subject lands will significantly contribute towards alleviating the housing crisis currently being experienced in Ireland, which is a positive impact associated with the proposed Project.

The proposed *Landscape Strategy* has incorporated a number of measures such as the provision of exercise and play equipment to encourage physical activity which will have a positive impact on the health and wellbeing of residents and visitors.

The provision of local services such as the crèche *etc* will result in a positive impact on the existing population and human health of the surrounding area.

No significant risks to Population and Human Health, as a result of the proposed Project, have been identified during the Operational Phase. The proposed Project is considered to have a *positive* and *significant* impact. No further mitigation measures are required.

7.6 Residual Impacts

Residual impacts are the final or intended impacts which occur after the proposed mitigation measures have been implemented. They refer to the degree of change that will occur after the proposed mitigation measures have taken effect.

The proposed Project is anticipate to provide a *significant positive* impact to the overall economy and social benefits for the local area and Fingal. Adherence to the mitigation measures outlined above in this chapter will ensure that there will be no *negative residual impacts or effects* on Population and Human Health, during the Construction and Operational Phases of the proposed Project. The provision of residential accommodation will result in a *likely significant positive effect* for the local area.

7.7 Monitoring

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

Site specific Health and Safety requirements will be undertaken by the Site Project Manager for the Construction Process. The Building Regulations certification process will address the necessary monitoring requirements of specific conditions of planning permission.

7.8 Reinstatement

There are no reinstatement plans proposed specifically with respect to Population and Human Health.

7.9 Interactions

There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to human health. In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

It is considered that there is the potential for *slight, temporary negative* impacts on the existing population due to: dust emissions associated with construction activities (**air quality**), **noise** associated with construction activities and inward traffic noise, construction **traffic** movements (noise & vibration), **visual** impacts associated with incomplete building structures *etc.* and waste (as a result of the incorrect management of waste resulting in littering, which could cause a nuisance to the public and attract vermin) associated with the **Construction Phase** of the proposed Project.

In addition, the construction of the proposed Project will also have a *temporary* impact on the services in the area, when the Site has to interrupt these services to connect to the main lines and on the landscape of the area, in terms of both general visual disturbance and visual intrusion. These impacts are addressed in more detail in Chapters 8-19. These impacts are *not considered* to be *significant.*

There is a potential for the **Operational Phase** of the proposed Project to impact human health via **air quality and climate** (climate change associated with greenhouse gas emissions from increased traffic movements), **noise and vibration** (associated with traffic and mechanical plant), **wind** (wind microclimate within and around the Site), **traffic** (traffic flow within and around the Site has the potential to create safety risks for local population) and **waste** (generation of waste for the development) and **services** (demand on built services *i.e.* water supply demand and wastewater services). These issues are discussed fully under the relevant chapters of the EIAR and in Chapter 20 (Interactions):

- Chapter 11: Air Quality and Climate.
- Chapter 12: Noise and Vibration.

- Chapter 16: Microclimate - Wind.
- Chapter 17: Traffic and Transport.
- Chapter 18: Material Assets - Waste.
- Chapter 19: Material Assets - Services.

7.10 Cumulative Impacts

Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions, together with those generated by the proposed Project. Therefore, the potential impacts of the proposed Project cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

In addition to the proposed Project there are a number of additional developments proposed in the vicinity of the Site that are considered in terms of a cumulative impact on the surrounding communities. These projects are discussed in Chapter 21 (Cumulative impacts).

The Site will accommodate 882 no. new residential dwellings (747 no. apartments, 135 no. houses), residential tenant amenities, village centre, and crèche. The proposed Project on its own will have a *positive, significant* and *permanent* impact on the population of Baldoyle and the Greater Dublin Area, in the provision of a residential development and amenity facilities.

The proposed Project, in-combination with the wider Fingal Development Plan is considered to be *positive*, having regard to the zoning objective for the Site.

7.11 'Do-Nothing' Impact

A '*do-nothing'* scenario is not considered valid as the lands are zoned RA '*new residential'*, with the objective to '*provide for new residential communities subject to the provision of the necessary social and physical infrastructure.*

In the event that the proposed Project does not proceed, it is likely that the Site will remain in is - partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development further south) - until an alternative redevelopment proposal is granted planning permission.

The potential impacts that may arise from the proposed Project on Population and Human Health have been considered cumulatively with other developments in the area. Refer to Chapter 21 (Cumulative Impacts) of this EIAR.

The cumulative impact of the proposed Project at the subject lands will be *positive* in the long-term in relation to Population and Human Health as the introduction of a new type of tenure will provide opportunities for a wide cohort of persons to rent within an area excellently served by local facilities, educational establishments and modes of transport.

7.12 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered in compiling this chapter of the EIAR.

8 Biodiversity

8.1 Introduction

This chapter of the EIAR was prepared by Bryan Deegan MCIEEM, Managing Director of Altemar Ltd. This chapter assesses the biodiversity value and potential impacts of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, on the ecology of the surrounding area within the potential zone of influence (ZOI).

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.

Bryan Deegan MCIEEM holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and National Diploma in Applied Aquatic Science. Bryan has over 26 years' experience as an environmental consultant in Ireland. Appendix A8.1 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.).

Desk studies were carried out to obtain relevant existing biodiversity information within the ZOI. The assessment extends beyond the immediate development area to include those species and habitats that are likely to be impacted upon by the proposed Project.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project 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 scheme 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 outline Construction Environmental Management Plan (CEMP). A Wintering Bird Survey Report has also been prepared and included at Appendix A8.1 in Volume 3.

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 Natura 2000 sites. No significant impacts are likely on Natura 2000 sites, alone in combination with other plans and projects based on the implementation of standard construction phase mitigation measures.*

The implementation of standard construction phase mitigation measures including the measures outlined above will be followed and will be sufficient to prevent adverse effects on the integrity of Natura 2000 sites."

8.2 Methodology

A pre-survey data search was carried out. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biological Data Centre (NBDC), the 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*[75], *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*[76], *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission*[77] and *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland*[78]. The Site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping[79] (Habitats were identified in accordance with *Fossitt's Guide to Habitats in Ireland*[80].

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[75] EPA (2017).
[76] EC (2013).
[77] EC (2017).
[78] CIEEM (2018).
[79] Smith et al., (2010)
[80] Fossitt (2000).

Figure 8.1: Satellite Image of the Site of the Proposed Project[81]

All surveys were carried out within the optimal survey period, refer to Table 8.1.

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

8.2.1 Receiving Environment

The vast majority of the Site primarily consists of an area of bare ground that has undergone re-profiling and enabling works in the past. Historic satellite imagery shows that the Site was originally an agricultural field, however site clearance commenced after 2005 and by 2009, the vast majority

[81] Google Earth (2020).

of the Site had been cleared with areas of construction activity, roads and bare 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. The Site is proximate to the Baldoyle Bay SAC and Baldoyle Bay SPA.

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

Designated conservation sites within 15km of the Site outline 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 15km.

Up to date GIS data (National Parks and Wildlife Service (NPWS) WMS data in addition to shapefiles) were acquired and plotted against 5km, 10km and 15km buffers from the Site. The potential zone of influence (ZOI) was set at a radius of 2km from 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 assessment extended. A data search of rare and threatened species within 5km of the Site was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre maps data search and previous planning applications in the vicinity.

8.2.3 Habitats, Flora and Avian Ecology

A pre-survey data search was carried out. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources; the National Parks and Wildlife Service, NPWS Rare and Protected Species Database, National Biodiversity Data Centre, in addition to aerial, 6-inch, satellite imagery. Following the desktop study, a 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 ArcGIS 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 fields 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 search for habitats suitable for amphibians and reptiles.

8.2.4 Bat Fauna

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

8.2.5 Invasive Species

On the 11 September 2020, the Site 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 (Japanese Knotweed) was carried out on the 9 August 2019 by Knotweed Surveyor Ronnie Murphy of Knotweed Control Ireland and this report is included in Appendix A8.2 in Volume 3. This includes a survey of the area outside the red line where Japanese knotweed has been noted.

8.3 Baseline Environment

8.3.1 Designated Conservation Sites

Designated sites are presented in Figure 8.2 (SAC within 15km), Figure 8.3 (SPA's within 15km), Figure 8.4 (NHA and pNHAs within 5km), Figure 8.5 (watercourses in proximity to the Site), Figure 8.6 (watercourses and SAC's within 1km), Figure 8.7 (Watercourses and SPA's within 1km) and Figure 8.8 (Watercourses and pNHA's within 1km). It should be noted that the Site is not within a designated conservation site. The closest Natura 2000 site is Baldoyle Bay SAC, which is 400m from the proposed Project. The nearest SPA to the Site is the Baldoyle Bay SPA which is located 700m from the Site.

There are no designated Natural Heritage Areas (NHA) within a 15km radius, however the nearest Proposed NHA (Baldoyle Bay) is 400m from the Site. The distance and details of the conservation sites within 15km 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 & pNHA via the existing attenuation pond and the Mayne River.

Table 8.2: Distances to Designated Conservation Sites within 15km

Name	Distance (km)	Type
SAC		
Baldoyle Bay SAC	(400m)	SAC
North Dublin Bay SAC	(1.6km)	SAC
Malahide Estuary SAC	(3.8km)	SAC
Howth Head SAC	(4.5km)	SAC
Ireland's Eye SAC	(4.9km)	SAC
Rockabill to Dalkey Island SAC	(6.0km)	SAC
South Dublin Bay SAC	(6.8km)	SAC
Rogerstown Estuary SAC	(10.5km)	SAC
Lambay Island SAC	(10.9km)	SAC
SPA		
Baldoyle Bay SPA	(700m)	SPA
North Bull Island SPA	(1.8km)	SPA
Malahide Estuary SPA	(4.4km)	SPA
Ireland's Eye SPA	(4.6km)	SPA
South Dublin Bay and River Tolka Estuary SPA	(5.4km)	SPA
Howth Head Coast SPA	(6.0km)	SPA
Rogerstown Estuary SPA	(10.0km)	SPA
Lambay Island SPA	(11.6km)	SPA
Dalkey Islands SPA	(14.0km)	SPA
NHA / pNHA		
Baldoyle Bay pNHA	(400m)	pNHA
North Dublin Bay pNHA	(1.6km)	pNHA
Sluice River Marsh pNHA	(2.0km)	pNHA
Malahide Estuary pNHA	(3.8km)	pNHA
Feltrim Hill	(4.1km)	pNHA
Howth Head pNHA	(4.5km)	pNHA
Ireland's Eye pNHA	(4.9km)	pNHA
Santry Demesne pNHA	(6.0km)	pNHA
South Dublin Bay pNHA	(6.8km)	pNHA
Royal Canal pNHA	(7.9km)	pNHA
Grand Canal pNHA	(8.8km)	pNHA
Dolphins, Dublin Docks pNHA	(8.9km)	pNHA
Rogerstown Estuary pNHA	(10.5km)	pNHA
Booterstown Marsh pNHA	(10.5km)	pNHA
Lambay Island pNHA	(11.6km)	pNHA
Dalkey Coastal Zone and Killiney Hill pNHA	(12.3km)	pNHA
Liffey Valley pNHA	(14.3km)	pNHA

Figure 8.2: Special Areas of Conservation (SAC) within 15km of the Site

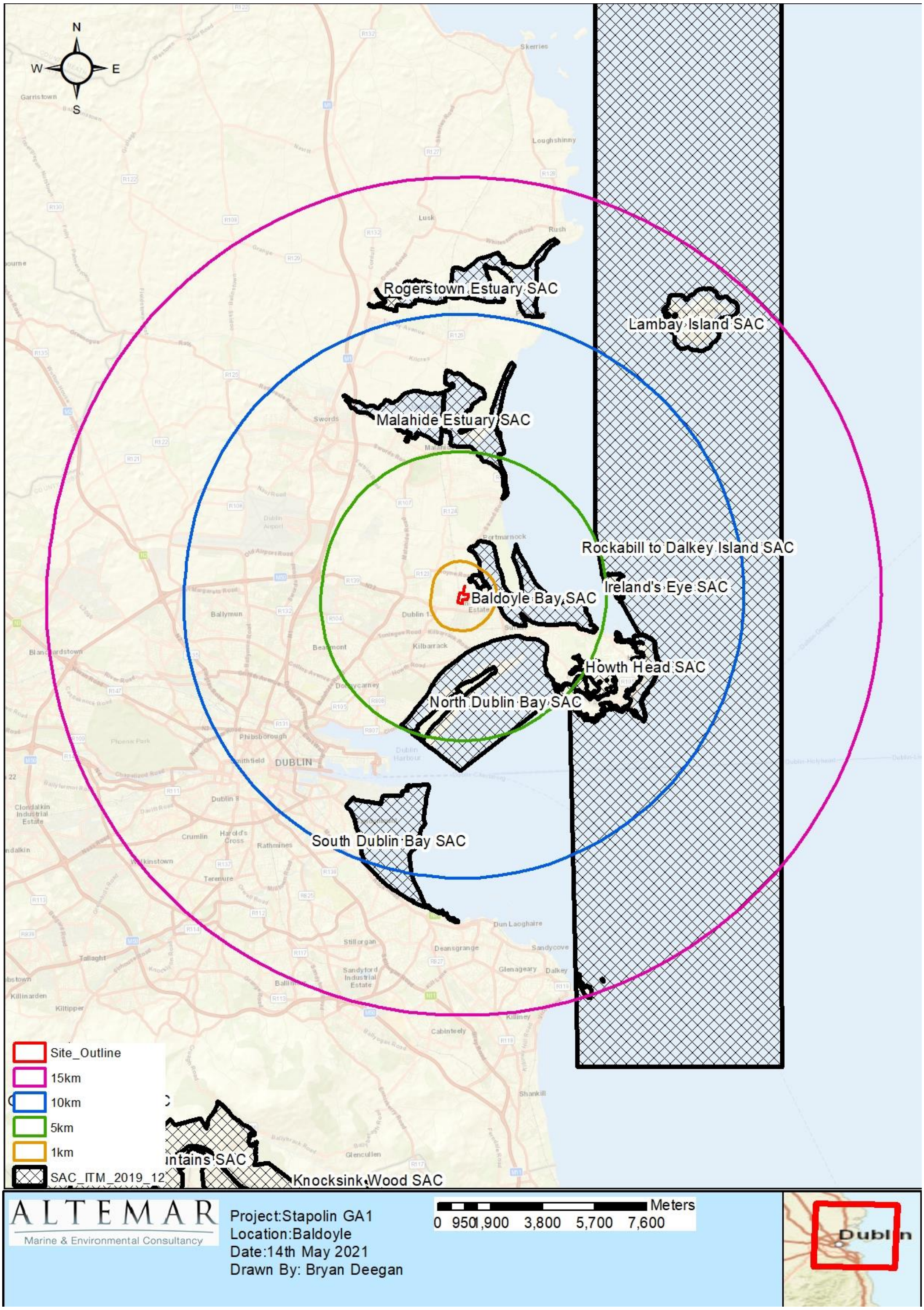


Figure 8.3: Special Protection Areas (SPA) within 15km of the Site

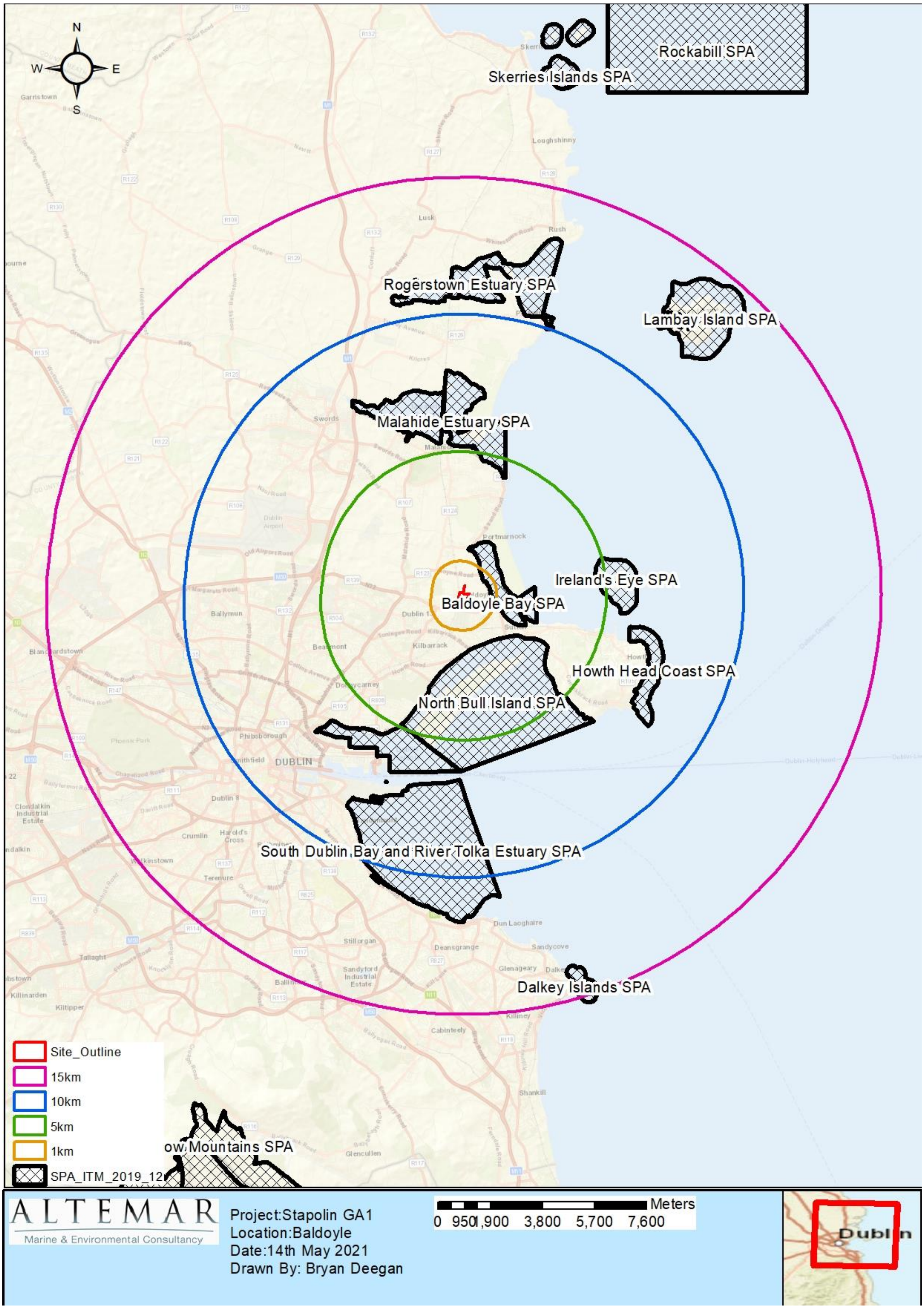


Figure 8.4: Natural Heritage Areas (NHA) & proposed Natural Heritage Areas (pNHA) within 5km of the Site

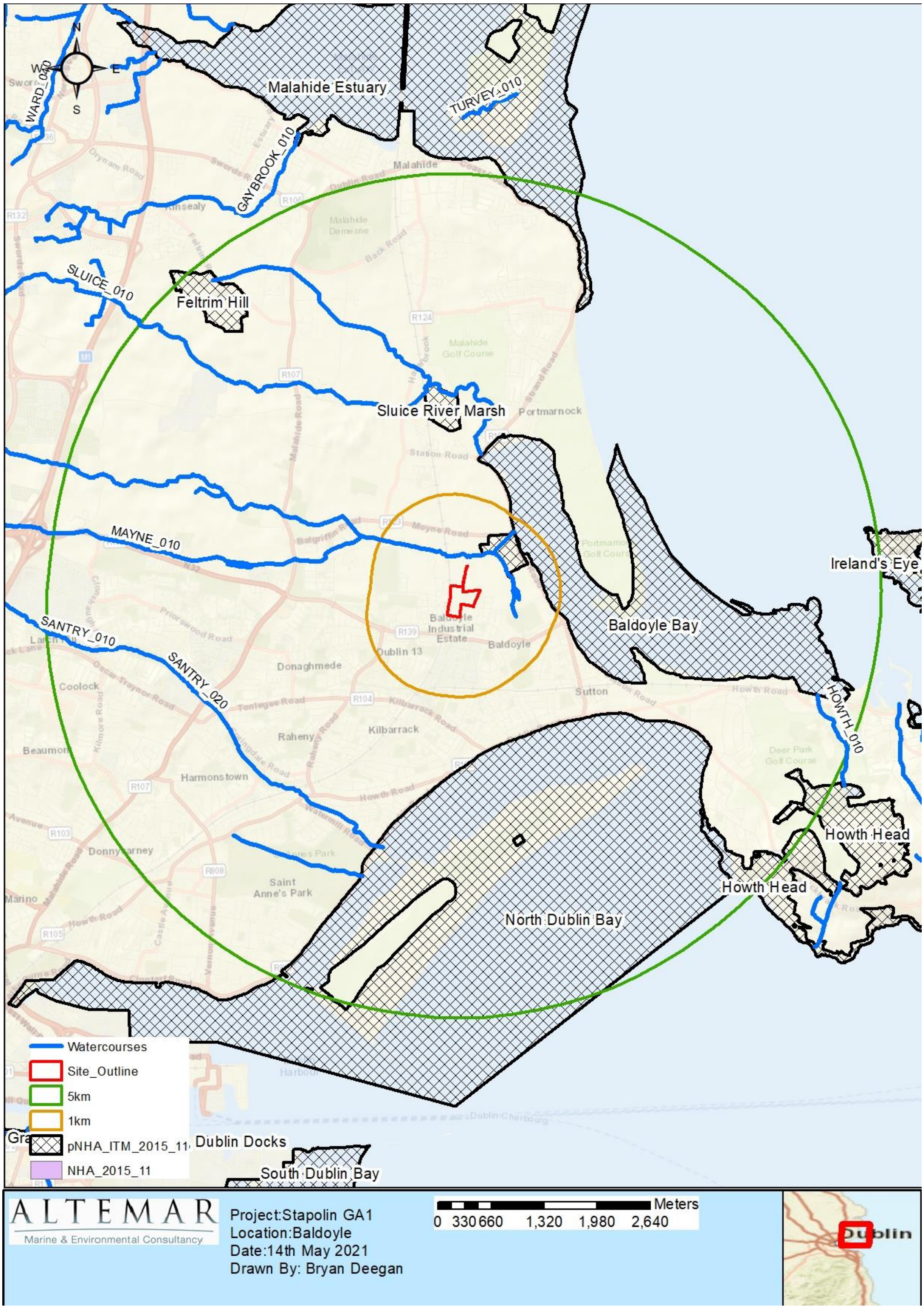


Figure 8.5: Watercourses within 1km of the Site (EPA-WFD)

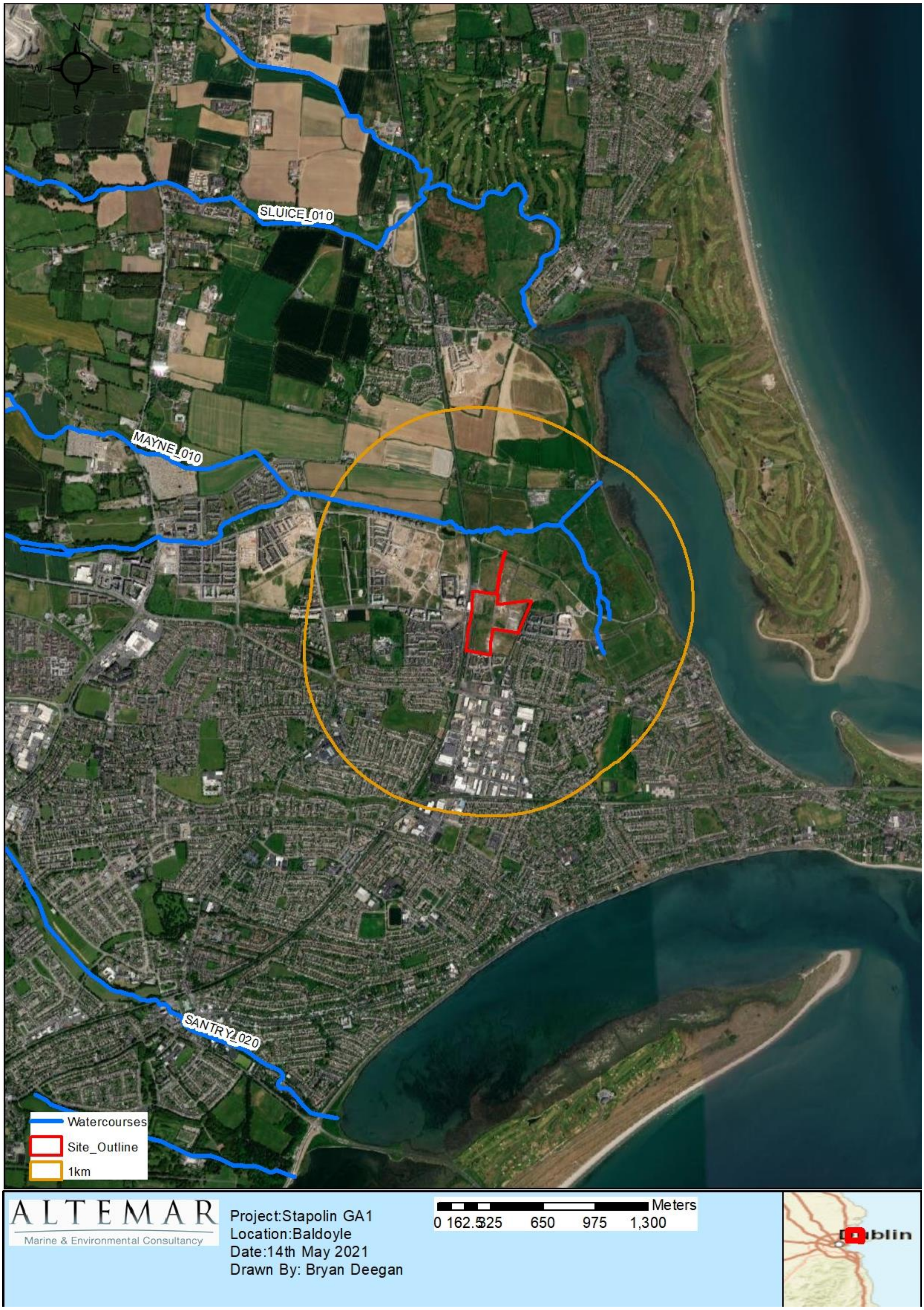
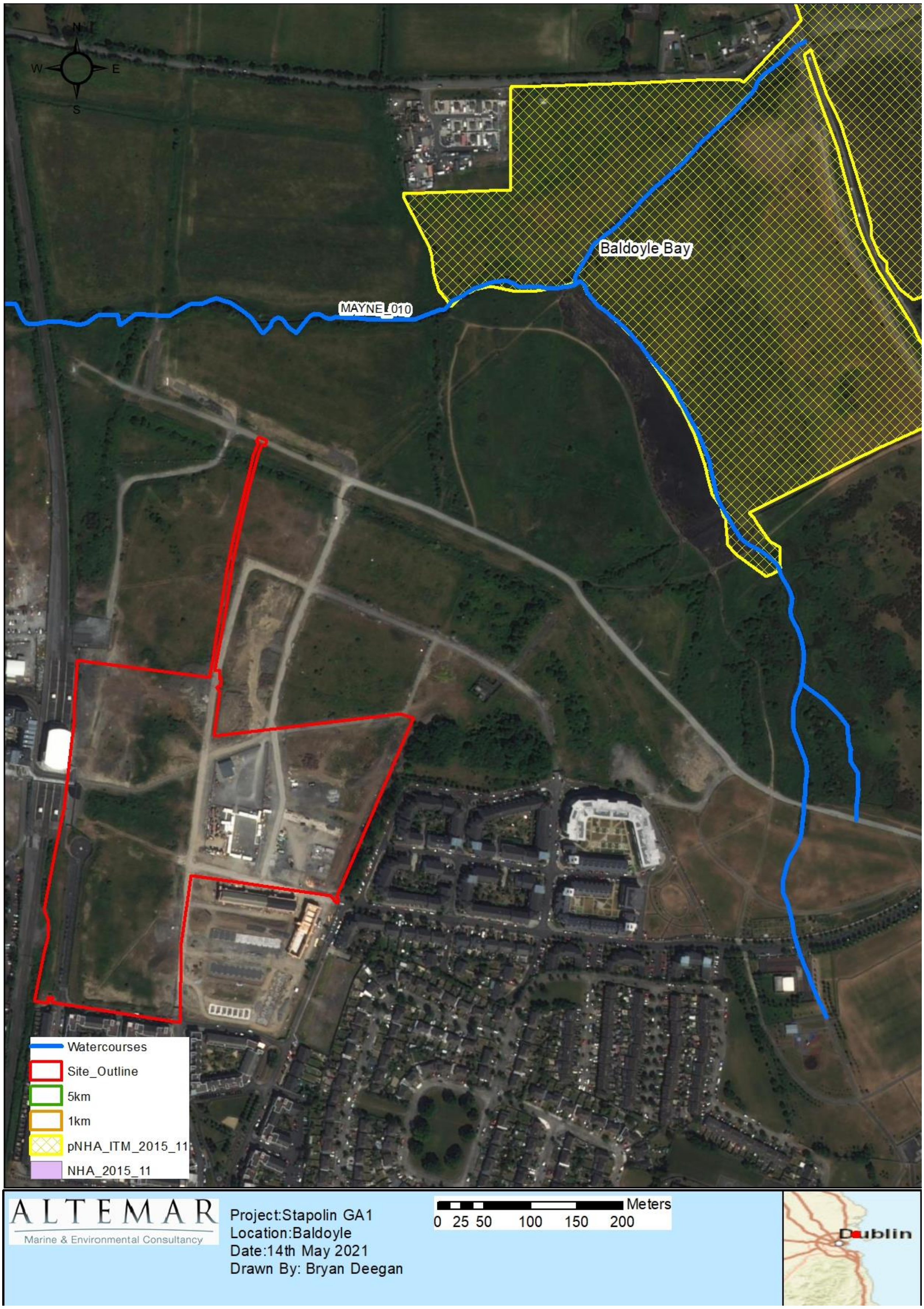


Figure 8.6: Waterbodies and SAC's within 1km of the Site (EPA-WFD)

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

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



8.3.2 Biodiversity Records

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

Table 8.3: National Biodiversity Centre Records Data (Rare, protected and invasive species only) within the 2km^2 grid (O24F)

List Of All Species Recorded in the 2km^2 Grid Area	
Common Frog (*Rana temporaria*)	Northern Lapwing (*Vanellus vanellus*)
Barn Swallow (*Hirundo rustica*)	Rock Pigeon (*Columba livia*)
Black-headed Gull (*Larus ridibundus*)	Short-eared Owl (*Asio flammeus*)
Black-tailed Godwit (*Limosa limosa*)	Sky Lark (*Alauda arvensis*)
Brent Goose (*Branta bernicla*)	Spotted Flycatcher (*Muscicapa striata*)
Common Kestrel (*Falco tinnunculus*)	Stock Pigeon (*Columba oenas*)
Common Linnet (*Carduelis cannabina*)	Yellowhammer (*Emberiza citrinella*)
Common Redshank (*Tringa totanus*)	Bombus (*Bombus lucorum*)
Common Shelduck (*Tadorna tadorna*)	Large Red Tailed Bumble Bee (*Bombus (Melanobombus lapidarius*)
Common Snipe (*Gallinago gallinago*)	Moss Carder-bee (*Bombus (Thoracombus) muscorum*)
Common Starling (*Sturnus vulgaris*)	Eurasian Pygmy Shrew (*Sorex minutus*)
Common Swift (*Apus apus*)	European Otter (*Lutra lutra*)
Common Wood Pigeon (*Columba palumbus*)	European Rabbit (*Oryctolagus cuniculus*)
Eurasian Curlew (*Numenius arquata*)	Irish Hare (*Lepus timidus subsp. hibernicus*)
Eurasian Oystercatcher (*Haematopus ostralegus*)	Irish Stoat (*Mustela erminea subsp. hibernica*)
Eurasian Teal (*Anas crecca*)	Soprano Pipistrelle (*Pipistrellus pygmaeus*)
Eurasian Tree Sparrow (*Passer montanus*)	West European Hedgehog (*Erinaceus europaeus*)
Eurasian Wigeon (*Anas penelope*)	
Eurasian Woodcock (*Scolopax rusticola*)	
Great Cormorant (*Phalacrocorax carbo*)	
Herring Gull (*Larus argentatus*)	*Invasive Species*
House Martin (*Delichon urbicum*)	Butterfly-bush (*Buddleja davidii*)
House Sparrow (*Passer domesticus*)	Giant Hogweed (*Heracleum mantegazzianum*)
Little Egret (*Egretta garzetta*)	Harlequin Ladybird (*Harmonia axyridis*)
Mallard (*Anas platyrhynchos*)	
Mew Gull (*Larus canus*)	
Mute Swan (*Cygnus olor*)	

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. There are no recorded sightings within the Site itself, however the Common Frog (*Rana temporaria*) were noted 30m and 150m to the south-west. No other species of conservation importance were noted at high resolution within 1km^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 8.9. Each habitat type and species encountered are assessed in detail.

Figure 8.9: Fossitt (2000) Classification of the Site of the Proposed Project

ED3- Recolonising Bare Ground

As can be seen from Figure 8.9 the vast majority of the Site consists of an area of Recolonising Bare Ground. Based upon an examination of historic satellite imagery 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 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.

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. Ongoing management is in place for the management of the Japanese knotweed.

Plate 8.1: 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.

Plate 8.2: WS1 Scrub

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.

Plate 8.3: 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.

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 10km square but not within 2km at a finer resolution. No hedgehogs were seen during the Site visit.

Amphibians

The common frog (*Rana temporaria*) or newts (*Triturus vulgaris*) were not observed on-site. Frogs have been recorded by the NBDC within the 10km 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 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.

Bat fauna

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 was previously agricultural 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 Assessment (Appendix I), snipe (*Gallinago gallinago*) has amber conservation status and has been noted within GA1. This species is not 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. Based on the observations of wintering bird use within the wintering bird survey report and the lack of suitable foraging habitat on site which primarily consists of recolonising bare ground, the Site is deemed not to be an important area for wintering or breeding birds.

8.4 Potential Impact of the Proposed Project

This section provides a description of the potential impacts that the proposed Project may have on biodiversity in the absence of mitigation. Methodology for determining the significance of an impact has been published by the EPA. This is based on the valuation of the ecological feature in question and the scale of the predicted impact. In this way, it is possible to assign an impact significance in a transparent and objective way.

8.4.1 Construction Phase

8.4.1.1 Designated Natura 2000 Sites within 15km

The proposed Project is not within a designated conservation site. However, Baldoyle Bay SAC, pNHA and SPA 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 would be localised to the vicinity of the works and would not impact on the qualifying interests of the Baldoyle Bay SPA. It is noted that the existing busy coastal road (R106) is located between the proposed Project and the Baldoyle Bay SPA, which is 700m 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 SAC and pNHA, along with the Baldoyle Bay SPA are located to the direct east of the proposed Project. Without mitigation, dust emissions from construction works would have potential to impact vegetation in the SAC, pNHA and SPA. However, once the mitigation measures outlined in Section 11.5 and in the Dust Management Plan (Appendix A11.3) are implemented, dust related impacts from the short-term Construction Phase are predicted to be imperceptible.*"

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 outline. Works have the potential to lead to silt laden and contaminated runoff 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 mammal species of were recorded on-site or in NPWS or NBDC records. Loss of habitat and habitat fragmentation may affect some common mammalian species and there is expected to be mortality during construction. 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 Bat Fauna

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 / Slight, negative, temporary, localised.* Mitigation is not required

8.4.1.5 Avian Fauna

As can be seen from Appendix A8.1, the *Wintering Bird Survey* covered the Site 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 at GA1 is 700m from the Baldoyle Bay SPA (at its closest) Based on the "*maximum likely distance at which disturbance will impact SCIs from the Baldoyle Bay SPA is 300m*"[82], disturbance from the proposed works would not be expected. Snipe (*Gallinago gallinago*) has amber conservation status and has been noted within GA1. This species is not a

[82] Cutts *et al.*, (2013).

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 (Snipe) and breeding / nesting birds.

Impacts: *Negative / Slight / Short-term, likely, localised*. Mitigation is required.

8.4.2 Operational Impacts

Once constructed all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff 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.

8.4.2.1 Designated Conservation Sites within 15km

The development 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.

Impacts: *Negative / Slight / Short-term, likely, localised*. Mitigation is required.

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.

Impacts: *Neutral, Slight, negative to slight positive, localised, likely; permanent.*

8.4.2.3 Bat Fauna

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 / Slight negative; permanent, localised.*

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 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 may result in an increase in activity on the surrounding roads and on Portmarnock Beach. The presence of buildings and landscaping on site could result in increased nesting opportunities.

Impacts: *Negative / Slight / long-term, likely, localised.* Mitigation is required

8.4.3 Cumulative Impacts

The Site is located in a previously disturbed environment. Projects and plans in the vicinity of the proposed Project are seen in Table 8.4 and the projects and plan in the wider area are in Table 8.5.

Table 8.4: Key Projects / Developments in the Immediate Surrounding Area

Title (Planning Reference)	Description
Baldoyle-Stapolin Local Area Plan 2013 (Extended)	The Site forms part of a wider RA zoning as set out in the Baldoyle-Stapolin Local Area Plan (LAP) 2013 (extended), refer to Section 3.4.2. Development of the remainder of the LAP, including the future GA3 project to the north of the Site, as well as further potential future residential and landscape / amenity works as indicated in the LAP, refer to Figure 21.1 of Chapter 21.
Primary School Myrtle, Grange Road Baldoyle (FCC ref. no.: F19A/0461)	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 development also incorporates associated car parking, access road, pedestrian access, bicycle lane, construction of two (2 no.) external ball courts, landscaping, connection to public services and all associated site works. Refer to Figure 21.1 of Chapter 21.
Growth Area No. 2 (GA2) (FCC Reg. Ref. 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 No. 2 (GA2), as per Baldoyle-Stapolin Local Area Plan.

Title (Planning Reference)	Description
	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. Refer to Figure 21.1 of Chapter 21.
Clongriffin - Belmayne Local Area Plan 2012-2018	Lands west of the railway lie with the functional area of Dublin City Council. The lands are covered by the Clongriffin – Belmayne Local Area Plan 2012-2018, with the Clongriffin and Marrsfield areas located directly west of the railway. Refer to Figure 21.1 of Chapter 21. 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 on-going from previous permissions (DCC Refs.: 2903/16, 3776/15, 2478/17, 4266/16, 2610/16, 3117/16, 4101/16 and 2569/17). Refer to Figure 21.1 of Chapter 21.

Table 8.5: Key Projects / Developments in the Wider Area

Title (Planning Reference)	Description
Portmarnock South Local Area Plan 2013	The Baldoyle-Stapolin LAP area is linked in planning framework terms with the Portmarnock South LAP 2013 (to immediate north), which will provide for up to c. 1200 residential units. Refer to Figure 21.1 of Chapter 21.
St. Marnock's Bay Off Station Road, Portmarnock South	▪ **Phase 1A** (c. 100 no. residential units) is complete; ▪ **Phase 1B** (c. 150 no. residential units) is nearing completion; and ▪ **Phase 1C** (c. 153 no. residential units - including a small local centre) is commencing construction. An Bord Pleanála Ref.: 305619.

Title (Planning Reference)	Description
	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. These three areas are located to the north-west of the proposed Project. Refer to Figure 21.1 of Chapter 21.
Drumnigh (F14A/0132 (ABP Ref. PL06F.244401) as amended by F17A/0412 (minor))	Construction on-going south of Drumnigh in accordance with F14A/0132 (ABP Ref. PL06F.244401) as amended by F17A/0412 (minor). Construction of 270 no. dwelling houses (terraced, semi-detached and detached), 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 (comprising 111 no. on-street car parking spaces and 445 no. on-curtilage car parking spaces); provision of a vehicular and pedestrian access to the site via a new roundabout junction onto the Drumnigh Road.
Greater Dublin Drainage (GDD) Project (An Bord Pleanála ref. 301908)	Irish Water received permission for a major wastewater infrastructure project (Greater Dublin Drainage (GDD) 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 An Bord Pleanála. 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.

All of the proposed residential developments listed in Tables 8.4 and 8.5 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 has provided for the inclusion of specific measures to avoid and mitigate potential adverse impacts on the environment.

In addition, the proposed Project provides for alterations and amendments to an existing permitted development, which was also subject to environmental impact assessment (EIA) and the preparation of an Environmental Impact Statement (EIS).

Developments at Portmarnock South (St. Marnock's Bay) and Drumnigh are located approximately 1km 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 attention wetlands 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 on-going 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 in the context of an area undergoing continued development, would be considered neutral.

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, recreational 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. No significant negative cumulative impacts will arise during the operation of the proposed Project.

Where they arise, the assessment presented in each chapter of the EIAR has considered potential cumulative impacts of Construction and Operational Phases of the proposed Project.

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.

Construction phase mitigation will be incorporated into the proposed Project to minimise the potential negative impacts within the Zone of Influence (ZoI) including biodiversity, the Mayne River, downstream Natura 2000 sites and human health including nearby residents (refer to Table 8.6). These measures have been developed by a multidisciplinary team and are also outlined in the CEMP.

Table 8.6. Mitigation Measures

Sensitive Receptors	Potential Impacts	Mitigation Measures
Baldoyle Bay SPA [IE0004016] Baldoyle Bay SAC [IE0000199] Mayne River Population / Human Health & Residents Biodiversity	Habitat degradation Dust deposition Pollution Silt ingress from site runoff Downstream impacts Negative impacts on aquatic and bird fauna. Disturbance	**Construction Phase** <u>Contamination of watercourses leading to Natura 2000 Sites</u> ▪ Appointment of an ecologist to oversee enabling works and the implementation of mitigation measures outlined. ▪ Staging of project to reduce risks to watercourses from contamination ▪ Control of Water during Construction ▪ 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. ▪ Sealing of drainage ditches at the most downstream element prior to the watercourse, with a tall 45 degree sloped earth and batted back bund prior to site clearance and re-profiling. ▪ Any discharges to the watercourse during construction must be discussed with the ecologist and undergo desilting and petrochemical interception. ▪ Should discharges be required to the watercourse the drainage network and attenuation must be implemented at initial stages. Discharges of desilted water from the site should be made to the attenuation system so that the hydro-brake and interceptor are in place during any discharges. ▪ Local watercourses must be protected from dust, silt and contaminated surface water throughout the works. ▪ Local silt traps established throughout site as discussed with the ecologist. ▪ Mitigation measures on site include dust control, stockpiling away from watercourse and drains ▪ Stockpiling of loose materials will be kept to a minimum of 20m from watercourses and drains. ▪ Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system and watercourses. ▪ Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches or the watercourse, excavations and other locations where it may cause pollution.

Sensitive Receptors	Potential Impacts	Mitigation Measures
		▪ Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the stream. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality. ▪ During the construction works silt traps will be put in place in the vicinity of all runoff channels the stream to prevent sediment entering the watercourse. ▪ Petrochemical interception and bunds in refuelling area ▪ Planting in the vicinity of the stream crossings should be put in place as soon as possible to allow biodiversity corridors to establish. ▪ On-site inspections will be carried out by project ecologist during enabling works and until drainage connection is complete. ▪ Maintenance of any drainage structures (e.g. de-silting operations) must not result in the release of contaminated water to the surface water network. ▪ No entry of solids or concrete to the associated stream or drainage network during the connection of pipework. Air & Dust ▪ The pro-active control of fugitive dust will ensure prevention of significant emissions arising, rather than a less effective attempt to control them once they have been released. ▪ 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 15-20kmph, and on hard surfaced roads as site management dictates.

Sensitive Receptors	Potential Impacts	Mitigation Measures
		▪ 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. ▪ Dust may enter the onsite watercourse via air or surface water with potential downstream impacts. Mitigation measures will be carried out reduce dust emissions to a level that avoids the possibility of adverse effects on the onsite watercourse. The main activities that may give rise to dust emissions during construction include the following: o Excavation of material. o Materials handling and storage. o Movement of vehicles (particularly HGV's) and mobile plant. o Contaminated surface runoff. o Trucks leaving the site with excavated material will be covered so as to avoid dust emissions along the haulage routes. ▪ Speed limits on site (15kmh) to reduce dust generation and mobilisation. ▪ The stream is to be protected from dust on site. This may require additional measures in the vicinity of the bridge (east of the site) if this road is used for machinery e.g. placing of terram / protective material over the stream. ▪ Regular inspections of the site and boundary should be carried out to monitor dust, records and notes on these inspections should be logged. ▪ Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. ▪ Make the complaints log available to the local authority when asked. ▪ Record any exceptional incidents that cause dust and / or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.

Sensitive Receptors	Potential Impacts	Mitigation Measures
		<u>Monitoring</u> ▪ Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces within 100m of site boundary, integrity of the silt control measures, with cleaning and / or repair to be provided if necessary. ▪ Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. ▪ Fully enclose specific operations where there is a high potential for dust production and the Site is active for an extensive period. ▪ Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. ▪ Cover, seed or fence stockpiles to prevent wind whipping. ▪ 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 will be regularly watered, as appropriate, during dry and / or windy conditions. ▪ Maintain a vegetated strip and vehicle exclusion zone between the works and the onsite watercourse in consultation with the project ecologist. ▪ 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. ▪ 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. <u>Measures Specific to Earthworks</u> ▪ Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

Sensitive Receptors	Potential Impacts	Mitigation Measures
		▪ Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. ▪ Only remove the cover in small areas during work and not all at once. ▪ During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust. ▪ Due to the proximity of the onsite watercourse an ecologist will oversee works in particular the excavation of material from the perimeter of the site. ▪ The appointed Contractor will be required to consult with an ecologist prior to the beginning of works to identify any additional measures that may be appropriate and/or required. <u>Storage / Use of Materials, Plant & Equipment</u> ▪ Materials, plant and equipment shall be stored in the proposed site compound location; ▪ Plant and equipment will not be parked within 50m of the onsite watercourse at the end of the working day; ▪ Hazardous liquid materials or materials with potential to generate run-off shall not be stored within 50m of the onsite watercourse. ▪ All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed Project site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater; ▪ Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested, in good condition and have no signs of leaks or spillages; ▪ Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements; and ▪ All persons working will receive work specific induction in relation to material storage arrangements and actions to be taken in the event of an accidental spillage. Daily environmental toolbox talks /

Sensitive Receptors	Potential Impacts	Mitigation Measures
		briefing sessions will be conducted for all persons working to outline the relevant environmental control measures and to identify any environment risk areas / works. <u>Noise</u> With regard to Construction Phase 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 appointed 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 NSLs 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; ▪ screening; and ▪ liaison with the public. Construction Phase noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the 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.

8.5.2 Operational Phase

The proposed Project will have to comply with SUDS, legislative requirements in relation to pollution control (e.g. petrochemical interception) and the provision of measures such as petrochemical interceptors and silt interception. An existing attenuation pond has been developed. On-site amenity areas will be developed prior to completion of housing units. In relation to foul water treatment capacity, as outlined in the *Engineering Services Report*[83], submitted with this application. Irish Water have confirmed that the proposed connection to the Irish Water Network can be accommodated.

8.6 Residual Impacts

The successful implementation of the 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 into its design so that application of the mitigation measures outlined in this EIAR and CEMP will help reduce the impact on biodiversity ecology to not significant level. It is felt that where possible biodiversity enhancement measures have been incorporated into the design for the benefit of the overall biodiversity value of the Site. Landscaped areas such as the linear parks and swales will provide areas for biodiversity. The overall impact on the ecology of the proposed Project will result in a *long-term, slight, neutral, residual* impact on the existing ecology of the site and overall locality. 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 within the EIAR.

8.7 Monitoring

An appointed Ecologist will be appointed to monitor the Site from pre-construction surveys, during Construction Phases and Post Construction. This would include obtaining derogation licences if necessary from the National Parks and Wildlife Service (NPWS).

[83] Cronin & Sutton (CS) Consulting Engineers (2021).

8.8 Reinstatement

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

8.9 Interactions

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions. There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to the biodiversity chapter. The biodiversity chapter of the EIAR involves interactions with:

- Chapter 9: Land, Soils Geology and Hydrogeology.
- Chapter 10: Water (Hydrology).
- Chapter 11: Air Quality and Climate.
- Chapter 12: Noise and Vibration.
- Chapter 17: Traffic and Transportation.
- Chapter 18: Material Assets - Waste Management.

It is considered that there is the potential for *slight, temporary negative* impacts on biodiversity due to dust (air), noise, emissions to water, construction traffic and waste associated with the **Construction Phase** of the proposed Project. These impacts are addressed in more detail in chapters 9-19. The Site has previously undergone significant site clearance and these impacts are not considered to be significant.

There is a potential for the **Operational Phase** of the proposed Project to impact on biodiversity via water, air quality traffic. However, post mitigation these impacts are not deemed to be significant. These issues are discussed fully under the relevant chapters:

- Chapter 10: Water (Hydrology).
- Chapter 11: Air Quality and Climate.
- Chapter 13: Landscape and Visual.
- Chapter 17: Traffic and Transportation.
- Chapter 18: Material Assets - Waste Management.

8.10 'Do-Nothing' Impact

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. However, the Site has been identified for development within the Local Area Plan and it would be expected that these lands will be developed at some stage and that the impacts of any development would be broadly similar to those of proposed Project.

8.11 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.

8.12 Worst-Case Scenario

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

Worst Case Scenario Impacts: *Unlikely, Negative, Slight, localised, Temporary*. Standard controls required.

9 Land, Soils, Geology and Hydrogeology

9.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Paul Conaghan, Environmental Consultant of AWN Consulting Ltd. Paul Conaghan 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).

This chapter 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) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), 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.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. 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:

- CIRIA[84] (2001). *Control of Water Pollution from Construction Sites.*
- CIRIA (2002). *Environmental Handbook for Building and Civil Engineering Projects.*

[84] Construction Industry Research and Information Association.

- 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.*
- IGI (2013). *Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements*
- 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 A9.1 in Volume 3, 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;
- 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 2km 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) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) - website mapping and database information;
- National Parks and Wildlife Services (NPWS) - Protected Site Register; and

Site specific data was derived from the following sources:

- Ground Investigations Ireland (GII) (2020). *GA1 Baldoyle Environmental Assessment Report.*

Figure 9.1 below presents the location of the Site. This chapter details the environmental assessment of the proposed Project located at Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, on the receiving environment.

Figure 9.1: Site Location[85]

9.3 Baseline Environment

9.3.1 Site Description

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha.

The Site is partly undeveloped and historically greenfield in nature and partly a temporary construction compound associated with on-going development further south. The undeveloped lands of Baldoyle-Stapolin Growth Areas No. 2 (GA2) and No.3 (GA3) lie directly to the north and north-east of the subject lands. Baldoyle Racecourse Park is located further to the north and east of the Site and the Baldoyle Estuary is further east beyond the R106 Coast Road.

[85] CS Consulting.

The surrounding environment can be described as a mix of remnant agricultural, parkland and residential (to the south). Site investigation works[86] noted a network of access roads traversing the land and a large construction compound area located on the eastern section of the Site.

The Site is zoned RA '*new residential*'. The objective of RA zoned lands is to '*provide for new residential communities subject to the provision of the necessary social and physical infrastructure*.'

9.3.2 Topography & Setting

The Site is mostly flat at 6m 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 had been cleared with areas of construction activity, roads and bare 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 & commercial units 500m to the south, at Baldoyle Industrial Estate.

The Site is bound by the Dublin-Belfast / DART train line and Clongriffin train station to the west. The Site is also bound by existing residential areas at Myrtle and Red Arches to the south and east respectively.

The lands surrounding the western, southern and eastern boundaries of the Site are predominately residential in nature. To the north and north-east of GA2 and GA3 is an area designated as 'high amenity' comprising partially of open fields and areas associated with the Baldoyle Estuary.

The proposed Project gradient varies between 10m above Ordnance Datum (mAOD) in the south and 8mAOD 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, or which could be considered suitable for protection under this programme or recorded in the Fingal Development Plan 2017-2023 (the '*Development Plan*').

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[86] Ground Investigation Ireland (GII) (2020).

The nearest Geological Heritage Site is the North Bull Island, which is located c. 1.7km to the south of the Site. Due to the distance and the compact nature of the calp limestone beneath the 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). The assessment of Site history[87] confirms that until recently, the Site has been in agricultural use since the earliest mapping available (1837-1842).

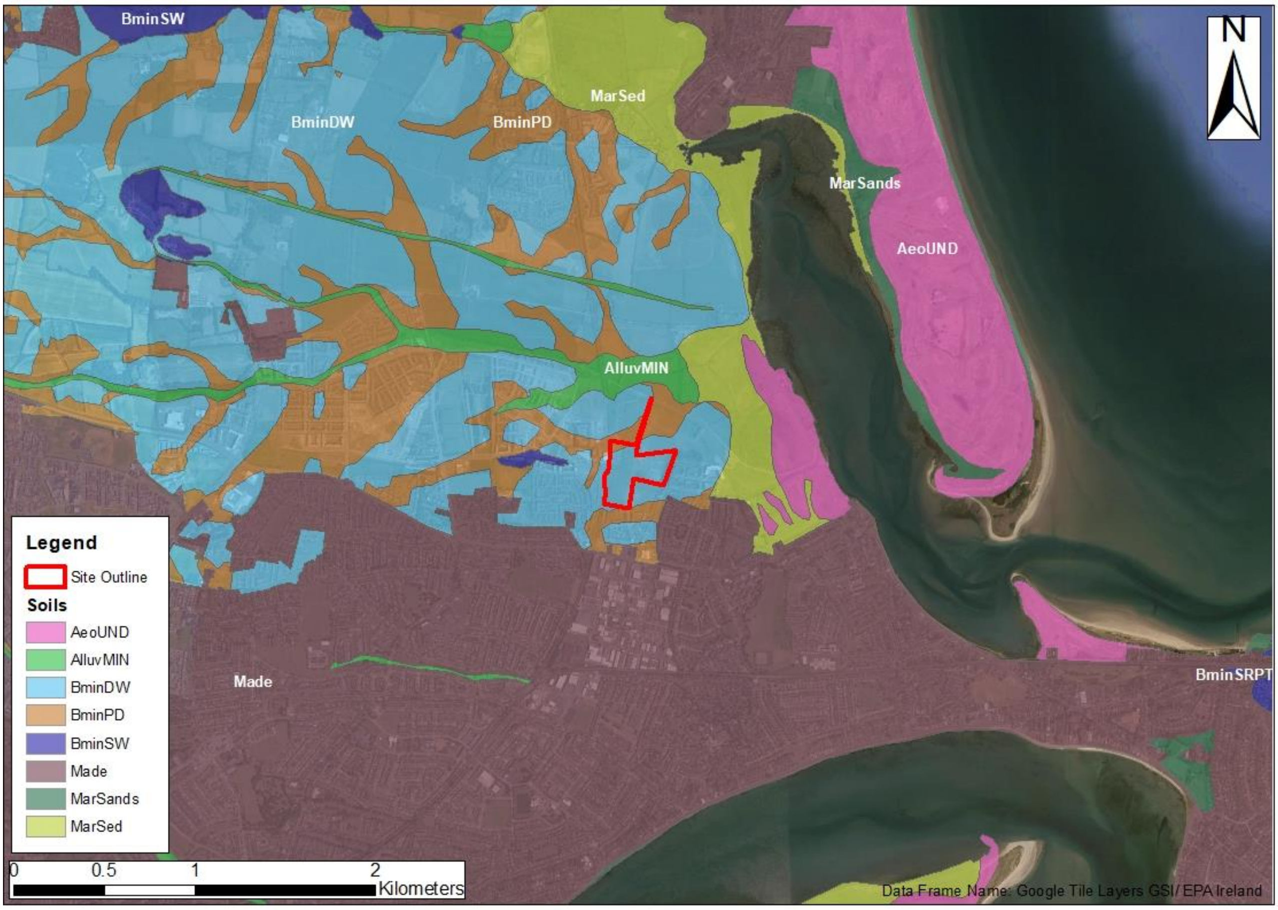
According to the EPA (2021) there are no licensed IPPC or IED facilities in the vicinity of the Site. There is no record of any landfills or licenced waste facilities in the vicinity of the Site.

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). 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 large part of the area is in use as a construction compound. The soil mapping for the site is presented below as Figure 9.2.

[87] OSI (2021).

Figure 9.2: Regional Teagasc Soils Map[88]



9.3.5 Subsoils (Quaternary)

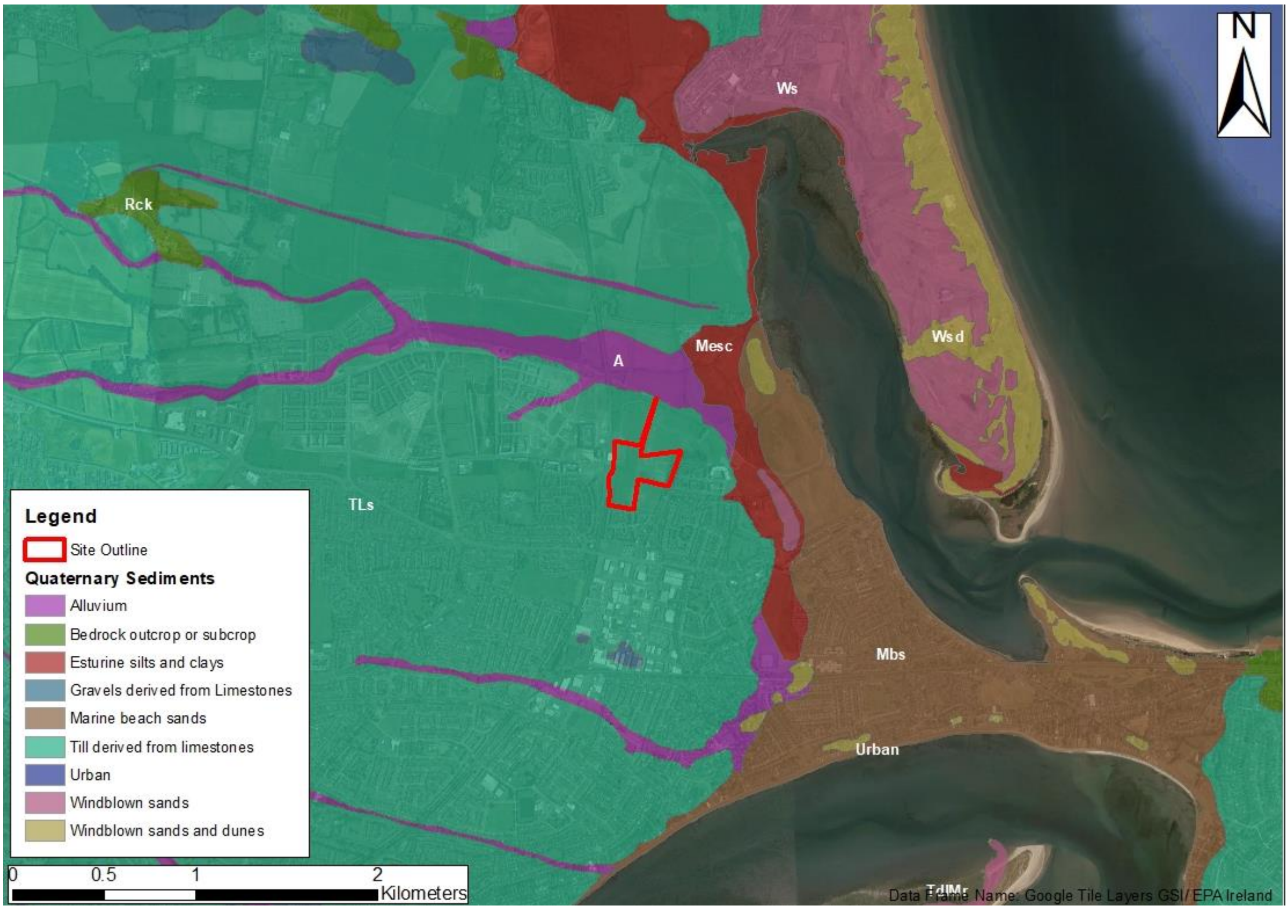
The Quaternary geological period extends from about 1.5 million years ago to the present day and can be sub-divided into the Pleistocene Epoch, which covers the Ice Age period, and which extended up to 10,000 years ago and the Holocene Epoch, which extends from that time to the present day.

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.

[88] Teagasc / GSI (2021).

Figure 9.3: Regional Subsoil (Quaternary) Map[89]



Ground Investigations Ireland (GII) carried out an Environmental site investigation at the Site in October 2019 and January 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 A9.2 in Volume 3.

[89] GSI (2021).

Table 9.1: Strata Noted From On-site Investigation

Name	Depths/ Notes
Topsoil	0 - 0.4m below ground level (mbgl).
Made Ground	Made ground was not encountered in general across the Site. However, at two very localised trial pits TP-08 and TP-67. To a max depth of 2.3mbgl black angular fine to coarse CRUSHED ROCK FILL or brown grey slightly sandy gravelly CLAY which varying amount of anthropogenic material including redbrick, timber and concrete fragments was noted.
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	Discrete granular lenses were encountered within the cohesive deposits and were typically described as *grey brown or grey gravelly clayey fine to coarse SAND with occasional cobbles and rare boulders.*

Bedrock was not proven during the on-site investigation with the deepest borehole (BH17) at the eastern boundary of the Site extending to 8.50mbgl without reaching the underlying limestone bedrock, confirming the GSI vulnerability categorisation as *'Low'*, refer to Section 9.3.7.

9.3.5.1 Soil Quality

During the 2019 & 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, BTEX, phenol, polychlorinated biphenyls (PCB) and 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 A9.3 in Volume 3. The Site investigation locations are shown in Figures 9.4 with the Site outline shown in blue.

The laboratory analysis did not identify any asbestos containing materials (ACMs) in any of the samples tested.

The majority of the samples collected at the Site (area outlined in blue in Figure 9.4) can be categorised as inert (as per Council Decision annex 2003/33/EC). Several of the leachate samples (BH5, BH9, BH11, BH14) from the naturally occurring dark grey to black boulder clay had concentrations of the metals molybdenum and antimony which exceeded the inert criteria limits. Due to the natural strata encountered at these locations these exceedances are possibly due to natural occurrences of the metals and not any anthropogenic input. These elevated levels may not be indicative of contamination of the subsoils. Soil comparison WAC category tables can be viewed in Appendix A9.4 with Sample comparison tables. There was no evidence of waste deposited on-site during Site investigation works. Refer to Chapter 18 (Material Assets - Waste) for further discussion on waste categorisation and removal.

Figure 9.4: Site Investigation Map (Red line shows extent of Site investigation survey boundary)[90]

The sample results were also compared against *Generic Assessment Criteria (GAC)*. There are no legislated threshold values for soils in Ireland. As such, the soil quality data was compared to a GAC

[90] GII (2021).

derived to be protective of human health and also ecology for a residential and commercial / industrial end use.

Generic Assessment Criteria in the UK has been derived using the Contaminated Land Exposure Assessment (CLEA) model to be protective of human health for a number of different land uses. LQM (Land Quality Management) and the CIEH (Chartered Institute of Environmental Health) developed a document in July 2009 detailing their own research and derivation of their own 'LQM GACs'. A total of 82 no. substances including many organic substances had LQM GACs derived, for the standard land uses of residential, commercial / industrial and allotments. This was updated in 2015 following further research and the derived results are now called LQM / CIEH Suitable 4 Use Level (S4UL). The LQM / CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and as transparently derived and cautious "*trigger values*" above which further assessment of the risks or remedial action may be needed. For each contaminant S4ULs have been derived for six land use scenarios based on assessing exposure pathways in each planning scenario. In this instance the commercial scenario has been considered. Soil type and soil organic matter (SOM) has an influence on the behaviour of contaminants. S4ULs have been derived for three SOM contents (1%, 2.5% and 6%) to cover the likely range in soils. The proposed future use of the Site is residential with a mix of apartments and houses and residential tenant amenity. In order to assess any potential risk to future Site users, the residential with home grown produce S4UL criteria have been applied to the data.

> *The UK values do not have any legal standing within the Republic of Ireland and no statutory guidance for assessing the significance of soil contamination currently exists. However, the values do provide a means of placing the data within context when considering magnitude of risk and have been used in that capacity for this assessment. The main basis of the assessment remains the conceptual site model and consideration of the pollutant linkages: Source - Pathway - Receptor.*

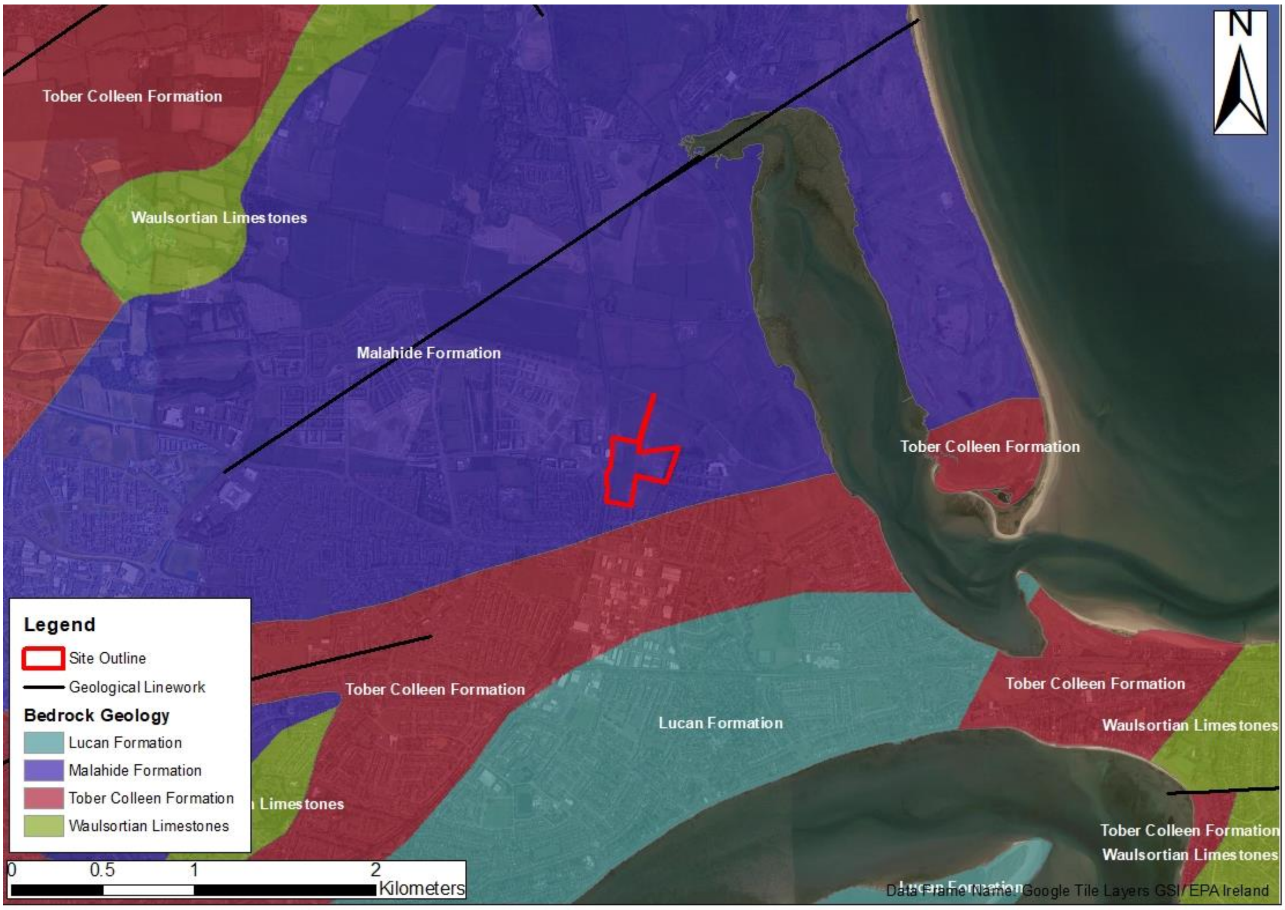
Apart from one (1 no.) sample taken from fill material at TP-65, all of the parameters tested for were within the residential with home grown produce S4ULs in all samples analysed. A full summary of the S4UL data is presented in Appendix A9.4 in Volume 3. Only one (1 no.) sample showed an exceedance above the residential with home grown produce S4UL) for arsenic - the crushed rock fill in TP-65 at 0.5mbgl. The surrounding natural soils showed no exceedances. Based on a review of the Site plan

TP-65 appears to be located within a rear garden of a proposed building. The fill material should be removed from this location prior to construction and disposed of based on the WAC criteria set out in the March 2020 Site Investigation (GII, 2020)

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, shale. The Bedrock Geology Map is shown in Figure 9.5 below.

Figure 9.5: Regional Bedrock Geology Map[91]



[91] GSI (2021).

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.
- 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 '*moderately productive only in local zones*.'

Figure 9.6: Regional Aquifer Map[92]

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 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[93] presently classifies the aquifer vulnerability in the region of the Site as *Low (L)* which indicates an overburden depth of c. 10m of low permeability soil is present. This was confirmed in 2019 & 2020 investigations undertaken by GII.

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[92] GSI (2021).
[93] GSI (2021).

Figure 9.7: Aquifer Vulnerability Map[94]

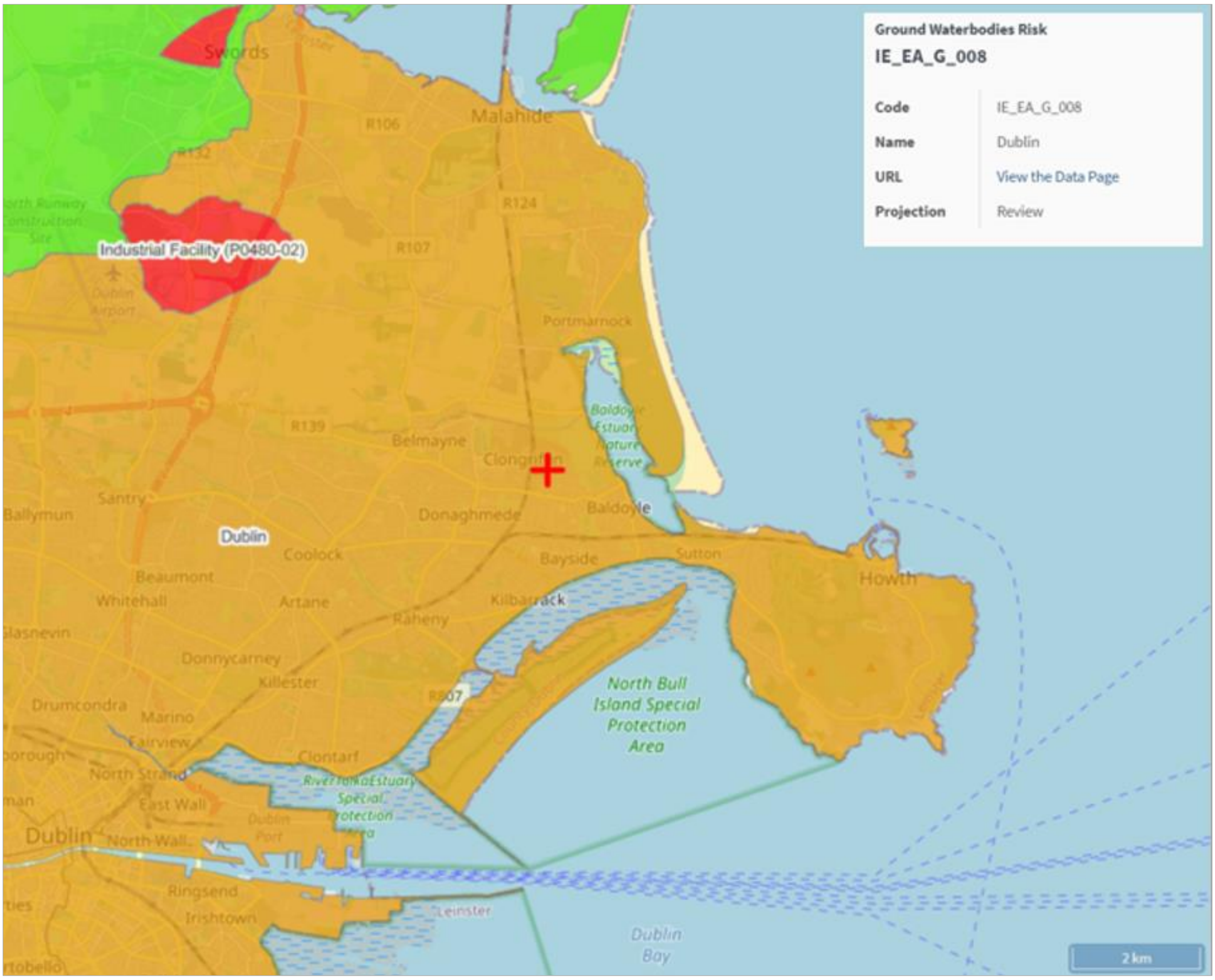
9.3.7.2 Description of the Groundwater Body

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 activities of the Eastern River Basin Districts (ERBDs), local authorities and State agencies in implementing the directive, 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[95]. The Dublin GWB achieved '*Good Status*' in the period 2013-2018.

[94] GSI (2021).
[95] EPA (2021).

Figure 9.8: Groundwater Body Map[96]



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[97] Well Card Index is a record of wells drilled in Ireland, kept by the Geological Survey of Ireland. It is noted that this record is not comprehensive as licensing of wells is not a requirement in ROI. This 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 within 2km of the Site drilled in 1988 recorded in the GSI Well Card; it had a good yield (196m^3/d) and was a depth of 57mbgl.

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

[96] EPA (2021).
[97] Geological Survey of Ireland

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. Wells were installed in some of the overburden borehole locations on-site (BH10, BH16, BH17, BH20, BH21, BH22, BH25 & BH26). Standing water levels (SWLs) was only recorded in three of these locations (BH10, BH22 & BH25) indicating a non-continuous perched water table throughout the Site.

The nearest drinking water protection area is located 22km west of the Site in Co. Meath at the Dunboyne public water supply.

Figure 9.9: Regional Groundwater Wells[98]

[98] GSI (2021).

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 Doolaghs) located 3km north-west of the Site. The lithology of the spring is Limestone, clean (>=90% $CaCO_3$), unbedded

9.3.7.5 Areas of Conservation

The closest Natura 2000 site is Baldoyle Bay Special Area of Conservation (SAC), which is 400m from the proposed Project. The nearest Special Protection Area (SPA) to the Site is the Baldoyle Bay SPA which is located 700m from the Site. There are no designated Natural Heritage Areas (NHA) within a 15km radius, however the nearest proposed NHA (pNHA) (Baldoyle Bay) is 400m from the Site.

According to the NPWS (2021) on-line database, the following area of conservations are located closest to the Site:

- Baldoyle Bay SAC (Site Code 000199) - c. 400m 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. 700m east of the Site.
- Baldoyle Bay pNHA - c. 400m east of the Site.

9.3.7.6 Conceptual Site Model

Local cross sections for the Site are presented below as Figure 9.10 (A-A' south-west to south-east) and a regional cross section is presented as 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 Project.

- The Site is mostly flat at 6m 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 2019 & 2020. Bedrock is > 8.5mbgl 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[99] 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, this then discharges into Baldoyle Bay SAC, c. 400m from the Site via the drainage pathway.
- Site soil analysis shows that all but one localised area of fill to the east of the Site (TP-65) is suitable for future use as residential as per S4Uls. TP-65 exceeded the generic assessment criteria for future residential land use as per the CIEH/LQM S4ULs. The material at TP-65 was recorded as primarily black angular fine to coarse crushed fill to a depth of 0.65 metres below ground level (mbgl). As sampling at the rest of the site was below the residential thresholds the excavation and removal of the fill material is advised to a minimum depth of 0.70 mbgl. The material is to be disposed of as per the WAC categorisation provided in section 10.3 of the March 2020 site investigation report by Ground Investigation Ireland[100].
- 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 area to the east of the Site (c. 400m). This is addressed in Chapter 10 (Water) and Chapter 8 (Biodiversity).

[99] EPA (2021).
[100] GII (2020).

Figure 9.10: Local Cross Section A-A

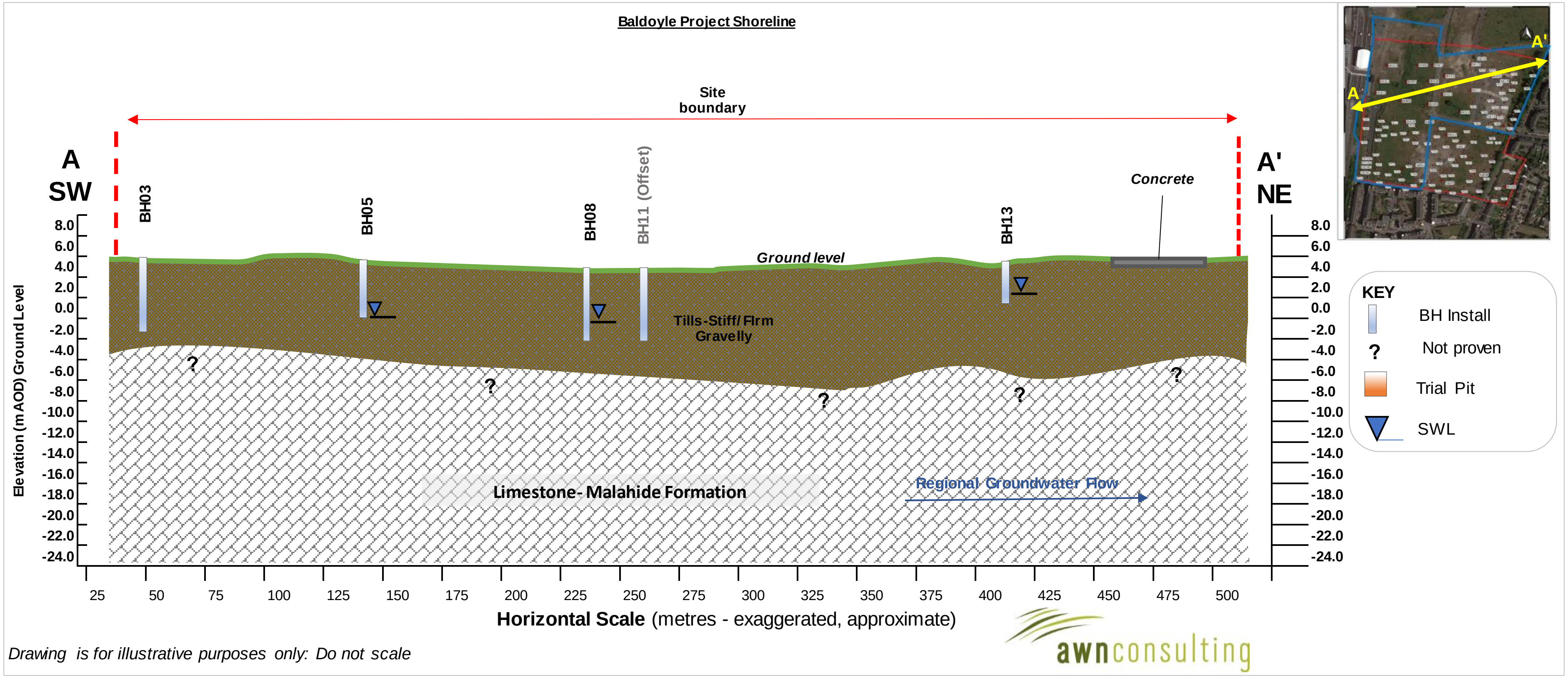
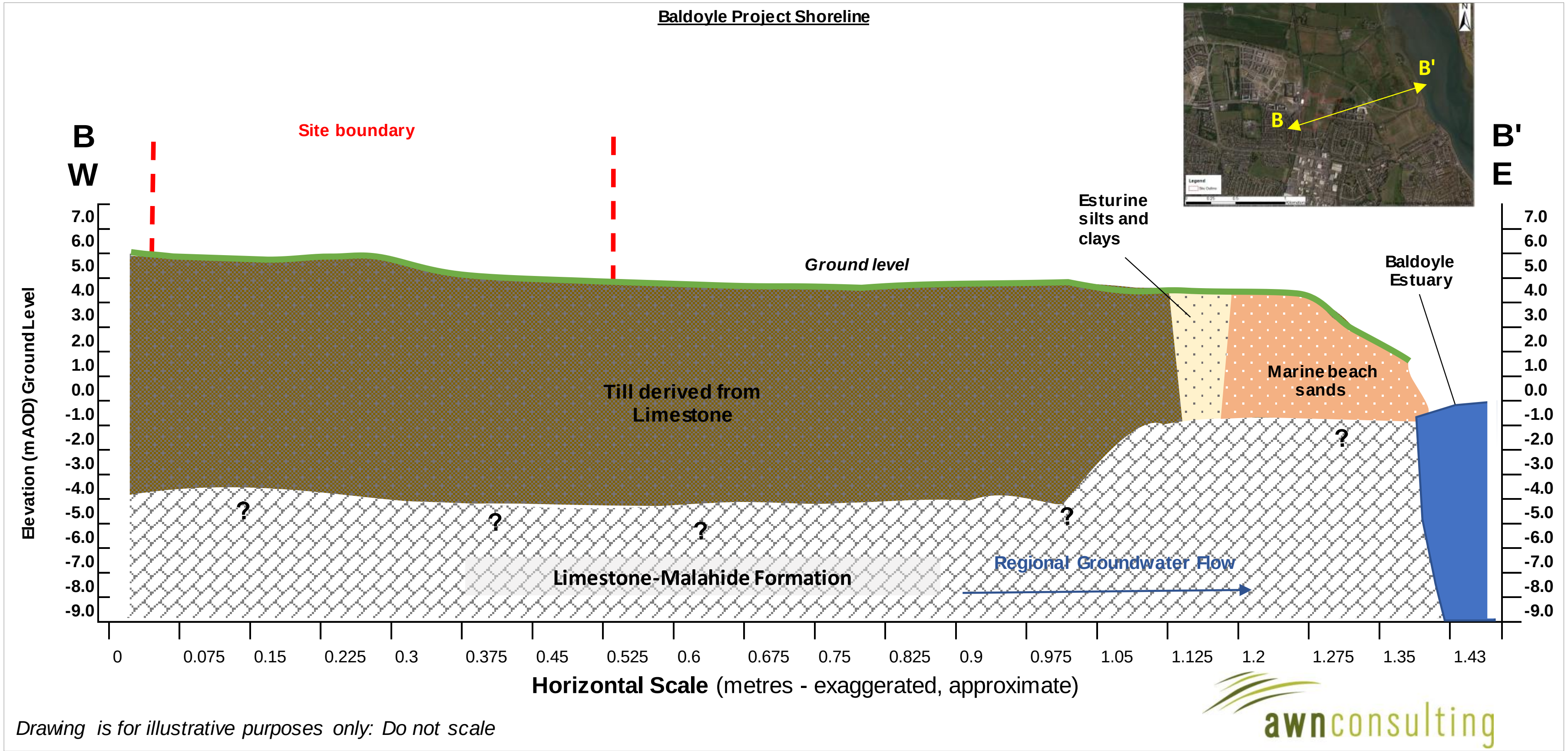


Figure 9.11: Regional Cross Section A-A



9.3.7.7 Rating of Site Importance of the Geological and Hydrogeological Features

Based on the NRA methodology[101] (refer to Appendix A9.1 in Volume 3), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this Site is rated as *'Medium'* importance with medium significance or value on a 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 A9.1) the importance of the hydrogeological features at this Site is 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 11.5km to the west of the Site. One mineral site was identified in Portmarnock, c. 2.6km 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 where between 1-5% of the homes in this 10km grid is estimated to be above reference level.

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 man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) 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 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

[101] NRA (2009).

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 and 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 was in the Irish Sea (1.0-2.0 Ml magnitude) and ~55km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to 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 as per the IGI Guidelines is:

Type B - Naturally Dynamic Hydrogeological Environment

- Historically the Site 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.
- 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 Impact 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

Phase	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. The maximum depth of excavation required to facilitate installation of services and foundations, as specified by the Project Engineers (Cronin Sutton (CS) Consulting) is c. 1m to 2m 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 c. 21,093m^3 of soils will be excavated to facilitate construction of the proposed Project. It is anticipated that all of this will be suitable for reuse on-site, and no material will be required to be removed off-site. It will be reused 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. However, it is not anticipated that any excavated material will be removed off-site or imported onto the Site for reuse as a by-product. 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 is estimated that c. 29,329m^3 of clean engineered fill material will be required to facilitate construction.
Operation	Increase in hard standing area	Altering of local recharge (percolation to ground) due to increase in hard standing area of 5.312ha.
	Storage of hazardous Material	Oil and fuel leaks from parked cars, service vehicles, HGV delivery's 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 operations 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

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. 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, which 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.
- Wastewater (nutrient and microbial rich) – arising from poor on-site toilets and washrooms.

There will be emissions to ground following attenuation from the 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 Growth Area 1 (GA1) (including GA2 and GA3). Following implementation of mitigation measures highlighted below and in Section 10.5 coupled with the *low* vulnerability of the underlying bedrock aquifer there will be *no impact* to the Locally Important bedrock aquifer.

Loss of agricultural land

There will be no local loss of agricultural soil, the area of development is small and has been zoned for residential development. There will be no impact to mineral resources in the area as a result of the proposed Project.

These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined in Section 9.5.1.

9.4.2 Operational Phase

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.

These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined in Section 9.5.2.

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.

Due to the inter-relationship between soils, geology and hydrogeology and surface water (hydrology), the following impacts discussed will be considered applicable to both Chapters 9 (Lands, Soils, Geology and Hydrogeology) and 10 (Water - Hydrology) of this EIAR.

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 Environment Management Plan (CEMP)

An outline Construction Environment Management Plan (CEMP) has been prepared[102] for the proposed Project and is included with this planning application. It is proposed that the CEMP 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 CEMP 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.

[102] Altemar Ltd (2021a).

It is unlikely any contaminated material will be encountered during the Construction Phase of the proposed Project apart from the localised area around TP-65 noted during investigations. 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.

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 A11.3 of Volume 3.

9.5.1.3 Export of Material from Site

It is envisioned that all soil / stones arising on the Site will be re-used on-site. It is not anticipated that any excavated material will be removed off-site or imported onto the Site for reuse as a by-product. 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 c. 29,329m^3 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 a 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; and
    - drip trays 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 CEMP.

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 silt-busters 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 stand

A proportion of the development area will be covered in hardstand (c. 5.312ha). This provides protection to the underlying aquifer but also reduces local recharge in this area of the aquifer. As the area of aquifer is large this reduction in local recharge will have *no significant change* in the natural hydrogeological regime.

9.6 Residual Impacts

This section describes the residual impact of the proposed Project following the implementation of the remedial and mitigation measures.

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-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 implementation of mitigation measures highlighted in Section 9.5.2 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the Operational Phase and that the residual impact 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 interceptor(s) 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

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

There is an inter-relationship between **biodiversity** and soils, geology and hydrogeology. There is potential for impact on biodiversity via contaminated run-off containing large amounts of silt from stockpiling of soil, causing damage to water systems and receiving watercourses and entering groundwater sources.

There is an inter-relationship between **hydrology (water)** 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 (Water) will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

There is an inter-relationship between **air quality and climate** and soils, geology and hydrogeology. Construction Phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for dust emissions.

There is an inter-relationship between **waste management** and soils, geology and hydrogeology. It has been identified in GII Site Investigation report some fill material around location TP-65 (refer to Figure 9.4) exceeds the S4ULs for future residential use this should be removed during Site preparatory. All other material excavated as part of the proposed Project works will be reused on-site.

9.10 Cumulative Impacts

The anticipated cumulative effects of the proposed Project and other known developments as outlined 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:

- 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 (Water); 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 Environmental Management Plans (CEMPs) are put in place and complied with. The project-specific CEMP 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 metres of overburden overlying the bedrock aquifer classifying it as “Low” vulnerability (GSI classification). As such, the 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 runoff 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

'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.

9.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in compiling this chapter of the EIAR.

10 Water (Hydrology)

10.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Paul Conaghan, Environmental Consultant of AWN Consulting Ltd. Paul Conaghan 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).

This chapter presents an assessment of the existing environment (baseline) and the likely impacts on the surrounding water & hydrological environment associated with the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), 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.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

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[103] tables are presented in Appendix A10.1 in Volume 3. 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 A10.1 in Volume 3.

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

[103] EPA (2017).

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:

- Cronin & Sutton Consulting Engineers (CS) (2021b). *Site Specific Flood Risk Assessment.*
- Cronin & Sutton Consulting Engineers (CS) (2021c). *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 1,369km^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. 120km west to east. The Snugborough Stream lies 650m to the east and the Mayne River lies 550m to the north (EPA designations). The Snugborough rises to the south as would appear in Figure 10.1 below and is culverted between Seagrange Park and the Red Arches Road.

According to the NPWS (2021) on-line database, the following area of conservations are located closest to the Site:

- Baldoyle Bay SAC (Site Code 000199) - c. 400m east of the Site. (Both the bay itself and saltwater marshland which is part of the old racecourse).
- Baldoyle Bay SPA (Site Code 004016) - c. 700m east of the Site.
- Baldoyle Bay pNHA - c. 400m east of the Site.

Refer to Chapter 8 (Biodiversity) for further information on designated conservation 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).

The 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*'. In the second cycle River Basin Management Plan published in April 2018 which replacing the first cycle river management plans (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 other 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, 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 assess the water quality of rivers and streams across Ireland using a biological assessment method, 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 (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. 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'[104] and these were not assigned a status in the

[104] requires more info to assign a status

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 1350mm storm water 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 1050mm storm water 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 storm water 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[105]. Although these culverts 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 (preconstruction SUDS pond).

10.3.3 Surface Water Flooding / Flood Risk Assessment

The proposed Project was subject to *Site Specific Flood Risk Assessment* (SSFRA)[106] in accordance with OPW *Flood Risk Management Guidelines*, and is included with this planning application. From a review of the OPW's online flood mapping tool[107] the Site is located in Flood Zone C (low probability for coastal or pluvial flooding). The SSFRA concluded that the proposed Project is not at risk from fluvial, pluvial or groundwater flooding; also, the SSFRA did not find any indicators that the proposed Project shall give rise to flood risk elsewhere[108].

10.3.4 Areas of Conservation

The closest Natura 2000 site is Baldoyle Bay SAC, which is 400m from the proposed Project. The nearest SPA to the Site is the Baldoyle Bay SPA which is located 700m from the Site. There are no designated Natural Heritage Areas (NHA) within a 15km radius, however the nearest proposed NHA (pNHA) (Baldoyle Bay) is 400m from the Site. (Both the bay itself and saltwater marshland which is part of the old Baldoyle Racecourse).

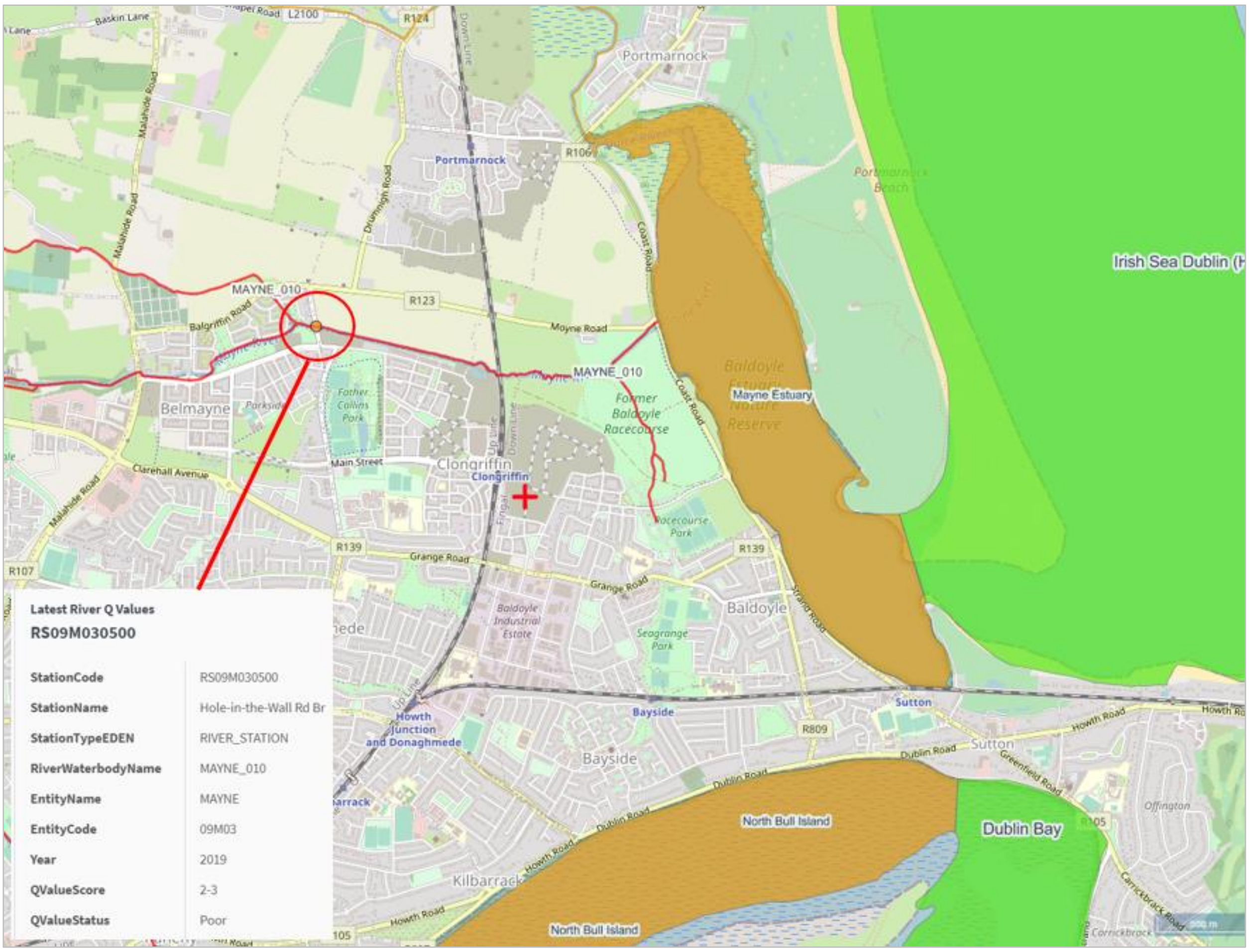
[105] CS Consulting Engineers (2021c).
[106] CS Consulting Engineers.
[107] Available at www.floodinfo.ie
[108] CS Consulting Engineers (2021b).

The North Dublin Bay SAC is c. 1.8km south of the Site. Currently storm water is discharged to the Mayne River from the Site via services installed under permission 16A/0412[109] 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. The nearest rivers and open water are 550m from the Site, refer to Figure 10.1. However currently storm water is discharged to the Mayne River from the Site which discharges into the Baldoyle Estuary. Based on the NRA methodology (refer to Appendix A10.1 in Volume 3), for the criteria for rating the importance of hydrological features, the features at this Site are rated as *high importance*.

Figure 10.2: Local Hydrological Environment and current WFD Status[110] (ring including location of Hole in the Wall River Station) (Site location shown with red cross)



[109] CS Consulting (2021c).
[110] EPA Maps (2021).

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 10 (Water) of this EIAR.

10.4.1 Construction Phase

10.4.1.1 Increased Run-off & Sediment Loading

Surface water run-off during the Construction Phase may contain increased silt levels or become polluted from construction activities. There is a direct pathway from the Site to the Baldoyle Bay SAC and Baldoyle Bay SPA via the existing surface water network and the Mayne River. There is also 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 storm water drainage if run-off is not managed adequately.

During the Construction Phase, there is 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, 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 is in an indirect hydraulic connection to the Mayne River. The potential impacts could derive from accidental spillage of fuels, oils, paints and solvents, which could impact surface water and groundwater quality if allowed to infiltrate to 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 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 Local Area Plan (LAP) that a wetland is 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 and future developments within the LAP. This wetland and its corresponding upstream surface water network were granted under planning reference F16A/0412 and is under construction and will be in place prior to the Construction Phase of the proposed Project, refer to see Section 10.4.1.

It is planned to discharge to the wetland / SUDS pond during construction following the mitigation measures listed in Section 10.5.1 above. The pond 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 the *Engineering Services Report*[111] (ESR) 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 water have been assessed under the following headings:

10.4.2.1 Surface Water

In accordance with Section 4.3 of Appendix 1 of the Baldoyle-Stapolin Local Area Plan (LAP), the Site is located adjacent to the tidal estuary at Baldoyle and as there is no downstream development before out falling to the Irish Sea, the Site 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 GDSDS. In addition, the lands discharge into salt wetlands which are the flood estuary of the Mayne River and extend over c. 40ha (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.

[111] CS Consulting Engineers (2021c).

Rainwater run-off from the impermeable areas of the Site, roofs and road / 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 Growth Area No. 1 (GA1) (Plus GA2 and GA3). It has been sized to cater for a treatment volume based on 15mm 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 of the majority of silt not removed by SUDS feature upstream. This ensures 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 1,860m^3 and is based on treatment 15mm 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 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. As informed on the Planning Application F16A/0412, the permitted wetland has been sized to serve GA2 and GA3 of the Local Area Plan in addition to GA1 as proposed. Refer to CS Consulting drawings[112] for the drainage network layout and the *Engineering Services Report*[113] (ESR).

10.4.2.2 Wastewater

There is an existing 375mm 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

[112] Drawing Nos. BD-CSC-ZZ-XX-DR-C-0003 and BDCSC-ZZ-XX-DR-C-0004
[113] CS Consulting Engineers (2021c).

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.

A Pre-Connection Enquiry was submitted to Irish Water (IW) based on the foul flows for the proposed Project a favourable response was received from IW on 25 November 2020[114]. 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 development 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 Environmental Management Plan (CEMP)

An outline Construction Environmental Management Plan[115] (CEMP) accompanies this planning application. A final CEMP will be prepared and maintained by the appointed Contractors during the Construction Phase. The CEMP 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 CEMP. At a minimum, the CEMP will be formulated in consideration of the standard best international practice including, but not limited, to:

[114] See Appendix D of CS Consulting's *Engineering Services Report*. (2021c).
[115] Altemar Ltd (2021a).

- 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).

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 silt-buster 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. This will prevent any potential negative impact on the storm water drainage and the material will be stored away from any surface water drains. 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 remove 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 (in the CEMP). 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"[116].

10.5.1.3 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 to surface water systems;

- designation of a 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; and
  - 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;
- all drums to be quality approved and manufactured to a recognised standard;

[116] Outline CEMP (2021a).

- 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 CEMP. All appointed Contractors will be required to implement the CEMP.

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 CEMP. All personnel working on the Site will be suitably trained in the implementation of the procedures.

10.5.1.5 Soil Removal and Compaction

Excavated material will be reused on-site where possible for site levelling, roads, car parking areas and other landscaping purposes. The Project Engineers have estimated that no of material will require removal from Site apart from a small area around TP-65. 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.

- Constructed Wetland: 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.
- Rainwater 'butts': rain which falls first on to roof areas shall be collected in a water storage unit, to allow for re-use for landscaping purposes to reduce the reliance on the potable water network. Rainwater butts will be provided to all single houses only.
- 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 the applicant lands.
- 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. 100mm deep Sedum green roof systems are proposed to the apartment buildings located to the west of Longfield Road in the north-west of the applicant lands.

- **Permeable Paving**: These systems are used 'source control' method in managing surface water run-off. Water is managed and dealt with onsite without piping off to storage tanks or surface water treatment systems. Surface water discharge is managed to ensure that risk of contamination or pollution are mitigated. Permeable Paving systems filter contaminants by microbial action. There is no requirement for additional filtering / polishing with Permeable Paving in normal use. It is proposed to construct all parking spaces to the development with permeable paving systems.

Petrol interceptors will be installed within car parks areas under the apartment buildings to cater for any oil / fuel leaks from onsite vehicles as required[117].

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 the *Engineering Services Report*[118]. A Pre-Connection Enquiry was submitted to Irish Water (IW) based on the foul flows for the proposed Project a favourable response was received from IW on 25 November 2020[119]. This is subject to a connection agreement with IW.

10.5.2.3 Water Supply

As stated above Irish Water 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 (in accordance with Draft EPA Guidelines[120]) is considered to be *likely, neutral, imperceptible* and *short-t*erm. This is due to the control measures highlighted in Section 10.5.1 above.

[117] Refer to CS Consulting Engineers *Engineering Services Report* (2021c).
[118] CS Consulting Engineers (2021c).
[119] See Appendix D of CS Consulting's *Engineering Services Report*. (2021c).
[120] EPA (2017).

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 development is constructed and operational (in accordance with Draft EPA Guidelines[121]) is considered to be *likely, neutral, imperceptible* and *long-term*. This is due to the mitigation measures highlighted in Section 10.5.2 above there will be *no impact* to the quality of local watercourse and the nearby SAC due to lack of direct hydraulic connectivity and control measures cited. Overall, the attenuation proposed for the development 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 as part of the proposed Project due to the low hazard potential at the development. Oil interceptor(s) 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

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

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[121] EPA (2017).

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) & 10 (Water (Hydrology)) will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

There is an inter-relationship between **hydrology** and **biodiversity**. There is potential for impact on biodiversity via contaminated run-off and sedimentation enters the local surface water.

10.10 Cumulative Impacts

The anticipated cumulative effects of the proposed Project and the other known surrounding developments listed in Chapter 21 (Cumulative Impacts) are addressed below

In relation to the potential cumulative impact on hydrology during the Construction Phases, the construction works which would have potential cumulative impacts include:

- 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. 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 unless project-specific CEMPs are put in place for each development and complied with. There is a direct pathway from the Site to the Baldoyle Bay SAC and Baldoyle Bay SPA via the existing surface water network and the Mayne River.

Potential cumulative impacts included in the Operational Phase include:

- 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 i.e. bunded tank.
- Increased risk of accidental discharge of hydrocarbons from car parking areas and along roads and 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.

<u>Increase in wastewater loading and water supply requirement is an impact of all development</u>: 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 has been designed to accommodate the future GA1 & GA3 developments. Irish Water have confirmed connection to its water and foul network can be facilitated subject to a connection agreement.

Development will not result in an increase in hard standing 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 proposed Project.

<u>There is a potential for contamination of watercourses during construction and operation:</u> Mitigation measures are required 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, neutral* in terms of quality and of i*mperceptible* significance, once appropriate mitigation measures to manage water quality run-off in compliance with legislative requirement are put in place for each development.

10.11 'Do-Nothing' Impact

'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.

10.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in the compilation of this chapter of the EIAR.

11 Air Quality and Climate

11.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Niamh Nolan, Environmental Consultant (air quality and climate) of AWN Consulting Ltd. Niamh holds a BSocSci (Hons) in Social Policy and Geography from University College Dublin and is an Associate Member of the Institute of Air Quality Management (AMIAQM) and the Institute of Environmental Science (AMIEnvSc).

This chapter assesses the likely air quality and climate impacts, if any, associated with the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

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, refer to Table 11.1 and Appendix A11.1 in Volume 3 of this EIAR.

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 the proposed Project, refer to 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, refer to Appendix A11.1 in Volume 3.

Table 11.1: Ambient Air Quality Standards

Pollutant	Regulation Note 1	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.	200µg/m^3
		Annual limit for protection of human health.	40µg/m^3
		Critical level for protection of vegetation.	30µg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times / year.	50µg/m^3
		Annual limit for protection of human health.	40µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health.	25µg/m^3

Note 1 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

11.2.1.2 Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in Table 11.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the Construction Phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of the proposed Project.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust)[122] sets a maximum permissible emission level for dust deposition of 350mg/(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[123] apply the Bergerhoff limit of 350mg/(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 with efforts to limit this rise to 1.5°C. The aim is to limit global 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 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* (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 greenhouse gas emissions by 2030 relative to its 2005 levels.

The *Climate Action and Low Carbon Development Act 2015*[124] was developed to provide for the approval of plans by the government in relation to climate change and to enable achievement of the national transition objective of achieving decarbonisation by 2050. This is referred to in the Act as

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[122] German VDI (2002).
[123] DEHLG (2004).
[124] Government of Ireland (2015).

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*[125], 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 *Climate Action Plan* 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 *Climate Action Plan* has set a built environment sector reduction target of 40-45% relative to 2030 pre-NDP (National Development Plan) 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 for the *Climate Action and Low Carbon Development (Amendment) Bill 2021* (hereafter referred to as the 2021 Climate Bill) in March 2021[126]. The *2021 Climate Bill* was prepared for the purposes of giving statutory effect to the core objectives stated within the *Climate Action Plan*.

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 Act 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

[125] Government of Ireland (2019).
[126] Government of Ireland (2021).

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 (FCC) *Climate Change Action Plan 2019 - 2024* sets out specific objectives in relation the climate.

- a 40% reduction in the Council's greenhouse gas 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.

11.2.2 Construction Phase

The current assessment focuses on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the proposed Project by an assessment of EPA monitoring data. Thereafter, the impact of the Construction Phase of the proposed Project on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the proposed Project.

Construction Phase traffic also has the potential to impact air quality and climate. The UK Design Manual for Roads and Bridges (DMRB) guidance[127], 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. Transport Infrastructure Ireland (TII) recommend the use of the UK DMRB guidance[128] in its document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*[129]. This approach is considered best practice in the absence of specific Irish guidance.

- 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.

[127] UK Highways Agency (2019a).
[128] UK Highways Agency (2007).
[129] TII (2011).

- A change in carriageway alignment by 5m or greater.

The Construction Phase traffic does not meet the above scoping criteria as the AADT will not change by 1,000 or more and HDV AADT will not change by 200 or more. Therefore, has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

11.2.3 Operational Phase

11.2.3.1 Air Quality Assessment

The air quality assessment has been carried out following procedures described in the publications by the EPA[130] and using the methodology outlined in the guidance documents published by the UK Highways Agency[131] and UK Department of Environment Food and Rural Affairs (DEFRA)[132]. Transport Infrastructure Ireland (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*[133]. 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 this screening tool indicated compliance issues with the EU air quality standards. Guidance from Transport Infrastructure Ireland[134] 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

[130] EPA (2015 & 2017).
[131] UK Highways Agency (2019a).
[132] UK DEFRA (2016 & 2018).
[133] TII (2011).
[134] TII (2011).

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[135] 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[136].

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 (2022), and design year (2037).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 50m 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 200m 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 a proportionate number of representative receptors which are located in areas which will experience the highest concentrations

135 UK Highways Agency (2019a).
136 EPA (2020a).

or greatest improvements as a result of the proposed Project are to be included in the modelling[137]. The TII guidance[138] 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 five (5 no.) sensitive receptors within 200m of impacted road links were included within the modelling assessment (refer to Figure 11.1), these are all 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 guidance[139] details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on 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 A11.2 in Volume 3 (see Tables A11.2.1 and A11.2.2). The significance criteria are based on NO_2 and PM_{10} as these pollutants are most likely to exceed the annual mean limit values (40µg/m^3).

Conversion of NO_x to NO_2

NO_X (NO + NO_2) is 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 HGV's 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 in the form of NO, have the potential to be converted to NO_2.

137 UK Highways Agency (2019a).
138 TII (2011).
139 TII (2011).

Transport Infrastructure Ireland states the recommended method for the conversion of NOx to NO_2 in the TII guidance[140]. The TII guidance recommend the use of DEFRAs NOx to NO_2 calculator (2020) which was originally published in 2009 and is currently on version 8.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O_3 and proportion of NOx 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. 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.

<u>Update to NO_2 Projections using DMRB</u>

In 2011 the UK DEFRA published research[141] on the long-term trends in NO_2 and NO_X for roadside monitoring sites in the UK. This study marked 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.

<u>Traffic Data Used in Modelling Assessment</u>

Traffic flow information was obtained from CS Consulting (Traffic and Transportation Consultants - refer to Chapter 17 of this EIAR) for the purposes of this assessment. Data for the Do Nothing and Do Something scenarios for the base year 2020, opening year 2022 and design year 2037 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 200m of receptors were

[140] TII (2011).
[141] Highways England (2013).

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[142].

This traffic data has also been used in the operational stage climate impact assessment.

Table 11.2: Traffic Data Used in Modelling Assessment

Road Name	Base Year	Do-Nothing		Do-Something		Speed (kph)
	2020	2022	2037	2022	2037	
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 E	12,403 (2.89%)	13,206 (2.94%)	15,572 (3.44%)	14,531 (2.80%)	16,899 (3.28%)	50
Link M	26,228 (4.63%)	27,491 (4.71%)	32,225 (5.54%)	28,600 (9.06%)	33,708 (5.38%)	50

[142] EPA (2020a).

Figure 11.1: Location of Sensitive Receptors used in Air Quality Modelling Assessment

11.2.3.2 Air Quality Impact on Ecological Sites

For routes that pass within 2km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an ecologist[143]. However, in practice the potential for impact to an ecological site is highest within 200m of the proposed scheme 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[144] states that a detailed assessment does not need to be conducted for areas that have been designated for geological features or watercourses.

Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* and *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*[145] provide details regarding the legal protection of designated conservation areas.

[143] TII (2011).
[144] UK Highways Agency (2019a).
[145] DEHLG (2010).

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition should be conducted:

- A designated area of conservation is located within 200m of the proposed Project.
- 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 direct east of the proposed Project within 200m. An assessment of the impact with regards to nitrogen deposition was conducted for the SAC, pNHA and SPA. 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 2022 along a transect of up to 200 m within the pNHA 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).

11.2.3.3 Climate Assessment

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to reduce the impact of 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 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*. 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*[146] the climate baseline is first established by reference to EPA data on annual GHG emissions (refer to Section 11.3.3). Thereafter the impact of the proposed Project on climate is determined. Emissions from road traffic associated with the proposed Project have the potential to emit carbon dioxide (CO_2) which will impact climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate*[147]. The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the Operational Phase. If any

[146] EC (2013).
[147] UK Highways Agency (2019b).

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
- a change in daily average speed of more than 20km/hr.

There are five road links that will experience an increase of 10% or more in the AADT. These road links have been included in the detailed climate assessment, refer to Table 11.2.

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 *Design Manual for Roads and Bridges* (2007)[148]. 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, refer to Table 11.2.

The EU guidance (2013)[149] also states indirect GHG emissions as a result of a development must be considered, this includes emissions associated with energy usage. The Building Lifecycle Report prepared in relation to this assessment 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 development to reduce the impact to climate where possible.

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 (*i.e.* traffic levels). 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

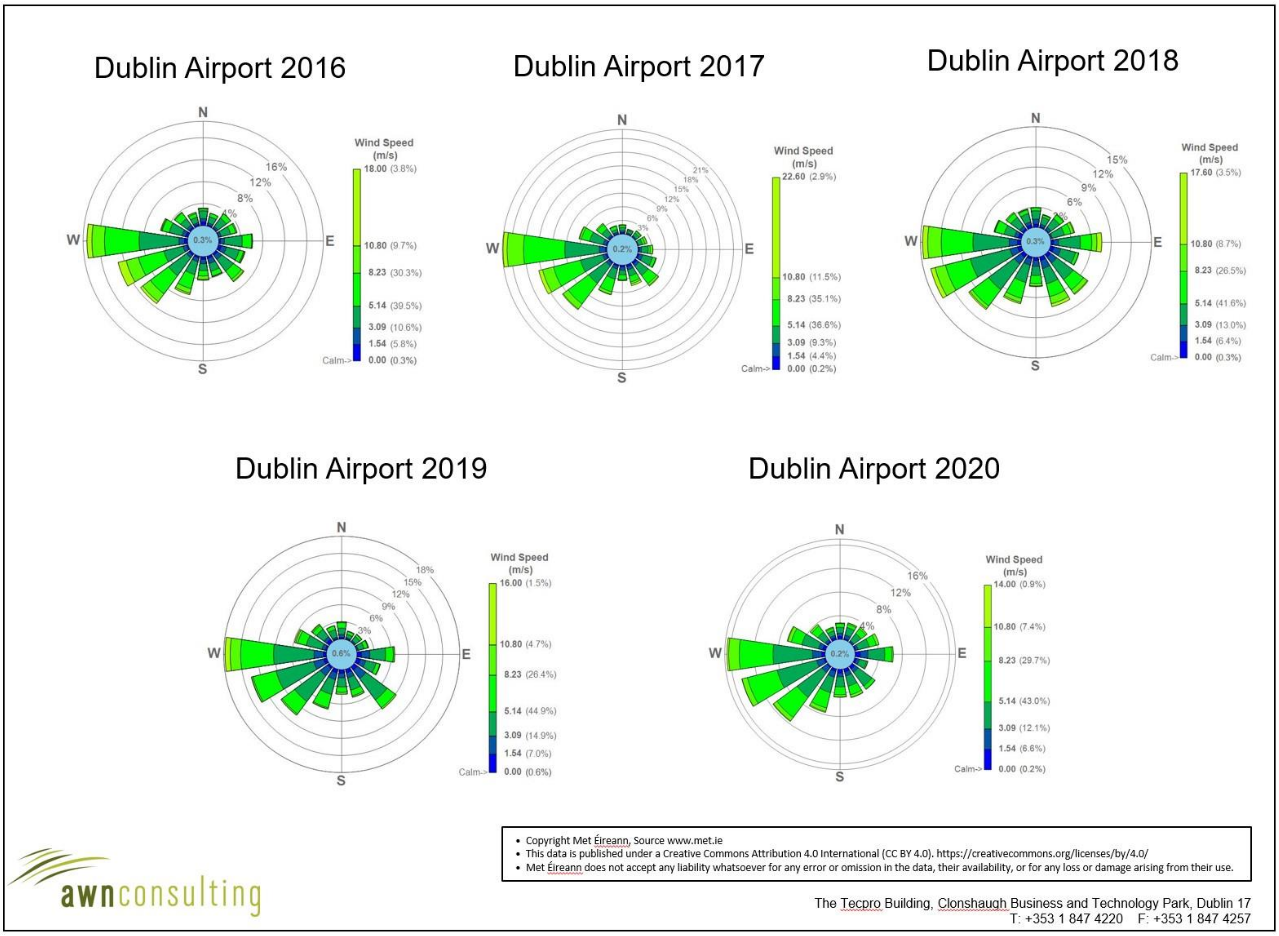
[148] UK Highways Agency (2007).
[149] EC (2013).

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 5km west of the Site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period, refer to 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[150].

[150] 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*"[151]. 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[152].

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[153]. Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 no. 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.

151 EPA (2020b).
152 EPA (2020b).
153 EPA (2020b).

In terms of air monitoring and assessment, the proposed Project is within Zone A[154]. The long-term EPA monitoring data has 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[155] at suburban Zone A locations in Ballyfermot, Dun 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 15-22µg/m^3 in 2019, refer to Table 11.3. Sufficient data is available for all stations to observe the long-term trend since 2015[156], refer to Table 11.3, with results ranging from 13-22µg/m^3 and few exceedances of the one-hour limit value. The station in Swords is approximately 7km north-west of the 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 13-16µg/m^3. Based on the above information, an estimate of the background NO_2 concentration in the region of the proposed Project is 16µg/m^3.

Table 11.3: Trends in Zone 'A' Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period Notes 1, 2	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

Note 1 Annual average limit value - 40µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Note 2 1-hour limit value - 200µg/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 9-15µg/m^3 (refer to Table 11.4), with at most nine (9 no.) exceedances (in Rathmines) of the 24-hour limit value of 50µg/m^3 (35

[154] EPA (2020b).
[155] EPA (2020b).
[156] EPA (2020b).

no. exceedances are permitted per year). The most representative location is Phoenix Park which had an average annual mean concentration of 10.8µg/m^3 over the five year period. Based on the EPA data (refer to Table 11.4) a conservative estimate of the current background PM_{10} concentration in the region of the proposed Project is 13µg/m^3.

Table 11.4: Trends in Zone 'A' Air Quality - PM_{10}

Station	Averaging Period Notes 1, 2	Year				
		2015	2016	2017	2018	2019
Rathmines	Annual Mean PM_{10} (µg/m^3)	15	15	13	15	15
	24-hr Mean > 50µg/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 > 50µg/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 > 50µg/m^3 (days)	3	0	2	0	2

Note 1 Annual average limit value - 40µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Note 2 24-hour limit value - 50µg/m^3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

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 Project of 9.1µg/m^3.

Background concentrations for Opening Year 2022 and Design Year 2037 have been calculated. These have used current estimated background concentrations and the 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)[157].

11.3.3 Climate Baseline

Anthropogenic emissions of greenhouse gases 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[158]. The data published in 2020 states that Ireland will exceed its 2019 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.98Mt. For 2019, total national greenhouse

[157] UK DEFRA (2018).
[158] EPA (2020b).

gas emissions are estimated to be 59.90 million tonnes carbon dioxide equivalent ($MtCO_2eq$) with 45.71$MtCO_2eq$ of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2019 at 35.3% of the total, with the transport sector accounting for 20.3% of emissions of CO_2.

GHG emissions for 2019 are estimated to be 4.5% lower than those recorded in 2018. Emission reductions have been recorded in six of the last ten years. However, compliance with the annual EU targets has not been met for four 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 emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2019 *GHG Emissions Projections Report for 2018-2040*[159] notes that there is a long-term projected decrease in greenhouse gas 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. 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 a change from 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 10$MtCO_2eq$ under the "With Existing Measures" scenario and 9$MtCO_2eq$ under the "With Additional Measures" scenario[160].

11.3.4 Sensitivity of the Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction'*[161] 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

159 EPA (2019).
160 EPA (2019).
161 IAQM (2014).

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 no. highly sensitivity residential properties within 100m of the main works area of the Site. Based on the IAQM criteria outlined in Table 11.5, the worst case sensitivity of the area to dust soiling is considered to be *low.*

Table 11.5: 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 13µg/m^3 and there are approximately 60 high sensitivity receptors located within 200m of the Site. Based on the IAQM criteria outlined in Table 11.6, the worst case sensitivity of the area to human health is considered to be *low.*

Table 11.6: 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	< 24µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24µg/m^3	>1	Low	Low	Low	Low

11.4 Potential Impact of the Proposed Project

11.4.1 Construction Phase

11.4.1.1 Air Quality

The greatest potential for 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 350m of a construction site, the majority of the deposition occurs within the first 50m. The proposed Project can be considered moderate in scale and therefore, there is the potential for significant dust soiling impacts within 50m of the Site, refer to Table 11.7. The closest high sensitivity receptors (residential properties) to the Site are approximately 60m to the west of the Site. As per Section 11.3.4 the surrounding area, within 50m of the site, 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.

Table 11.7: Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place[162]

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 Phase 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 Phase traffic will have an *imperceptible, neutral, localised and short-term* impact on air quality.

11.4.1.2 Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the proposed Project. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document "*Guidance on the Assessment of Dust from Demolition and Construction*"[163] 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.*

11.4.1.3 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 11.7 significant PM_{10} emissions can occur within 15m 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

[162] TII (2011).
[163] IAQM (2014).

the absence of mitigation there is the potential for *imperceptible, negative, short-term* impacts to human health as a result of the proposed Project.

11.4.2 Operational Phase

11.4.2.1 Air Quality

The impact of the proposed Project has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of NO_2 emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined. The assessment was carried out at five (5 no.) high sensitivity residential receptors (R1-R5), refer to Figure 11.1.

Transport Infrastructure Ireland's guidance (2011) detail a methodology for determining air quality impact significance criteria for road schemes and this 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, which assumes that the proposed Project is not in place in future years, 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 2022 are shown in Table 11.8 and for design year 2037 are shown in Table 11.9. The annual average concentration is in compliance with the limit value at the worst-case receptor in 2022 and 2037. Concentrations of NO_2 are at most 59% of the annual limit value in 2022 and at most 53% in 2037 for the do-something scenario. There are some increases in traffic volumes between 2022 and 2037, therefore any reductions in concentrations are due to decreased background values. In addition, the hourly limit value for NO_2 is 200µg/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, refer to Table 11.10.

The impact of the proposed Project on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. Relative to baseline levels, there are predicted to be some small increases in NO_2 concentrations at receptors R1, R2 and R5. NO_2 concentrations are predicted to be imperceptible at receptors R3 and R4. Concentrations will increase by at most 4.7% of the annual limit value in 2022 and by 2.8% in 2037 at worst case receptors. Using the assessment criteria outlined in Appendix A11.2 in Volume 3[164], the impact of the proposed Project in terms of NO_2 is considered *negligible*. Therefore, the overall impact of NO_2 concentrations as a result of the proposed Project is *long-term, negative* and *imperceptibl*e.

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 40µg/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[165]. Concentrations reached at most 0.97µg/m^3 excluding background concentrations. When a background concentration of 13µg/m^3 is included the overall impact is 32% of the annual limit value at the worst case receptors (R3 and R5).

The impact of the proposed Project on ambient air quality in the Operational Phase is considered *long-term, localised, negative and imperceptible.*

Table 11.8: Predicted Annual Mean NO_2 Concentrations - Opening Year 2022 (µg/m^3)

Receptor	Impact Opening Year 2022				
	DN	DS	DS-DN	Magnitude	Description
R1	17.2	17.9	0.69	Small	Negligible Increase
R2	17.4	17.8	0.42	Small	Negligible Increase
R3	21.5	21.6	0.09	Imperceptible	Negligible Increase
R4	19.3	19.6	0.25	Imperceptible	Negligible Increase
R5	21.7	23.5	1.87	Small	Negligible Increase

Note 1 Based on UK Highways Agency IAN technique for predicting future NO_2 concentrations

164 Volume 3 of the EIAR. Refer to Table A11.2.1 and A11.2.2
165 UK Highways Agency (2019b).

Table 11.9: Predicted Annual Mean NO_2 Concentrations - Design Year 2037 (µg/m³)

Receptor	Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description
R1	16.1	17.2	1.10	Small	Negligible Increase
R2	16.6	17.2	0.53	Small	Negligible Increase
R3	21.8	21.2	-0.65	Small	Negligible Decrease
R4	19.0	19.1	0.08	Imperceptible	Negligible Increase
R5	21.3	21.3	0.05	Imperceptible	Negligible Increase

Note 1 Based on UK Highways Agency IAN technique for predicting future NO_2 concentrations

Table 11.10: Predicted 99.8th percentile of Daily Maximum 1-hour NO_2 Concentrations (µg/m³)

Receptor	Opening Year 2022		Design Year 2037	
	DN	DS	DN	DS
R1	60.1	62.5	56.3	60.1
R2	61.0	62.4	58.2	60.0
R3	75.4	75.7	76.4	74.1
R4	67.7	68.5	66.4	66.7
R5	75.9	82.4	74.4	74.6

11.4.2.2 Air Quality Impact on Sensitive Ecosystems

The existing road network and the proposed Project both impact a section of Baldoyle Bay SAC and pNHA (Site Code 000199), along with the Baldoyle Bay SPA (Site Code 004016) to the direct 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 the current road network and proposed Project have been calculated and are detailed in Table 11.11. Ambient NO_X concentrations have been predicted for the opening year of 2022 as per the UK

Highways Agency and TII guidance[166]. Concentrations are predicted along a transect of up to 200m 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 30µg/m^3 for the existing "Do Nothing" scenario and the "Do Something" scenario. Concentrations are at most 104% of the annual limit value, including a background concentration of 23µg/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 0.68µg/m^3.

Appendix 9 of the TII Guidelines (2011) state that where the scheme is expected to cause an increase of more than 2µg/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 0.68µg/m^3 at the worst-case location, therefore, effects are predicted to be *not significant.*

The contribution to the NO_2 dry deposition rate along the 200m 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 0.037 Kg(N)/ha/yr. This is well below the critical load for coastal habitats of 10-20 Kg(N)/ha/yr[167].

Overall, the air quality effect on the Baldoyle Bay SAC, pNHA and SPA, is considered *negative, long-term* and *imperceptible.*

Table 11.11: 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) Note 1			NO_2 Dry Deposition Rate Impact
	Do Nothing	Do Something	Change in NO_X Concentration	Kg N ha^{-1} yr^{-1}
10	30.56	31.24	0.68	0.037
20	28.72	29.24	0.52	0.027
30	27.39	27.79	0.40	0.022
40	26.42	26.73	0.31	0.017
50	25.68	25.93	0.24	0.013
60	25.12	25.31	0.19	0.011
70	24.67	24.82	0.15	0.008

[166] UK Highways Agency (2019b) and TII (2011).
[167] TII (2011).

Distance to Road (m)	NO_X Concentration (µg/m³) Note 1			NO_2 Dry Deposition Rate Impact
	Do Nothing	Do Something	Change in NO_X Concentration	Kg N ha^{-1} yr^{-1}
80	24.31	24.43	0.12	0.006
90	24.03	24.12	0.09	0.005
100	23.80	23.88	0.07	0.004
110	23.63	23.68	0.06	0.003
120	23.49	23.53	0.04	0.002
130	23.39	23.42	0.03	0.002
140	23.31	23.34	0.03	0.002
150	23.26	23.29	0.02	0.002
160	23.24	23.26	0.02	0.001
170	23.23	23.25	0.02	0.001
180	23.19	23.21	0.02	0.001
190	23.15	23.17	0.01	0.001
200	23.12	23.13	0.01	0.001

Note 1 Based on a background NO_X concentration of 23 µg/m³ in 2022

11.4.2.3 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 (FRA) has been undertaken as part of this planning application and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the impact will be *imperceptible*.

There is the potential for a number of greenhouse gas emissions to atmosphere during the Operational Phase of the proposed Project. The predicted concentrations of CO_2 for the future years of 2022 and 2037 are detailed in Table 11.12. These are significantly less than the 2030 target set out under EU legislation. It is predicted that in 2022 the proposed Project will increase CO_2 emissions by 0.00132% of the EU 2030 target. In 2037 CO_2 emissions will increase by 0.00095% of the 2030 target. Therefore, the climate impact of the proposed Project is considered *negative, long-term* and *imperceptible*.

Table 11.12: Climate Impact Assessment

Year	Scenario	CO_2 (tonnes/annum)
2022	Do Nothing	3178
	Do Something	3679
2030	Do Nothing	3863
	Do Something	4174
	Increment in 20242	500.5 Tonnes
	Increment in 2037	311.4 Tonnes
	Emission Ceiling (kilo Tonnes) 2030	32,860 [Note 1]
	Impact in 2022 (%)	0.00132 %
	Impact in 2037 (%)	0.00095 %

Note 1

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.*

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 of the development: 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.

11.4.2.4 Human Health

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. It can be determined that the impact to human health during the Operational Phase is *imperceptible.*

11.5 Mitigation Measures

11.5.1 Construction Phase

11.5.1.1 Air Quality

The pro-active control of fugitive dust will ensure prevention of significant emissions arising, rather than a less effective attempt to control them once they have been released. The key measure for controlling dust are set out in the Dust Management Plan (refer to Appendix A11.3 in Volume 3).

These measures are also incorporated into the Construction Environmental Management Plan (CEMP) prepared for the Site. In summary the measures 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 15-20kmph, 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.

The appointed Contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan. In the event of dust nuisance occurring outside the Site boundary, movements of materials likely to raise dust would be curtailed and appropriate and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

11.5.1.2 Climate

Construction Phase traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the Construction Phase of the proposed Project. 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 Project to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on-site will aid to minimise 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.

The proposed Project has been designed to minimise the impact to climate where possible during operation. Details of the measures to be incorporated into the design of the development are outlined within the Building Lifecycle Report prepared in support of this planning application.

11.6 Residual Impacts

11.6.1 Construction Phase

11.6.1.1 Air Quality

Once the dust minimisation measures outlined in Section 11.5 and in the Dust Management Plan (Appendix A11.3 in Volume 3) are implemented, the impact of the short-term Construction Phase 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[168], Site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore the predicted impact during the short-term Construction Phase 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 of the proposed Project will ensure that the impact of the development complies with all EU ambient air

[168] IAQM (2014).

quality legislative limit values which are based on the protection of human health. Therefore, the 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 Phase

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 as a result of the proposed Project will be *imperceptibl*e. Therefore, the Operational Phase 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 as a result of the proposed Project and are significantly below the EU 2030 GHG target. The Operational Phase impact to climate is *long-term, negative* and *imperceptible*. In addition, the proposed Project has been designed to reduce the impact to climate where possible during operation.

11.6.2.3 Human Health

As the air dispersion modelling has shown that emissions of air pollutants are significantly below the ambient air quality standards, which are based on the protection of human health, impacts to human health are *long-term, negative* and *imperceptibl*e.

11.6.2.4 Worst Case Impact

Conservative background concentrations were used in order to ensure a robust assessment. Thus, the predicted results of the Operational Phase assessment are worst-case and will not cause a significant impact on either air quality or climate.

11.7 Monitoring

11.7.1 Construction Phase

There is a low risk of dust soiling and human health impacts as a result of the Construction Phase. Once the dust mitigation measures outlined in Section 11.5 and in the Dust Management Plan (refer to Appendix A11.3) are implemented construction dust emissions will be *imperceptible*.

11.7.2 Operational Phase

There is no monitoring recommended for the Operational Phase of the proposed Project as impacts to air quality and climate are predicted to be *imperceptible.*

11.8 Reinstatement

Not applicable to air quality and climate.

11.9 Interactions

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

Air quality does not have a significant number of interactions with other topics. The most significant interactions are between **air quality** and **population** and **human health**. An adverse impact due to air quality in either the Construction or Operational Phases has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits and therefore the predicted impact is *long-term and imperceptible* with respect to human health.

There is the potential for interactions between **air quality** and **biodiversity** as the Baldoyle Bay SAC and pNHA, along with the Baldoyle Bay SPA are located to the direct east of the proposed Project. Without mitigation, dust emissions from construction works would have potential to impact vegetation in the SAC, pNHA and SPA. However, once the mitigation measures outlined in Section 11.5 and in the Dust Management Plan (Appendix A11.3) are implemented, dust related impacts from the short-term Construction Phase are predicted to be *short-term* and *imperceptible.* Traffic emissions also have potential to impact vegetation as a result of NOx 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 NOx concentrations within the pNHA, SAC and SPA. Therefore the impact is *long-term, negative* and *imperceptible.*

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, it is predicted that there will be no significant interactions between air quality and land and soils.

There is an inter-relationship between **air quality** and **traffic**. 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 Project. In this assessment, the impact of the interactions between traffic and air quality are considered to be *imperceptible.*

There is an inter-relationship between **air quality** and **Material Assets - Services.** The development and installation of services / utilities has the potential to impact on the local air quality. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits.

No other significant interactions with air quality and climate have been identified.

11.10 Cumulative Impacts

Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions, together with those generated by the proposed Project. Therefore, the potential impacts of the proposed Project cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

The potential cumulative impact projects are discussed in Chapter 21 (Cumulative impacts).

11.10.1 Construction Phase

According to the IAQM guidance[169] (2014) should the Construction Phase of the proposed Project coincide with the Construction Phase of any other developments within 350m 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 Baldoyle development. However, provided the mitigation measures outlined in Section 11.5 and Appendix A11.2 (Volume 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 *long-term, negative* and *imperceptible.*

[169] IAQM (2014).

There are no significant cumulative impacts to air quality or climate predicted for the Construction Phase.

11.10.2 Operational Phase

The traffic data used to assess the Operational Phase impacts to air quality and climate included the cumulative traffic associated with the proposed Project as well as other existing and permitted developments in the local area where such information was available. Therefore, the cumulative impact is included within the Operational Phase impact for the proposed Project. The impact is predicted to be *long-term, negative* and *imperceptibl*e with regards to air quality and climate.

11.11 '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).

11.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered when conducting this assessment.

12 Noise and Vibration

12.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Leo Williams Acoustic Consultant of AWN Consulting Ltd. Leo Williams BAI MAI PgDip MIOA has over 6 years' experience as an environmental consultant specialising in Acoustic Impact Assessments.

This chapter assess the noise and vibration impact of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the 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.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

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 impact, in particular of aircraft movements at Dublin Airport, has 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:

- Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health. (2017). *Professional Guidance on Planning & Noise.*
- DCC. DLRCC. FCC. SDCC (2013). *Dublin Agglomeration Noise Action Plan 2019-2023*.
- EPA (2002). *EPA 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 on Current Practice in the Preparation of Environmental Impact Statements.*
- EPA (2017). *Draft Guidelines on the Information to be Contained in n Environmental Impact Assessment Reports.*
- FCC (2017). *Fingal Development Plan Policy on Aircraft Noise*.
- FCC (2019). *Noise Action Plan for Dublin Airport 2019-2023.*

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, this is summarised in the following sections; and
- where necessary, a schedule of mitigation measures has been proposed to control the noise and vibration emissions associated with both the Construction and Operational Phases of the proposed Project.

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 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, in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Daytime (08:00 – 19:00) and Saturdays (08:00 – 14:00)	65	70	75
Evenings and weekends D	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

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.
D. **Category D**: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate assessment period *(i.e.* daytime in this instance) the ambient noise level is determined and rounded to the nearest 5dB. 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 the proposed Project, 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.

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 15mm/s at 4Hz. The standard also notes that below 12.5mm/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 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 15Hz 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

Vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of			
Structure Type	4 to 15 Hz	15 to 40Hz	40Hz and above
Structurally sound and non-protected buildings	15mm/s	20mm/s	50mm/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 to 0.3mm/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 6mm/s respectively if adequate public relations are in place. These values refer to the day and evening time periods only.

During certain construction works (*e.g.* piling) the vibration limits set within Table 12.1 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.

The following table, as set out in the standard, details the values of VDV where various comments from occupiers are possible. The standard notes that the values are applicable for both vertical and horizontal vibration with the appropriate weighting applied. The values in Table 12.3 have been adopted for this assessment.

Table 12.3: VDV ($m{\cdot}s^{-1.75}$) Above Which Various Degree 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

Once operational, the various facilities within the proposed Project will be served by mechanical and electrical plant items, *i.e.* retail units, medical centre, café / restaurant and gym. The operation of the plant will typically be tied to the daytime operating hours of the facilities, with some instances whereby plant items may operate and minimal levels at night.

In relation to day-to-day Operational Phase noise impacts on off-site residential locations, Local Authorities would typically apply the following condition to 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 proposed Project 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 this British Standard 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 2dB penalty for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

The following definitions as discussed in BS 4142 as summarised in Table 12.4.

Table 12.4: BS 4142 Tonal Noise Characteristics

Noise	Description
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 +10dB 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 +5dB 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.

Making the assumption that certain items of mechanical plant serving the proposed Project will operate 24/7 the mechanical plant noise emissions must be designed to achieve the *BS 4142* 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 or lower to the prevailing background noise level at the nearest off-site noise sensitive locations.

Due to the fact that 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 1hr for daytime (07:00 to 23:00 hours) and 15 minutes for night-time (23:00 to 07:00 hours).

Noise criteria have been derived from measured background noise levels for various noise sensitive receivers surrounding and within the proposed Project itself. This is discussed and presented in Section 12.5.3.1.

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 level that arises 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 12.5 offers guidance as to the likely impact associated with any particular change in traffic noise level noise level[170]. It shows that small changes in noise levels are not normally noticeable, whereas an increase of 10dB would be described as a doubling of loudness. In summary the assessment looks at the impact with and without development at the nearest noise sensitive locations.

[170] UK Highways Agency (2020).

Table 12.5: Significance in Change in Noise Level

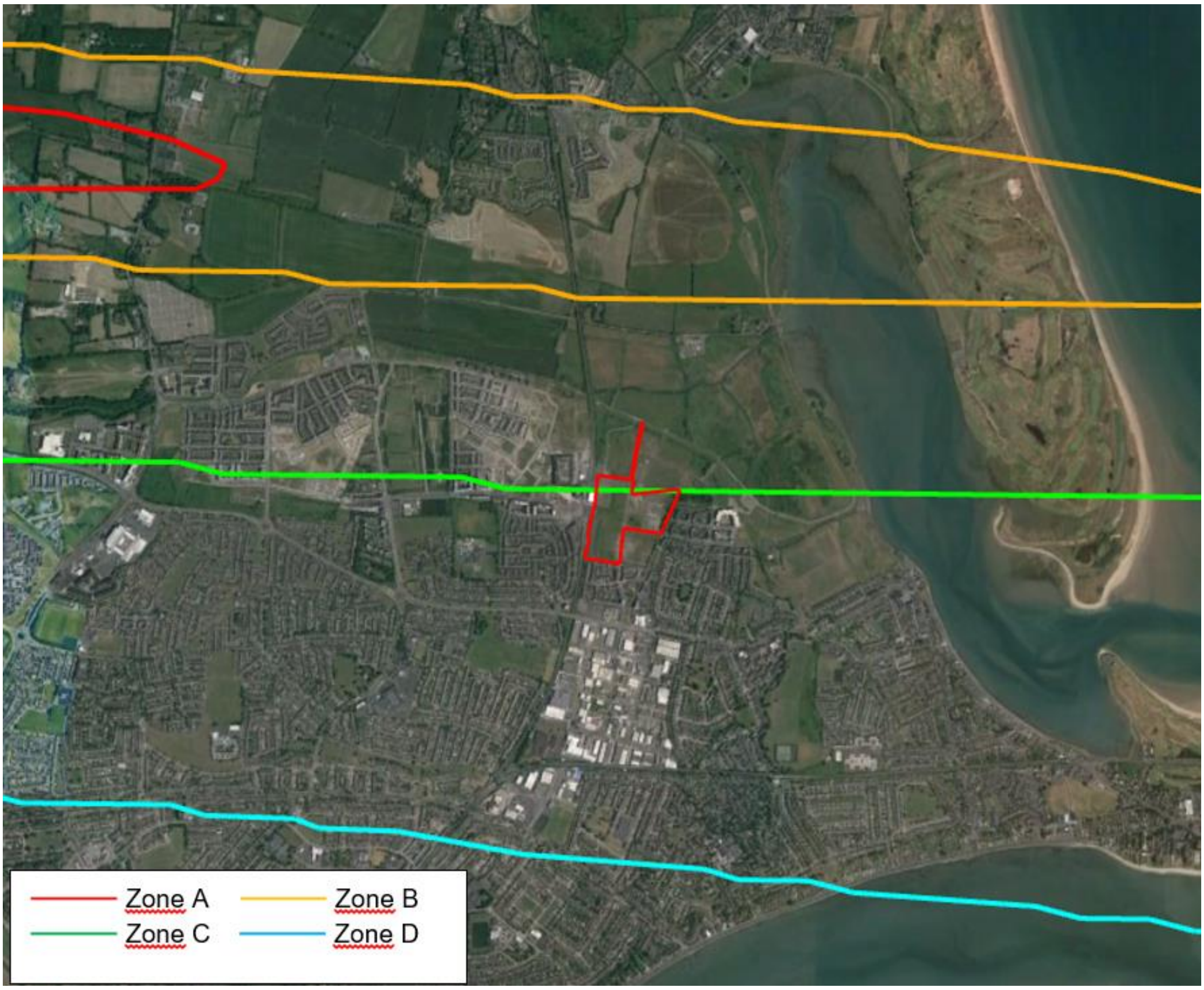
Change in Sound Level ($dB\ L_{A10}$)	Subjective Reaction	DMRB magnitude of Impact	EPA Classification Magnitude of Impact
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate

12.2.3.3 Inward Noise Impact

12.2.3.3.1 Fingal Development Plan Policy on Aircraft Noise

The Site is located in Zone D with part of the northern sector located in Zone C, as illustrated in Figure 12.1.

Figure 12.1: Proposed Airport Noise Zones – Site Location



The members of Fingal County Council (FCC) resolved to adopt Variation No. 1 of the Fingal Development Plan 2017-2023 (the '*Development Plan*') 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.

Table 12.6 below outlines the objectives to be adhered to by applicants for developments in the zones relevant in this instance.

Table 12.6: Aircraft Noise Zones

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
D	≥ 50dB and < 54dB $L_{Aeq,\ 16hr}$ and ≥ 40dB and < 48dB 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 not normally be refused on noise grounds, however where the development is residential-led and comprises non-residential noise sensitive uses, or comprises 50 no. residential units or more, it may be necessary for the applicant to demonstrate that a good acoustic design has been followed. Applicants are advised to seek expert advice.
C	≥ 54dB and < 63dB $L_{Aeq,\ 16hr}$ and ≥ 48dB and < 55dB 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 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.

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
		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.
Notes: '*Good Acoustic Design*' means following the principles of assessment and design as described in ProPG: *Planning & Noise – New Residential Development, May 2017*; Internal and External Amenity and the design of noise insulation measures should follow the guidance provided in British Standard BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'*.		

12.2.3.3.2 Noise Action Plan for Dublin Airport 2019-2023

The *Noise Action Plan* for Dublin Airport (2019-2023) was published by FCC on 19 December 2019. The *Noise Action 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 *Noise Action 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 consider planning only in the context of outward impact 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 Plan2019-2023.*

12.2.3.3.3 Dublin Agglomeration Noise Action Plan 2019 - 2023

The Dublin Agglomeration 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:

1. *To integrate Noise Action Plans into the County Development Plans.*
2. *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.*
3. *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.*
4. *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,*
5. *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.*
6. *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.

7. *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.*

8. *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 Dublin Agglomeration NAP policy, an Acoustic Design Statement (ADS) has been incorporated into this EIAR chapter to comply with the requirements of this policy.

12.2.3.3.4 Professional Guidance on Planning & Noise (ProPG)

The *Professional Guidance on Planning & Noise*[171] (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:

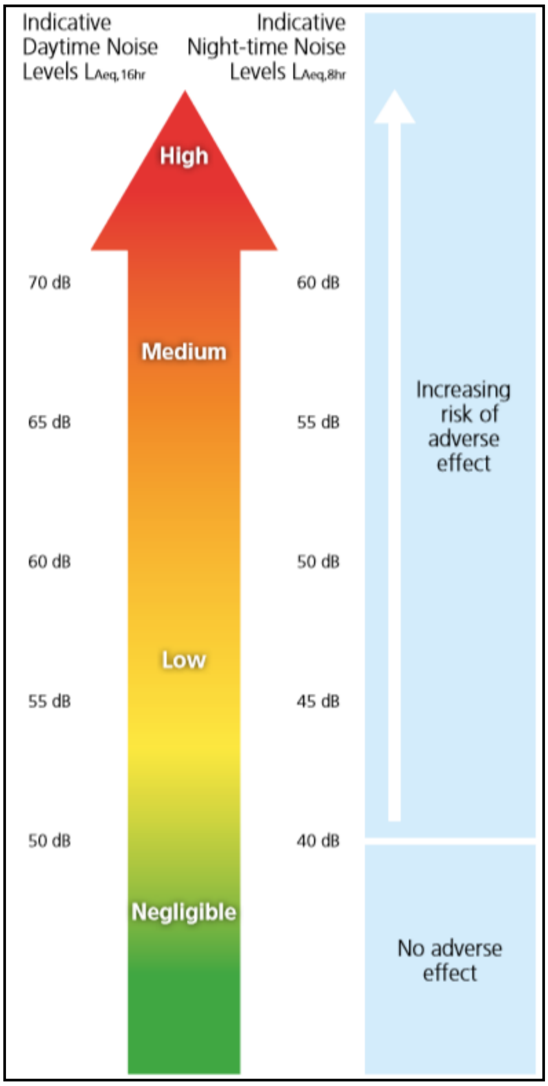
- **Stage 1** - Comprises a high-level initial noise risk assessment of the Site considering either measured and or predicted noise levels.
- **Stage 2** - Involves a full detailed appraisal of the proposed Project covering four "key elements" that include:
  - **Element 1 -** Good Acoustic Design Process.
  - **Element 2 -** Noise Level Guidelines.

[171] Institute of Acoustics (IOA) (2017).

- **Element 3 -** External Amenity Area Noise Assessment.
- **Element 4 -** Other Relevant Issues.

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the Site as a *negligible, low, medium or high risk* based on the pre-existing noise environment. Figure 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 $10L_{AFmax}$ events exceed 60dB during the night period and the Site should be considered a *high* risk if the L_{AFmax} events exceed 80dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from *BS 8233:2014*. The recommended indoor ambient noise levels are set out in Table 12.7 and are based on annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

Table 12.7: 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	35dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$ 45dB $L_{Amax,T}$*

***Note** 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.

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

12.2.4 Operational Phase - Vibration

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.

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 Choice of Measurement Locations

The measurement locations were selected in order to obtain prevailing noise levels at noise sensitive locations closest to the Site and to assist in the outward impact assessment. Location NM5 was selected to obtain noise levels relating to rail traffic for use in the inward noise assessment.

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 Details

Survey Periods - The attended noise survey was carried out by AWN personnel over the period 11:00 to 15:30 on 8 January 2020.

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.

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 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 2×10^{-5} Pa.

12.3.1.4 Survey Results and Discussion

The results of the noise survey at the five monitoring locations are summarised below.

Location NM1

Table 12.8: Measured Noise Levels – NM1

Start Time (hrs)	Measured Noise Level (dB re. 2×10^{-5} Pa)		
	L_{Aeq}	L_{AFmax}	L_{A90}
14:40	52	71	39
15:00	52	68	39
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 58dB. The background L_{A90} was of the order of 39dB.

Location NM2

Table 12.9: 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 67dB. The background L_{A90} ranged from 54 to 55dB.

Location NM3

Table 12.10: 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 45dB.

Location NM4

Table 12.11: 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 55dB. The background L_{A90} ranged from 45 to 46dB.

Location NM5

Table 12.12: 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 56dB. The background L_{A90} ranged from 44 to 45dB.

L_{max} noise levels during the daytime survey did not exceed 80dB 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 Sound Exposure Levels (SEL) are detailed in the table below.

Table 12.13: 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

12.3.1.5 *Do-Nothing* Scenario

In the absence of the proposed Project being constructed, the noise environment at the nearest noise sensitive locations and within the Site will remain largely unchanged.

12.4 Characteristics of the Proposed Project

Refer to Section 12.1 for the description of the proposed Project and Chapter 5 (Description of the Proposed Project) of this EIAR.

Figure 12.4 illustrates the Site layout.

Figure 12.4: Proposed Site Masterplan showing Red Line Boundary[172]

12.4.1 Construction Phase

The Construction Phase will involve excavation over the Site, the formation of the basement levels, construction of the new buildings and landscaping.

[172] Henry J Lyons (2021). Site Masterplan. Drawing No. STP0011 GA1

12.4.2 Operational Phase

The primary sources of outward noise that are deemed long-term are mechanical plant items that will serve the proposed Project and traffic travelling to and from the Site. Inward noise from road and rail movements and aircraft will also be incident on the development buildings.

12.5 Potential Impact of the Proposed Project

12.5.1 Construction Phase

The proposed construction hours are 07:00 to 19:00, Monday to Friday and 08:00 to 14:00 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 12.14 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme at a standard reference distance of 10m from the various plant items.

Table 12.14: 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

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at 10m Distance (dB L_{Aeq})
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 the 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 to the proposed Project have been identified and are illustrated in Figure 12.5.

- NSL1 Apartments at Myrtle Avenue some 20m south of the Site.
- NSL1 Houses at Red Arches Drive some 30m east of the Site.
- NSL2 Apartments at Bridge Street, some 50m west of the Site.
- NSL3 Apartments at Railway Road, some 70m west of the 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 biodiversity is assessed in Chapter 8 (Biodiversity).

- N1 Baldoyle Bay SAC, approximately 400m north-east of the Site at the closest point.
- N2 Baldoyle Bay SPA, approximately 700m east of the 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 65dB $L_{Aeq,1hr}$ during daytime hours.

Figure 12.5: Nearest Noise Sensitive Receiver

Table 12.15 presents the predicted daytime noise levels associated with construction activity.

Table 12.15: Typical Construction Noise Emission Levels

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at Distance (dB L_{Aeq})					
		20m (NSL1)	30m (NSL2)	50m (NSL3)	70m (NSL4)	470m (N1)	830m (N2)
Site Preparation	Wheeled Loader Lorry (D3 1)	62	59	54	51	35	30
	Track Excavator (C2 22)	59	56	51	48	32	27
	Dozer (C2.13)	65	62	57	54	38	33
	Dump Truck (C4.2)	65	62	57	54	38	33
	Site Preparation Total	70	66	62	59	42	37
Foundations	Tracked Excavator (C3.24)	61	57	53	50	33	28
	Concrete Pump (C3.25)	65	61	57	54	37	32
	Large Rotary Bored Piling Rig (C3.14)	71	66	62	59	42	38
	Compressor (D7 6)	64	60	56	53	36	31
	Poker Vibrator (C4 33)	65	61	57	54	37	32
	Foundations Total	73	70	65	62	45	41
General Construction	Hand tools	68	65	60	57	41	36
	Tower Crane (C4.48)	63	60	55	52	36	31
	Pneumatic Circular Saw (D7.79)	62	59	54	51	35	30
	Internal fit – out	57	54	49	46	30	25
	General Construction Total	70	67	62	60	43	38
Landscaping	Dozer (C2.13)	65	62	57	54	38	33
	Dump Truck (C4.2)	65	62	57	54	38	33
	Surfacing (D8.25)	55	52	47	44	28	23
	Wheeled Loader Lorry (D3 1)	69	64	59	56	40	37
	Landscaping Total	71	67	63	60	43	39

Predictions indicate that at 20m distance from areas of major works, the predicted construction noise levels for certain activities are above the construction noise threshold, therefore the associated noise impact is *significant* at this distance. At distances of 30m, the predicted construction noise levels are marginally above the noise criteria for foundation works but are equal or less than the noise criteria for the majority of works indicating a *moderate to significant* 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 receiver's off-site. As works move around the Site of the proposed Project, the distances between works and sensitive receivers increase and the noise levels associated with the works decrease.

12.5.2 Construction Phase - Vibration

The main potential source of vibration during the Construction Phase 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. The following vibration magnitudes associated with rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock are summarised below:

- 0.54 mm/s at a distance of 5m, for auguring;
- 0.22 mm/s at a distance of 5m, for twisting in casing;
- 0.42 mm/s at a distance of 5m, for spinning off; and
- 0.43 mm/s at a distance of 5m, for boring with rock auger.

The residential dwellings situated on Myrtle Avenue, across from the southern perimeter of the Site are located at the closest distances to the Site, situated some 20m from areas of piling or excavation. 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 further distances from the works vibration magnitudes will dissipate further resulting in lower vibration levels to those noted above and hence are orders of magnitude below the limit values in Table 12.2 for structurally sound buildings. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of the closest buildings along southern 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 on mitigation measures during this phase are discussed in Section 12.6.

12.5.3 Operational Phase - Outward Noise Impact

12.5.3.1 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 Phase noise level at the nearest noise sensitive location within the development (e.g. apartments, etc.) will be designed / attenuated to meet the relevant *BS 4142* noise criteria for day and night-time periods.

Given the baseline noise levels measured and presented in Section 12.3, and on review of available EPA Noise Maps[173] 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:

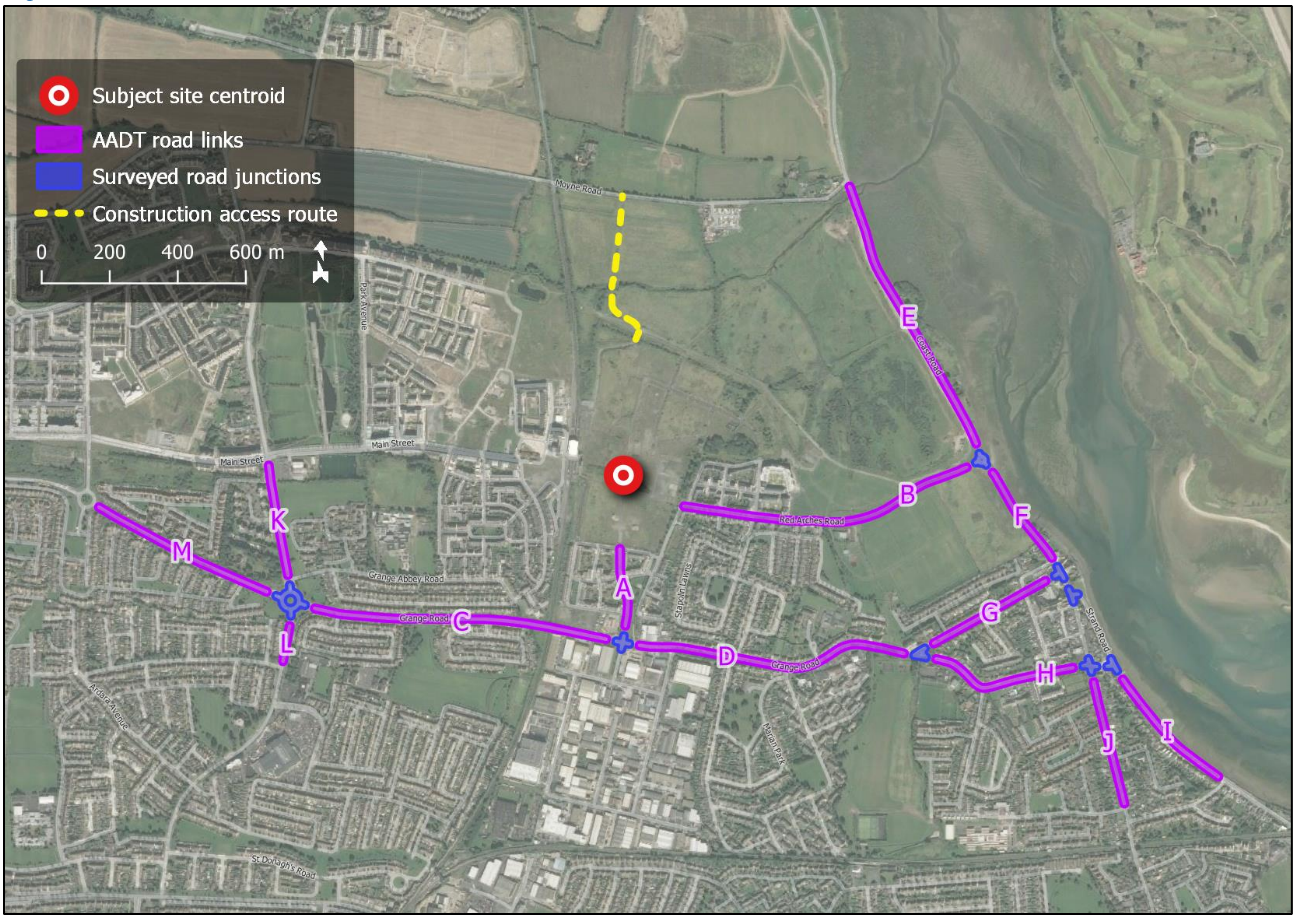
- Daytime (07:00 to 23:00hrs) 50 dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00hrs) 40 dB $L_{Aeq,15min}$

12.5.3.2 Additional Traffic on Local Roads

During the Operational Phase of the proposed Project, an increase in vehicles associated with the new development has the potential to increase the noise levels on the surrounding road network. Figure 12.6 below from the *Traffic and Transport Assessment*[174] (TTA) illustrates the road links in the vicinity of the Site. The traffic flows on these road links have been provided by Cronin & Sutton Consulting Engineers in the form of Annual Average Daily Traffic (AADT).

[173] EPA Maps (2021).
[174] CS Consulting Engineers (CS) (2021d).

Figure 12.6: 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 12.16. This assessment considers the worst-case cumulative impact of the proposed Project as well as permitted nearby developments.

Table 12.16: Predicted Change in Traffic Noise Levels - Opening Year 2022

Road Link	Traffic Flows – AADT		
	Do Nothing - 2022 (Without development)	Do Something - 2022 (With Development)	Predicted Change in Noise Level (dB)
A	2844	6107	+3.3
B	2726	4141	+1.8
C	20930	22835	+0.4
D	14937	14046	-0.3
E	13206	14531	+0.4
F	13630	12861	-0.3
G	5713	4308	-1.2

Road Link	Traffic Flows – AADT		
	Do Nothing - 2022 (Without development)	Do Something - 2022 (With Development)	Predicted Change in Noise Level (dB)
H	8077	8590	+0.3
I	10986	11495	+0.2
J	10505	11149	+0.3
K	15307	15550	+0.1
L	24737	25288	+0.1
M	27491	28600	+0.2

Table 12.17: Predicted Change in Traffic Noise Levels - Design Year 2037

Road Link	Traffic Flows – AADT		
	Do Nothing - 2037 (Without development)	Do Something - 2037 (With Development)	Predicted Change in Noise Level (dB)
A	2402	6473	+4.3
B	3093	4508	+1.6
C	24103	26645	+0.4
D	17302	16701	-0.2
E	15572	16899	+0.4
F	16067	15298	-0.2
G	6711	5307	-1.0
H	9413	10028	+0.3
I	12996	13504	+0.2
J	12181	13034	+0.3
K	18025	18348	+0.1
L	29056	29792	+0.1
M	32225	33708	+0.2

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 1.8dB. With reference to Table 12.5 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, slight* and *long-term*.

12.2.3.4 Noise Associated with Crèche

Measurement of noise levels generated by children playing outdoors at several crèches and kindergartens indicate typical noise levels in the order of 56dB $L_{Aeq,1hr}$ at distance of 5m. The nearest noise sensitive locations offsite are located approximately 160m from the crèche, to the south-west. Considering the usage of the crèche area (*e.g.* external areas are only expected to be in use for a portion of the 16 hour daytime period) and the large separation distance, internal noise levels associated with the crèche will be comfortably within the criteria in Table 12.7 will be met in the closest off-site sensitive locations. Therefore, the resultant noise impact due to the crèche is *negligible.*

12.5.4 Operational Phase - 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.

12.5.4.1 Rail Noise

Noise from rail traffic was measured during the baseline noise survey on site and Sound Exposure Level (SEL) derived.

Using this SEL and knowledge of the number of rail movements in a given period, it is possible to calculate 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 12.18 below.

Table 12.18: Predicted Rail Line Noise

Location	Distance	Period	Predicted Façade Noise Level $L_{Aeq,T}$ (dB)
Block D1 (Western Façade)	45m	Daytime	54
		Night-time	46
Block A1 (Western Façade)	32m	Daytime	58
		Night-time	51
Block C2 (Western Façade)	20m	Daytime	61
		Night-time	53
Houses C1 (Western Façade)	30m	Daytime	58
		Night-time	51

At façades located further from the rail line, rail noise levels are calculated to be of a level that is similar to the prevailing background noise levels.

12.5.4.2 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 Fingal 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}.

Figure 12.7: Aircraft Noise Zones

As discussed, and illustrate above, the Site is located for the most part in Zone D with the northern portion of the Site located in Zone C. Therefore, the worst-case noise levels incident to dwellings and external amenity areas falling within these zone can be summarised as:

Zone D

- Daytime 54dB $L_{Aeq,16hr}$.
- Night-time 48dB L_{night}.

Zone C

- Daytime 63dB $L_{Aeq,16hr}$.
- Night-time 55dB L_{night}.

12.5.4.3 Inward Noise Impact Summary

Noise

With reference to the *Noise Risk Assessment* outlined in ProPG the noise levels for relevant periods have been derived in order to classify the Site. Table 12.19 summarises the calculated cumulative noise levels at various proposed building facades as per the Site layout provided.

Table 12.19: Categorising the Site of the Proposed Project

Location	Period	Predicted Noise Level (dB, $L_{Aeq,T}$)	"Noise Risk Category"
Block D1 (Western Façade)	Daytime	64	Medium
	Night-time	56	Medium
Block A1 (Western Façade) and Houses C1 (Western Façade)	Daytime	59	Low - Medium
	Night-time	53	Low - Medium
Block C2 (Western Façade)	Daytime	63	Medium
	Night-time	56	Medium
Rest of the Proposed Project Site (Zone C)	Daytime	58 - 63	Low - Medium
	Night-time	50 - 55	Low - Medium
Rest of the Proposed Project Site (Zone D)	Daytime	51 - 56	Low
	Night-time	45 - 50	Low

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 80dB 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.

ProPG states the following with respect to *Low* and *Medium Risk* categories:

Low Risk *At low noise levels, the site is likely to be acceptable from a noise perspective provided that 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 in the finished development.*

Medium Risk *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 Site may be categorised as *Low* to *Medium Risk* and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided at the Site.

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used:

> *"2.12 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.

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.

12.5.4.4 Acoustic Design Statement - Part 1

Noise levels have been calculated across the Site during day and night-time periods.

Where façade noise levels are less than 55dB $L_{Aeq,16hr}$ during the day and 50dB $L_{Aeq,8hr}$ 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 55dB $L_{Aeq,16hr}$ during the day and 50dB $L_{Aeq,8hr}$ 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 facades 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:

Table 12.20: Calculated Façade Noise Levels

Location	Daytime Calculated Noise Level (dB, $L_{Aeq,T}$)	Night-time Calculated Noise Level (dB, $L_{Aeq,T}$)
Block D1 (Western Façade)	64	56
Block A1 (Western Façade)	59	53
Block C2 (Western Façade)	63	56
Houses C1 (Western Façade)	59	53

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.

12.5.4.4.1 External Noise Levels

External noise levels within the vast majority of communal open spaces across the Site are within the recommended range of noise levels from ProPG of between 50-55dB $L_{Aeq,16hr}$. 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.

12.5.5 Operational Phase - Vibration

There is no vibration source proposed that would generate significant vibration during the Operational Phase of the proposed Project therefore there is no vibration effects on the surrounding environment.

12.6 Mitigation Measures

12.6.1 Construction Phase

The final Construction Environmental Management Plan (CEMP) will outline the construction hours for the proposed Project. The expected construction hours will be 07:00-19:00 Monday to Friday and 08:00-14:00 on Saturdays. There will be no works on Sundays or bank / public holidays in accordance with the Environmental Noise Regulations (S.I. No. 140 of 2006 Environmental Noise Regulations) and subject to final agreement with FCC.

12.6.1.1 Noise

With regard to Construction Phase 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 appointed 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 NSLs 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;
- 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 should be considered:

- 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, lining drops 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. General guidance in relation to piling is outlined in the following paragraphs.

Piling programmes should 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 that themselves may generate significant noise and vibration, the working programme should 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, should be made aware of the proposed method of working of the piling contractor. The piling contractor should in turn have evaluated any practicable and more acceptable alternatives that would economically achieve, in the given ground conditions, equivalent structural results.

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.

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 Phase 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 environmental liaison officer should be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. 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 liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

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 other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Monitoring - Construction Phase noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the 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 Peak Particle Velocity parameter (PPV, 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*.

12.6.2 Operational Phase

12.6.2.1 Noise

Mechanical Plant 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 development 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. 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; and
- 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.

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 facades highlighted in Figure 12.8 will be provided with glazing and ventilation that achieves the minimum sound insulation performance as set out in Tables 12.21 and 12.22. Other facades in the proposed Project have no minimum requirement for sound insulation.

Table 12.21: 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
Orange	19	27	34	39	35	40	35

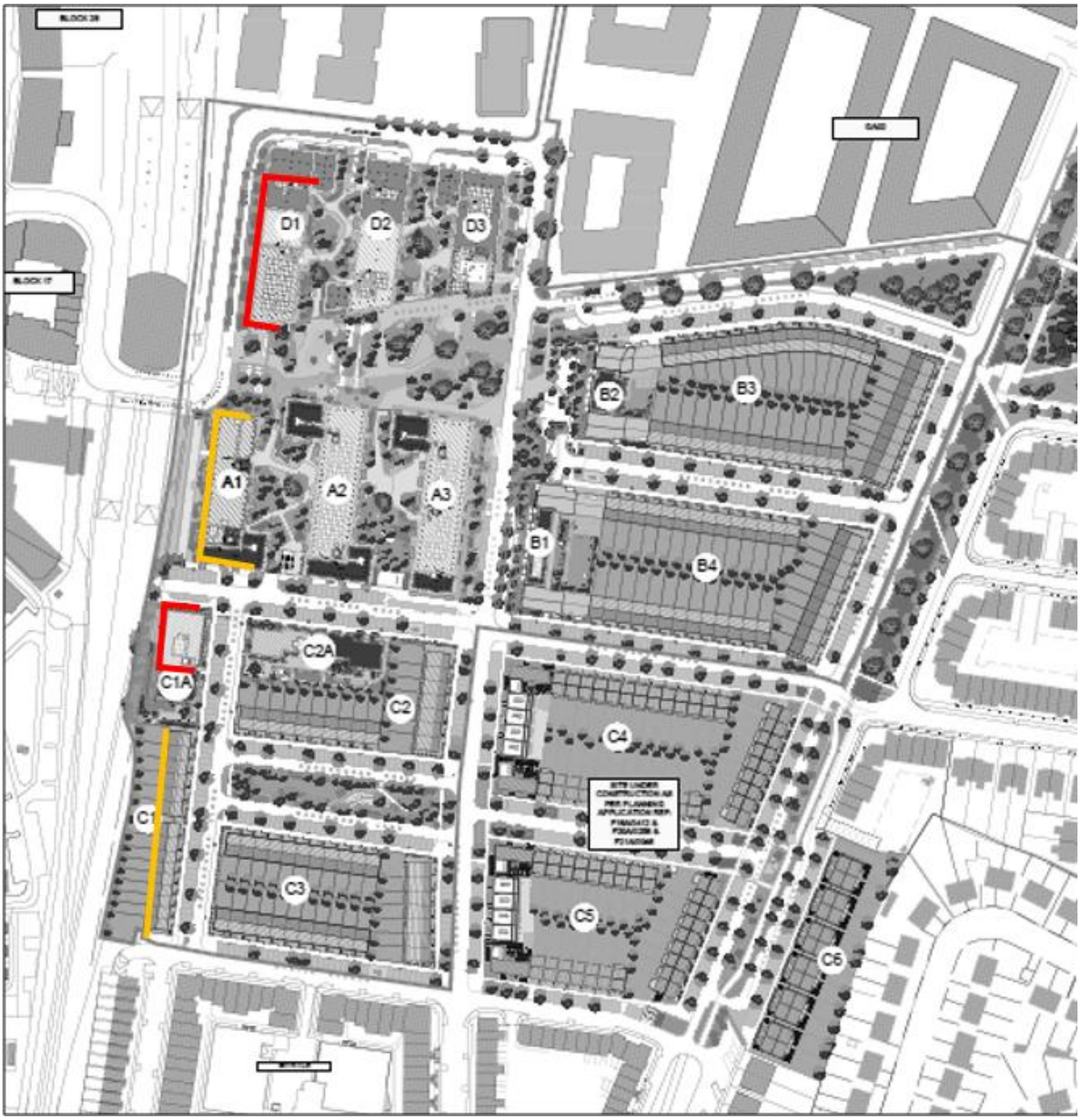
The overall R_w and $D_{ne,w}$ outlined in this section are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing and ventilation configurations. Any selected system will be required 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 12.22: 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[175]	35	34	33	38	49	45	39
Orange	29	32	37	36	35	40	37

Figure 12.8: ProPg Stage 2 - Façade Sound Insulation Requirement



[175] The facades highlighted red and orange experience different façade noise levels, therefore there are two minimum performance specs presented for glazing and ventilation to ensure internal noise targets are met

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.

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 houses, a suitable sound reduction performance would be provided by a standard tiled or slated roof with a single 12.5mm layer plasterboard ceiling and heat insulation layer above the ceiling.

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 the Site.

Residual impacts associated with construction activities undertaken adjacent to the Site boundaries are categorised as:

Quality	Significance	Duration
Negative	*Moderate*	*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 as follows:

Quality	Significance	Duration
Negative	*Slight*	*Short-term*

12.7.2 Operational Phase

12.7.2.1 Noise

Mechanical Plant and Services Noise

Once cumulative plant noise emissions from the proposed Project are designed to achieve the appropriate noise criteria the residual noise impact is as follows

Quality	Significance	Duration
Neutral	*Imperceptible*	*Permanent*

Additional Traffic on Local Roads

Based on the traffic flows associated with the operation of the proposed Project the impacts are predicted to be as follows for assessed local road Links B to M:

Quality	Significance	Duration
Neutral	*Imperceptible*	*Permanent*

For road Link A, the impact is predicted as:

Quality	Significance	Duration
Negative	*Slight*	*Permanent*

Noise Associated with Crèche

Based on reference measurements of noise from crèches and the separation distance between the proposed crèche (Block A), and the nearest offsite noise sensitive receivers, the impact is predicted to be as follows:

Quality	Significance	Duration
Neutral	*Imperceptible*	*Permanent*

12.8 Monitoring

12.8.1 Construction Phase

The appointed Contractor will be required to ensure construction activities operate within the noise and vibration limits set out within this assessment. The appointed Contractor will be required to undertake regular noise and vibration monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, Measurement and Assessment of Environmental Noise*.

Vibration monitoring should be conducted in accordance with BS 6472 for human disturbance and BS ISO 4866:2010 for building damage.

12.8.2 Operational Phase

There is no requirement for monitoring during the Operational Phase.

12.9 Reinstatement

Reinstatement is not applicable in the context of noise and vibration.

12.10 Interactions

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

There is an inter-relationship between **noise and vibration** and **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 and adherence to good practice noise reducing measures will ensure that the residual impact on human health is *negative, moderate-significant* 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 development 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*.

There is an inter-relationship between **noise and vibration** and **biodiversity.** There is potential for impact on **biodiversity** during the Construction Phase of the proposed Project. 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 Chapter 8 (Biodiversity).

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*.

12.12 Cumulative Impacts

In terms of construction noise, it is possible that construction works at the GA3 site may occur simultaneously to 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 possibly occur at receptor locations equidistant to both sites, i.e. receptors bounding the west boundary of the Site and to a lesser extent to the east of the Site.

There are also permitted schemes on lands to the west of the 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.

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*.

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 Project, they are at sufficient distances such that the cumulative noise levels will remain dominated by the localised works referred to in Table 12.15.

With respect to sensitive receptors to the west of the Site, noise monitoring will therefore be undertaken to determine where noise control measures are required to reduce cumulative impacts. Permitted developments are included in the traffic impact and therefore the potential for a cumulative impact has already been assessed. Future projects of any future currently unpermitted large scale would need to conduct an EIA to ensure that no significant impacts resulting from noise and vibration will occur as a result of those developments.

12.13 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered when conducting this assessment.

13 Landscape and 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.

This chapter describes the likely significant effects on the landscape and visual aspects of the receiving environment of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), 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 new development.

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 has been assessed separately in the Daylight, Sunlight and Overshadowing Study prepared by O'Connor Sutton Cronin and is included with this planning application.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no.

units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

Figure 13.1: Proposed Red Line Boundary[176]

13.2 Methodology

This chapter has been prepared between January 2020 and June 2021, with reference to the methodology and terminology outlined in the following guidelines:

- 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.*

[176] Google Earth (2020).

- Landscape Institute / Institute of Environmental Management and Assessment (IEMA) (2013). *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition).

13.2.1 Relevant Legislation and Guidance

This chapter has been prepared having particular regard to the following guidelines, the EPA Draft Guidelines[177] and *Guidelines for Landscape and Visual Impact Assessment*[178] (Generally referred to as 'GLVIA3').

Specific guidance for the assessment of Landscape and Visual Impacts for an EIAR is given in the '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 Draft EPA Guidelines[179].

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 development. 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.

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.

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 are identified from this stage, which support this landscape and visual appraisal and inform production of supporting photomontages. The

[177] EPA (2017).
[178] LI / IEMA (2013).
[179] EPA (2017).

methodology for photomontage production is contained in the *Verified Photomontages* booklet by Modelworks, submitted with this 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 Shoreline Project Design Team and incorporated into the development proposal; the subsequent assessment of likely landscape and visual impacts takes account of the proposed mitigation measures.

13.2.2 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*[180] (hereafter 'the Guidelines'). This is rooted in the National Planning Framework (NPF) 2018, which states in Chapter 4 ‘Making Stronger Urban Places’ page 67 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."*

The NPF also sets out National Policy Objective 13, which states:

[180] DHPLG (2018c).

> *"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 *"… 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 "… *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 this, 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*[181].

[181] DEHLG and OPW (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.

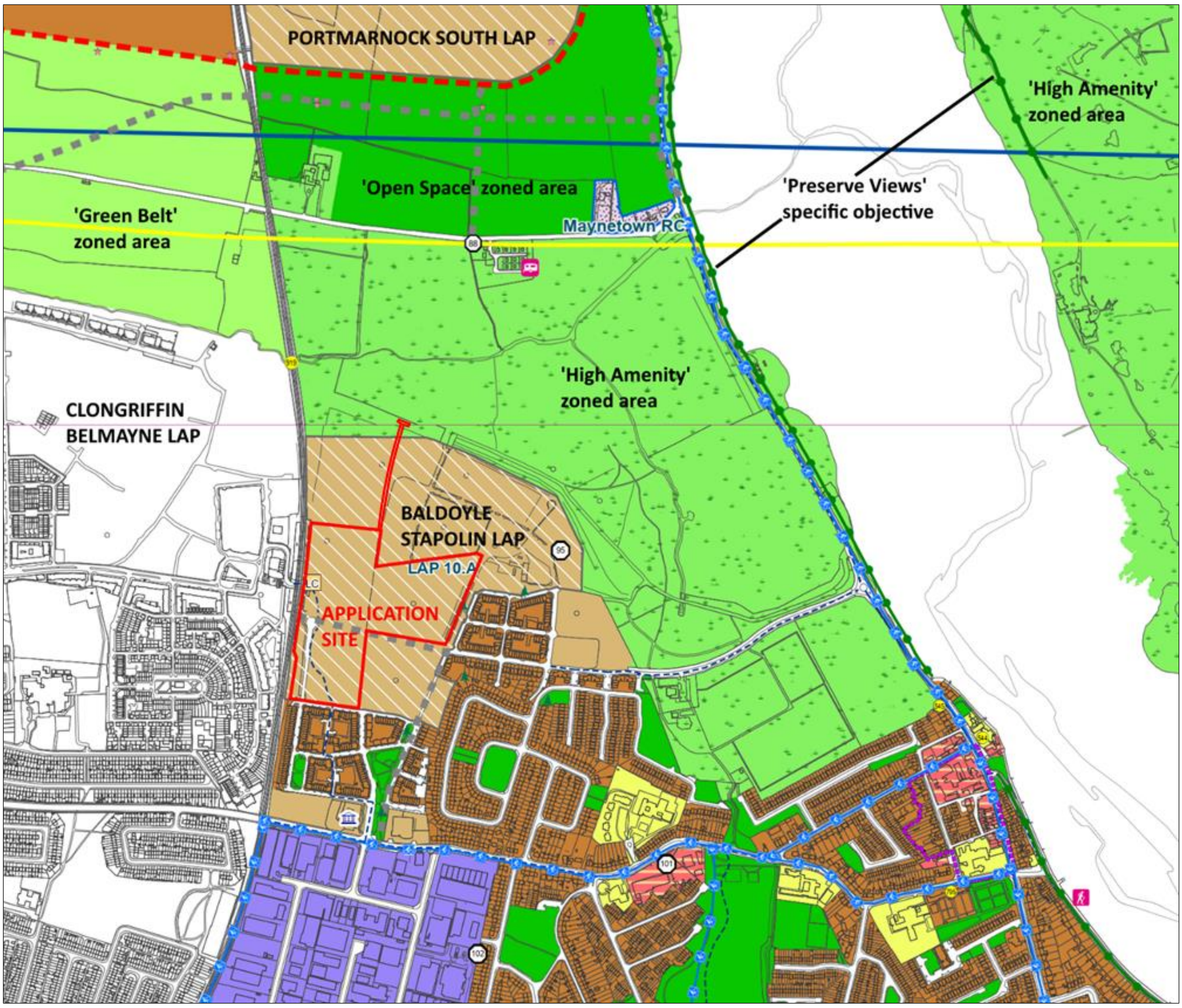
The proposed Project will be assessed against these and other criteria in detail later in this chapter.

13.2.3 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. Together with the Baldoyle-Stapolin LAP, these represent substantial areas of urban grown in the locality, accompanied by further future development to the north of the R123 in the Portmarnock South LAP area.

Figure 13.2: Fingal Development Plan 2017-2023 Sheets 9 & 10 (combined extracts), annotated



13.2.3.1 Fingal Development Plan 2017-2023

The Fingal Development Plan 2017-2023 (the '*Development Plan*') covers the Site 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.
- 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, which state:

> *"Protect High Amenity areas from inappropriate development and reinforce their character, distinctiveness and sense of place." (NH51)*

> *"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." (NH52)*

The *Landscape Character Assessment* for the 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, which states: *"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: *"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."*

13.2.3.2 Baldoyle-Stapolin Local Area Plan 2013 (as extended)

Chapter 4 of the Local Area Plan 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:

> *"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.

13.2.3.3 Nearby Planning Applications / Consents

To the west of the railway line, within the Clongriffin-Belmayne LAP, consent has been issued for an amended SHD scheme (ref. 305316) 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.

13.3 Baseline Environment

13.3.1 Site Description

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha. The Site is partly undeveloped (historically greenfield in nature and partly a temporary construction compound associated with on-going development further 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 greenspace / countryside to the north and east, including the Baldoyle and Portmarnock coastal area. The area is undergoing rapid change in character driven primarily, in more recent years, by 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.

Immediately to the west 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 local streets afford localised 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[182].

13.4 Potential Impact 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, some of which may be significant. Impacts are likely to arise from the following:

- temporary hoardings, parking, materials and Site offices;
- demolition of existing site structures;
- 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.

[182] Image: Google Maps / Christy Hunt.

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 95 months (7 years and 11 months), meaning construction phase impacts will be temporary or 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

The changes to the permitted scheme include the following key elements:

- extension of the red line boundary northwards to include apartment blocks D1-D3, enclosing and completing Stapolin Square;
- increased and enhanced amenity space for residents and commercial users, clustered centrally in Blocks A and D;
- increases and greater variation in building heights, in line with the Urban Development and Building Height Guidelines 2018 and the aspirations of the LAP; and
- a richer design response in terms of detailing, materials and variety.

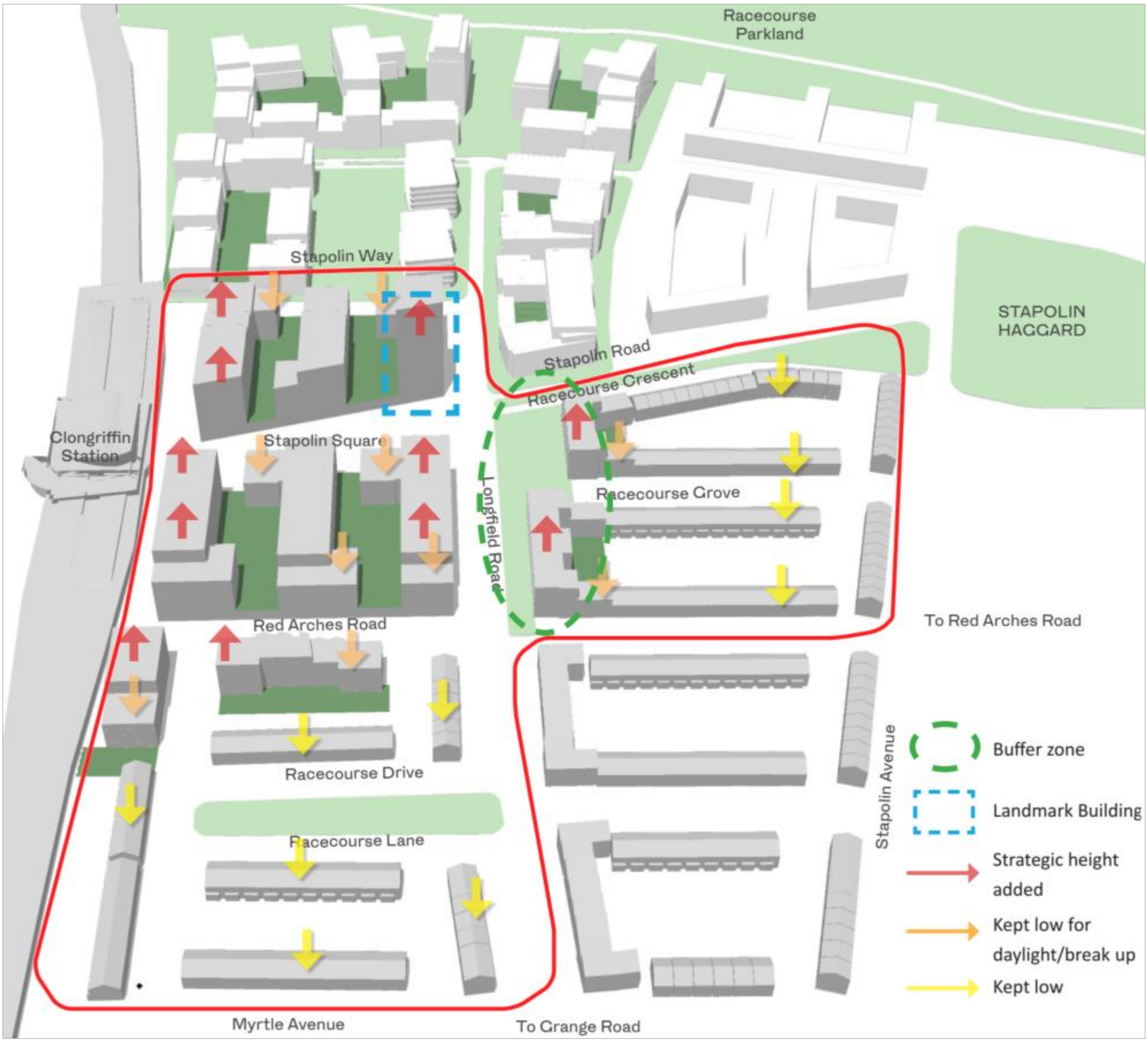
Figure 13.4: Proposed Site Masterplan[183]

Potentially *negative* impacts arise from the increased scale and height of a more extensive development with some taller buildings, while potentially *positive* impacts arise from the richer design response and the completion of Stapolin Square.

The figures and text that follow illustrate the approach to building heights, including changes from the permitted scheme, and present some of the key building elevations to demonstrate typical building character. This aids the subsequent account of potential landscape and visual impacts.

[183] Henry J Lyons (2021). Site Masterplan. Drawing No. STP0011 GA1

Figure 13.5: Approach to Building Heights[184]



[184] Henry J Lyons Architects.

Figure 13.6: Range of Building Heights[185]

The southern and eastern quarters of the Site (the greater parts of Blocks B and C) will be 2-3 storeys high, where neighbouring established residential areas are of similar height and scale. The central / western and northern quarters (Blocks A, D and the adjacent margins of Blocks B and C) of the proposed Project are 4-9 storeys high with an accent building at 15 storeys. The increasing density and height responds to neighbouring developments immediate west of the Site, including the district centre and railway station.

[185] Henry J Lyons Architects.

Figure 13.7: Block D Elevation from the East[186]

Figure 13.8: Block A, partial elevation from Stapolin Square[187]

The taller buildings, primarily Block A and Block D are likely to be clearly visible in views from the surrounding landscape, particularly from the north and east where there is little intervening development. These buildings will introduce changes to the skyline and intensify the built edge of the

[186] Henry J Lyons Architects.
[187] Henry J Lyons Architects.

urban area, with potential for negative visual impacts upon nearby High Amenity areas. However, the newly built neighbourhood adjoining and west of Clongriffin train station will provide a visible urban context for the proposed Project, while future phases of development within the LAP are likely to screen such views of the proposed Project and also provide a wider urban context for it. In close quarters, the new civic public spaces will match the scale and quality of the buildings, providing an attractive setting to them and making a positive contribution to the landscape.

Figure 13.9: Blocks B2 / B1 from Longfield Road[188]

Figure 13.10: Blocks C1 and C2[189]

[188] Henry J Lyons Architects.
[189] Henry J Lyons Architects.

Figure 13.11: Blocks B and C housing from Linear Park[190]

Lower buildings in Blocks A, B and C will be mostly visible from neighbouring residential areas, where their scale and materiality complement the existing houses. In-combination with the provision of hard and soft landscaped open space, this is likely to have a *positive* landscape and visual impact upon existing residential areas.

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

[190] Henry J Lyons Architects.

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 traffic management strategy 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 (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 c. 95 month period (7 years 11mths), with *moderate* or *sligh*t *negative* effects further afield. Completing the construction programme in this period represents an expedient construction programme and will ensure *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:

- Development 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 placemaking 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 station, 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. Taller buildings in the vicinity of the station are consistent with nearby consented development adjoining and west of the railway line, creating a unified character that reads as a whole in the wider landscape.

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.
- 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. This includes stepping down in height towards its northern edge where it is initially overlooked from the

nearby High Amenity area, but where it will ultimately transition to the Growth Area No. 3 (GA3) development area.

- The proposed Project incorporates a range of buildings solutions, from apartment blocks, duplex apartments and town houses, which incorporates further variation of elevation details and roofscapes.
- 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:

- Block A comprises five distinct volumes of 5-8 storeys, orientated north-south, where those with lower heights allow light penetration into Stapolin Square. Projecting / recessed balconies and splay windows add depth and shadow to the facades, accompanied by anodised metal balcony rails and window / cladding reveals. Warm brick tones to the outward-facing facades complement the character of adjacent neighbourhoods, while white brick panels facing into the landscaped courtyard spaces add contrast and illuminate these spaces.
- Block D echoes the layout and scale of Block A with light-filled courtyard spaces between blocks of 5-9 storeys plus a 15 storey accent building. A vertical emphasis is conveyed through the contrast of vertical brick panels and glazing with the slender expression of the floor-plates. Again, splay windows and projecting balconies add depth to the elevations, while warm brick tones to the public realm contrast with a prevalence of white brick facing into the landscaped courtyard spaces.
- Block B apartments / duplexes stand at 4-6 storeys with a regular grain of window / door openings, with private terraces, balconies and timber doors. Window / door openings to duplex apartments are double-height with glazed / curtain walling. A distinctive form and detailing includes articulated roofscape and contrasting panels of brickwork and window surrounds.

- **Block B and C houses** stand as two-storey terraces with pitched roofs. Each dwelling comprises one of a range of brick / render finishes to provide a subtle mosaic of muted brown, grey and white facades.
- A series of richly landscaped **linear parks and open spaces provide a setting for adjacent buildings and streets**. Stapolin Square is relatively formal and civic in it qualities, with a mix of hard and soft landscape spaces that respond to the commercial and community ground-floor uses within Blocks A and D. Elsewhere, predominantly green linear parks provide a lush setting to Longfield Road, Stapolin Road and Racecourse Drive / Lane. These are complimented by an extensive network of street trees through 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[191]. 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 them long-term impacts. 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 neglected urban infill site into an attractive contemporary urban neighbourhood. As part of this, the proposed Project effectively infills an area between Clongriffin train station and existing residential developments to the south-east, providing a more complete urban landscape with continuity and consistency between individual areas, removing the sense of an ‘unfinished’ urban development area. This has a *moderate* to *significant positive* impact upon landscape character of the Site and adjoining areas.

The proposed Project incorporates a variety of urban typologies, ranging from apartments with courtyard landscapes to more intimate ‘traditional’ scale streetscapes with generous landscaping. These complement the character of adjoining residential and commercial areas. The range of building

[191] EPA (2017).

types, the varied expression of roofscapes and elevation details, and richly detailed hard and soft landscape throughout creates a diversity of scale and character within the development, enriching the sequential experience of streetscapes and aiding legibility. This has a *significant positive* impact upon placemaking 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 *Verified Photomontages* booklet by Modelworks, submitted with this 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 *Verified Photomontages* booklet[192] 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 development 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 version that illustrate in outline other permitted developments. The intent is to inform the cumulative impact of these developments alongside the proposed Project, as well as 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.

[192] Modelworks (2021).

- 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 photomontages 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 site. The Site has a *slight adverse* impact upon this view as a result. As an established contemporary residential street, sensitivity to the proposed Project is *low*.

Photomontage View 1 (Proposed GA1 Masterplan) illustrates a marked change to the current outlook, where a richly landscaped street continues 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 incorporates on-street soft landscaping. The proposed Project lies mainly to the left, partially hidden by the intervening houses and existing and proposed on-street landscaping. Blocks C2, C3 and A3 are glimpsed between buildings and trees, while Block D3 and the tower element are screened from view at this particular position. From further south or across the street on Longfield Road, it is likely that Block D3 will also be partially visible.

The effect of both the consented development 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 the glimpsed view of the undeveloped site and making a *positive* contribution to urban street character. Where Block D3 may come into view from elsewhere on Longfield Road, this will terminate the vista and will continue to have a *moderately positive* visual impact.

Photomontage View 01 (Proposed GA1 + GA3 Masterplans) subtly incorporates an additional built element in the distance towards the end of the vista, appearing to the right of (and beyond) Block D3. This element is one of the taller blocks in the GA3 Masterplan area. It is a minor addition to the view, and overall there continues to be a *moderately positive* visual impacts arising from the combined developments.

Photomontage View 4 (Existing) extends west along Red Arches Road into the Site. To the left out of view is part of the development permitted under Reg. Ref. F16A/ 0412 (ABP Ref. PL06F.248970), currently under construction, while to the right is the Site - an area of fenced-off scrubby rough grassland. 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 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 GA1 Masterplan) illustrates *positive* visual effects arising from the removal of an unkempt 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); behind it lies a minor glimpse of the corner of Block C2. To the right, new two-storey houses from Block B4 are partially visible, though heavily screened by new street landscaping. Beyond Block B4, apartment Block A3 can be partially seen above and beyond the intervening roofs and street trees. This new vista remains unchanged with the addition of the GA3 Masterplan area – refer to Photomontage View 04 (Proposed GA1 + GA3 Masterplans).

The resulting effect of the proposed Project is to remove the *adverse* visual effect of the existing Site and rear of the station area, while introducing the *positive* visual attributes of a broad residential street with extensive soft landscaping. The proposed Project 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. Visual impacts are *moderately positive* as a result.

As illustrated by Photomontage View 04 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme), the very top of the tower permitted under SHD Reg. Ref 305316, beyond the railway line and above intervening rooftops, will also be seen in this view alongside a substantially lower element of the same scheme at the end of the vista; these are largely screened by the intervening street trees and buildings. A vantage point slightly further back (east) on this road is likely to reveal a little more of this permitted development. However, the magnitude of change arising from the proposed Project in combination with the permitted development remains *moderate* and the combined visual impact is also *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 at the end of this street, with no visual effect upon this view.

Photomontage View 5 (Proposed GA1 Masterplan) demonstrates that the majority of the proposed Project 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 provide a focal point for the vista. The magnitude of change is *minor* and the resulting visual impact is *slightly positive*.

Photomontage View 5 (Proposed GA1 and GA3 Masterplans) utilises a red outline for the GA3 Masterplan development to demonstrate that it will remains entirely screened from view from this vantage point. Visual impacts therefore remain *slightly positive*.

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 significant contribution to the view other than its openness, and there are no further urban or landscape features beyond the Site. As a rather bland modern residential street, sensitivity to the proposed Project is *low.*

Photomontage View 7 (Proposed GA1 Masterplan) illustrates a substantial change to this view as a result of the proposed Project. The apartments at Block A1-A3 are partially visible, as is part of Block D1. The tower element of Block D3 is not visible in this view, as the intervening apartments screen it entirely. The proposed Project lends a distinctly urban character to the view, reinforcing a *positive* urban character in conjunction with the apartment block at the left but with contrasting scale and higher quality detailing and finishes. 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. The magnitude of change is high and visual impacts are *moderately positive*. Photomontage View 07

(Proposed GA1 and GA3 Masterplans) demonstrates by way of a red outline no further change arising from the GA3 development, being completely screened by intervening buildings, and with no change to visual impacts arising from the combined developments.

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 to the right of the vista along Red Arches Road 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 GA1 Masterplan) demonstrates that there will be no change to this view as a result of the proposed Project, as indicated by the red outline superimposed on the intervening buildings and landscape. As a consequence, there will be *no* visual impact upon this view. Similarly, development of the anticipated GA3 Masterplan area will also be screened from view by intervening buildings as indicated with an additional red outline in Photomontage View 19 (Proposed GA1 and GA3 Masterplans), resulting in *no* visual impact.

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 GA1 Masterplan) demonstrates that the proposed Project will be entirely screened from view by intervening houses, as illustrated by the red outline superimposed on the building to the right. With no change to the view, there will be *no* visual impacts as a result.

Photomontage View 21 (Proposed GA1 Masterplan + Gannon Homes Scheme) demonstrates that part of the development permitted under SHD Reg. Ref 305316 will give rise to a moderate magnitude of change as it terminates the view along this vista. With the proposed Project remaining entirely screened from view to the right, there will be no visual impact arising from the proposed Project as a result.

Photomontage View 21 (Proposed GA1 and GA3 Masterplans + Gannon Homes Development) demonstrates an almost imperceptible addition to the skyline at the end of this vista as part of the GA3 development joins the cluster of contemporary buildings that terminate the view. The proposed Project remains screened from view and gives rise to *no* visual impact.

Photomontage View 24b (Existing) illustrates the view north from the junction of Longfield Road and Myrtle Avenue, encompassing a substantial part of the GA1 development area in the foreground and extending to Clongriffin train station and the surrounding apartments / commercial buildings. Perimeter fencing and disturbed ground in the foreground currently have a *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 GA1 Masterplan) demonstrates the *profound* magnitude of change to this view that will result from the proposed Project - a new contemporary residential neighbourhood will replace the existing vacant land. Longfield Road continues northwards through the proposed Project with permitted development blocks C4 and C5 to the right, complementing new terraces of houses and landscaped streets. At the end of the new vista along Longfield Road lies apartment blocks A3 and D3, 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.

Photomontage View 24b (Proposed GA1 and GA3 Masterplans) demonstrates by way of a red outline that the anticipated GA3 development will remain substantially or completely screened from view from this vantage point, though a slightly different position might give rise to a glimpse of taller buildings within GA3. 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 GA1 Masterplan) demonstrates a change to the vista, which is now terminated by a glimpse of the proposed Project. Apartment block D1 forms a backdrop to the station and forecourt, where its brick façade, stepped roofline and regular rhythm of window openings provide a distinct contrast to the station and the more suburban residential streetscape of the foreground. Its presence adds depth to the landscape by signalling the presence of another neighbourhood nearby, while also framing the station as a focal point within the urban landscape. The magnitude of change is *low* and visual impacts are *slightly positive*.

Photomontage View 26 (Proposed GA1 Masterplan + Gannon Homes Scheme) demonstrates that the development permitted under SHD Reg. Ref 305316 will occupy the middle-ground of this view and completely screen views of the proposed Project, which will have *no* visual impact as a result.

Photomontage View 26 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) demonstrates by way of a red outline that the development permitted under SHD Reg. Ref 305316 will obscure both GA1 and GA3 Masterplan developments, and as a result, there will be *no* visual impact arising from development of the proposed Project.

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 to the right. 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 GA1 Masterplan) demonstrates a *low to moderate* magnitude of change where a partial view of the proposed Project occurs beyond the station to the right. The stepped roofline and upper floors of Block D1 emerge above the station canopy and ramp, where the brick façade with its regular rhythm of window openings complements the other buildings in this view, and slightly intensifies the urban character of this view. The majority of the proposed Project remains screened from view behind existing buildings on the right. The resulting effect upon this view is neutral and visual impacts are *low* and *neutral.*

Photomontage View 27 (Proposed GA1 and GA3 Masterplans) illustrates an imperceptible magnitude of change to the view resulting from a glimpse of a taller building within GA3, partially visible beyond GA1 Block D3. The remainder of development within GA3 remains screened from view by intervening buildings. As a result, visual impacts remain *low* and *neutral*.

Photomontage View 27 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) introduces a block model of the development permitted under SHD Reg. Ref 305316, which occupies much of the foreground in this view and completely obscures views of the GA1 and GA3 developments. This is a profound magnitude of change to this view, to which the GA1 Masterplan development makes no contribution, and there will be *no* visual impact rising from it as a result.

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. The Site lies immediately beyond the railings that terminate this view but there are almost no landscape features to draw the viewer's eye beyond the station concourse. As a distinctly urban space with a public focus, sensitivity to the proposed Project is *low.*

Photomontage View 6 (Proposed GA1 Masterplan) illustrates a *very significant* magnitude of change to this view, where the presence of new apartments buildings (Blocks A and D) frame the station concourse and draw the viewer's eye beyond into the Site. There is a much 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 6 (Proposed GA1 and GA3 Masterplans) incorporates a red outline to demonstrate that from this vantage point, development within the GA3 Masterplan area is entirely hidden from view, and with no change, the visual impact of the combined developments remains *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. Sensitivity to the proposed Project is *low.*

Photomontage View 9 (Proposed GA1 Masterplan) illustrates the minor presence of the proposed Project (the tower element of Block D3). The magnitude of change is *minor* and most of the proposed

Project is completely screened from view. The proposed Project provides a contrast of materials and elevation detailing to the existing buildings, maintaining visual separation and introducing further depth to the urban landscape. The visual effect is to consolidate the urban character of the existing vista, intensifying the scale of built development and reinforcing the perception of a destination ahead. As a result, visual impacts are *slightly positive.*

Photomontage View 9 (Proposed GA1 and GA3 Masterplans) demonstrates by way of a red outline that the entire GA3 Masterplan development will be screened from view, with no visual impact upon this view as a consequence. However, Photomontage View 9 (Proposed GA1 and GA3 Masterplans + Gannon Homes Development) demonstrates that the permitted Gannon Homes development permitted under SHD Reg. Ref 305316 will screen the GA1 Masterplan development entirely from view. In this context, GA1 will contribute nothing to this emerging urban landscape and will have no visual impact as a consequence.

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. This is an ordinary residential landscape with no distinguishing *positive* features, where the railway corridor, adjacent vacant development plot and monotonous skyline have a *slightly adverse* visual impact upon this view.

Photomontage View 8 (Proposed GA1 Masterplan) illustrates a significant change to this view as a result of the proposed Project and nearby future development in the Clongriffin-Belmayne LAP area. Blocks A1-A3 and D1-D3 are partially visible beyond the intervening houses, left of centre in this view. The proposed Project presents itself as a coherent cluster of blocks with a range of building heights and contrasting but complementary range of colours, grain and textures in the elevation design. The proposed duplex apartments and houses across the rest of the Site remain screened from view by intervening housing, right of centre in this view.

The visual effect of the proposed Project is to add depth and variety to the urban landscape in this view. In contrast to the rather monotonous housing in the foreground, the proposed Project adds a contrasting scale and grain to the assembly of buildings in this view. Taller buildings punctuate the skyline, adding variation and vertical contrast that is missing from the current landscape. The scale and character of development signals a destination to the viewer and reflect the presence of a railway station nearby. The urban landscape is more legible with the proposed Project in view, and delivers a *low to moderate magnitude* of change and a *slightly* to *moderately positive* visual impact.

Photomontage View 8 (Proposed GA1 and GA3 Masterplans + 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, framing the railway line and Clongriffin train station on one side with the GA1 Masterplan development framing the opposite side. The taller buildings within the GA3 Masterplan area punctuate the background beyond the GA1 Masterplan development, their form, grain and colour palette complementing the character of GA1. The proposed Project continues to make a moderate contribution to this emerging urban landscape with moderately positive visual impacts as a result.

Photomontage View 20 (Existing) illustrates a 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 currently makes no contribution to the landscape. Sensitivity to the proposed Project is *moderate.*

Photomontage View 20 (Proposed GA1 Masterplan) demonstrates a moderate magnitude of change to this view where the northern part of the proposed Project is substantially in view. Proposed Blocks D1-D3 give rise to the majority of the change, comprising a series of buildings with a stepped roofscape above an assembly of coherent building facades. The tower element of Block D3 punctuates the skyline as an accent and focal point for the viewer. 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 greater clarity and distinction between urban and rural areas is a *positive* visual effect, and the proposed Project does not obscure any part of the distant view to Howth Head, maintaining its identity and visibility as a landmark. The proposed Project makes a *positive* contribution to the character of emerging urban neighbourhoods surrounding Clongriffin train station. As a result, visual impacts are *moderately positive*.

Photomontage View 20 (Proposed GA1 Masterplan + Gannon Homes Scheme) demonstrates a scale and broad form of significant change resulting from the Gannon Homes development permitted under SHD Reg. Ref 305316. In this context, the proposed Project will be almost entirely obscured by intervening buildings and contribute a *minor positive* visual impact.

Photomontage View 20 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) illustrates further phases of development on land adjoining the proposed Project within the Baldoyle-Stapolin LAP area. GA3 extends similar development further across this view to the left, contributing to a comprehensive urban edge framing the intervening green belt land. The collective visual impact is likely to be moderately positive, in the context of which the proposed Project will make a *minor or imperceptible 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. The Site itself contributes little to this view at presence and much of the intervening land in the middle ground is destined for change as either built development or parkland. However, the foreground remains designated as an area of High Amenity and the sensitivity of this view to the proposed Project is therefore *high.*

Photomontage View 11 (Proposed GA1 Masterplan) illustrates a *moderate magnitude* of change to this view due to the presence of the proposed Project. Whereas the existing development to the right appeared to be somewhat isolated in this landscape, the proposed Project now contributes a more coherent and visually rich backdrop to the intervening open landscape. It introduces a varied range of building heights to modulate the skyline with a vertical grain that is absent from the existing landscape. The warm brick tones used throughout much of the proposed Project complement the earthly tones of the foreground landscape, while the grain of windows and balconies add texture to the elevations.

While the overall effect is a more urbanised landscape, it is also a new and more cohesive urban landscape as a setting for the foreground landscape. It is also an unfinished landscape as more development land within the LAP lies between the viewer and the proposed Project, which will substantially screen the proposed Project from view at this vantage point. Visual impacts in the *short* to *medium* term are likely to be *slightly positive*. In the long-term when further phases of development have taken place and the foreground landscape is part of a linear park, a more substantial and *positive* change to the landscape can be anticipated, though the GA1 Masterplan Development is likely to contribute little to this as a result of screening.

<u>Photomontage View 11 (Proposed G1 Masterplan + Gannon Homes Scheme)</u> illustrates the tower element permitted under SHD Reg. Ref 305316 towards the right, rendered as a simple massing model. This will add an element with significant bulk and scale to this emerging urban landscape, where the GA1 Masterplan development helps to integrate it by way of establishing a complementary urban context, with a *moderately positive* visual impact as a result.

<u>Photomontage View 11 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme</u>) illustrates a very significant magnitude of change to this view as a result of the future GA3 Masterplan development, which lies directly between the viewer and the G1 Masterplan area. The GA3 Masterplan development will define 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 tower element of the Gannon Homes development permitted under SHD Reg. Ref 305316 and which remains visible. The intervening open space will ultimately incorporate enhancements for biodiversity, amenity and recreation as part of wider development in the LAP area. Only a very small glimpse of buildings within the GA1 Masterplan area are visible, which in themselves will have a negligible visual impact upon this view, while collectively the permitted and future developments illustrated here will have a significant and positive visual impact in the context of a more managed and formalised open space in the foreground.

<u>Photomontage View 13 (Existing)</u> 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. 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 *moderate.*

Photomontage View 13 (Proposed GA1 Masterplan) introduces a *minor to moderate magnitude* of change to the nature and extent of built development in this view. The proposed apartments at Block D are most prominent, with the tower element punctuating the skyline and emphasising the presence of new development, while Block A is partially screened; Blocks B and C are entirely screened from view. It is a subtle and complementary addition to the surrounding urban context, and with a more varied character, modulated skyline and focal point within the urban landscape, visual impacts are *slightly positive*.

Photomontage View 13 (Proposed GA1 Masterplan + Gannon Homes Scheme) illustrates the development permitted under SHD Reg. Ref 305316 as a simple block model. There is evidently significant change to the urban landscape expected as a result of the permitted development, raising the built skyline and lending a stronger sense of enclosure to the unbuilt landscape in the foreground. From this particular vantage point, the tower element of the permitted scheme appears clustered with the tower element of Block D3, providing a small cluster of height that accentuates the heart of Clongriffin as a focal point in this view. The proposed Project is consistent with the scale and form of the permitted development and continues to contribute a *slightly positive* visual impact.

Photomontage View 13 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) illustrates the further anticipated development of lands surrounding GA1, where the GA3 Masterplan development makes a significant contribution to the visible edge of this emerging urban landscape. Taller buildings towards the northern edge of the GA3 Masterplan Area echo the height of the tower elements of GA1 Block D3 and the nearby Gannon Homes development. While there is no materiality to the GA3 Masterplan development as illustrated, it is likely to complement the GA1 Masterplan development in scale, built form, grain, colour and texture, resulting in a *moderately positive* visual impact, to which development within GA1 will make a *slightly positive* visual impact.

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 2km away and makes no contribution to this view at present. Sensitivity to the proposed Project is *low*.

Photomontage View 22 (Proposed GA1 Masterplan) demonstrates a very minor change to the view where the upper floors of the tower element at Block D3 appears above the intervening rooftops. The contemporary character of the proposed Project contrasts with the more traditional houses in the foreground but is insignificant due to its visual separation and small scale in relation to the houses. Visual impacts are *imperceptible to low* and *neutral.* Photomontage View 22 (Proposed GA1 and GA3 Masterplans) demonstrates by way of a red outline that development of the GA3 Masterplan area is likely to be completely screened from view from this vantage point, resulting in no additional visual impacts 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 an 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 G1 Masterplan) demonstrates a *moderate magnitude* of change to the built-up elements within this panorama across the Baldoyle Estuary. The proposed Project delivers an expansion and intensification of the urban neighbourhood surrounding Clongriffin train station, right of centre in this view. Apartments within Blocks A and D comprise the principal change, creating a cluster of taller buildings with the tower element of Block D3 providing an accent and focal point. Visually, these combine with the existing taller buildings near the station to establish an undulating skyline and dynamic roofscape as part of a cohesive urban backdrop that contrasts with and frames the natural landscape in the foreground, and largely avoids interrupting views to the distant Dublin Mountains. In spite of creating a more urbanised landscape, this framing of the landscape by a clearly defined urban neighbourhood is a *positive* visual effect compared to the existing disjointed urban backdrop that has an undefined edge and appears to be sprawling into the landscape. Visual impacts are considered to be *slightly positive* as a result.

Photomontage View 15 (Proposed GA1 Masterplan + Gannon Homes Scheme) illustrates a much more extensive built edge to the background in this landscape, permitted under SHD Reg. Ref 305316, which extends across the right of the view. A gently undulating contemporary roofscape is occasionally punctuated by taller buildings, representing a series of new urban neighbourhoods emerging in this landscape. A clearly consolidated urban edge framing the foreground provides clarity and legibility to the landscape. The GA1 Masterplan development continues to make a *slightly positive* contribution to visual impacts, in the context of more extensive change that has a *moderately positive* visual impact.

Photomontage View 15 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) illustrates the further consolidation of this emerging urban landscape as a backdrop to the open natural landscape of the estuary in the foreground. Development within GA3 significantly obscures the proposed Project from view, within only glimpses of the buildings in Blocks A and D, with the Tower of Block D3 most visible. Visual impacts from the proposed Project are slight and neutral in this context, while the anticipated development nearby are likely to bring about a moderately positive visual impact as a cohesive contemporary urban landscape.

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 GA1 Masterplan) introduces a partial view of proposed Block D as distant buildings beyond the existing horizon. The tower element of Block D3 is prominent given its distinct height and vertical form, while the stepped roofscape of Block D1 also appears above the intervening horizon. Block D2 is almost completely hidden. Other blocks within the proposed Project are screened from view by intervening landform and blocks D1-D3. The new built forms appear isolated and incongruous in a largely unbuilt landscape, though their distance diminishes this effect. The visual impact is *slightly negative* as a result.

Photomontage View 16 (Proposed GA1 and GA3 Masterplans) illustrate likely future development adjacent to the proposed Project which establish a more coherent group of buildings clustered together in the distance, which convey the character of a new urban area over the horizon. Nonetheless, as new urban features in an otherwise largely unbuilt view, this will have a moderately *negative* visual impact, though the proposed Project is almost entirely screened from view by GA3 buildings and by intervening topography, and contributes a *negligible neutral* visual impact as a result.

Photomontage View 16 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) illustrates the additional built forms contributed by development permitted under SHD Reg. Ref 305316. While much of it is screened by intervening topography, taller buildings echo those within the GA1 and GA3 Masterplan areas, signalling a contemporary urban area beyond the intervening horizon. Collectively, the buildings appear spread out across the landscape, resulting in a *moderately to significantly 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 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.

Photomontage View 23 (Existing) extends a panorama across Baldoyle Bay to the built frontage of Strand, 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 and with a strong urban edge as part of the existing view, sensitivity to the proposed Project is *moderate.*

Photomontage View 23 (Proposed GA1 Masterplan) demonstrates a partial view of Block D, where the majority of the roofscape integrates subtly with the existing horizon, while the tower element of

Block D3 punctuates the skyline as a focal element. There is also a minor view of the Block A roofscape which also integrates into the existing skyline. The lack of other taller buildings nearby results in the tower element of Block D3 appearing a little isolated amongst an otherwise low-lying urban area, which results in a *slightly negative* visual impact.

Photomontage View 23 (Proposed GA1 Masterplan + Gannon Homes Scheme) introduces further integration of development within the existing roofscape accompanied by two taller tower elements. In conjunction with the GA1 tower at Block D3, this begins to signal the emerging new urban neighbourhoods as more coherent part of the skyline, signalling their presence beyond the immediate foreshore. 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 GA1 and GA3 + Gannon Homes Scheme) illustrates the anticipated GA3 Masterplan development as a consolidation of the emerging urban skyline beyond the urban edge of the foreshore, 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 GA1 Masterplan) demonstrates a *high magnitude* of change to this view resulting from the proposed Project. Block D is openly visible as is part of Block A, accompanied by extensive new soft landscape areas. Blocks A and D contribute a cluster of taller buildings to this emerging urban area, with the tower element of Block D3 providing a visual accent and focal point. Block B is also clearly visible with the apartments of Blocks B1 and B2 providing a transition between the taller blocks of A / D and the low-rise terraced houses of Block B. The result is a clear hierarchy of built development that successfully transitions between medium and high density urban blocks and the surrounding natural green spaces. Tree planting to the street network helps this transition from buildings to countryside. The visual effect is a stronger contrast and more deliberate transition between urban neighbourhood and surrounding greenspace, resulting in a *moderately positive* visual impact.

Photomontage View 25 (Proposed GA1 + Gannon Homes Scheme) demonstrates how the GA1 development is likely to consolidate and complement the development permitted under SHD Reg. Ref 305316. The tower element of Block D3 echoes the nearby permitted tower, while the two schemes have a consistent scale and form of apartments that help describe coherent and complementary new urban neighbourhoods. The magnitude of change is *high* and visual impacts are likely to be *moderately positive*.

Photomontage View 25 (Proposed GA1 and GA3 Masterplans + Gannon Homes Scheme) demonstrate a further high magnitude of change likely to result from development of the GA3 Masterplan area, which defines a substantial part of the emerging urban landscape as seen from this vantage point. The Gannon Homes Scheme will be substantially screened from view, except for part of the permitted tower. Development of the GA1 Masterplan area will be partially screened by buildings throughout the GA3 Masterplan area, which together will comprise a very coherent urban neighbourhood with a complementary range of building heights and detailing. In this context, the GA1 development is likely to make a *slightly positive* contribution to visual impacts.

13.6.3 Cumulative impacts

The assessment of landscape and visual impacts above includes references to neighbouring developments that are either permitted under SHD Reg. Ref 305316 or are anticipated as part of future LAP masterplan 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 masterplan 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 central position within the wider development area of the Baldoyle-Stapolin LAP. This means that in the short-term, the proposed Project often defines 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 often introduce greater depth and variety within the landscape, with positive landscape and visual impacts as a result.

However, these impacts can change as permitted or anticipated future development is added into the landscape. In broad terms, development permitted under SHD Reg. Ref 305316 interrupts or obscures views from the west, while providing additional urban context to views from other directions. Similarly, anticipated development within the GA3 Masterplan area obscures parts of the GA1 Masterplan development, sometimes substantially, defining a more permanent urban edge within the landscape. While visual impacts overall are generally more significant and remain positive in these instances, development within GA1 often makes a smaller contribution to these impacts and is less significant as a result.

Landscape and visual impacts resulting from the proposed Project are important in establishing a coherent urban landscape for existing residential areas that adjoin GA1 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. The development of GA1 therefore has a *highly positive* impact upon landscape character and visual amenity as central element of the wider masterplan for the area.

13.6.4 Summary 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 urban landscape character that offsets and emphasises the character of neighbouring 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 D3 sometimes provides a focal terminating feature to vistas along local streets. 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. It also continues the spine route extending from Main Street in Clongriffin past the station and into the Site, 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 zone, 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 masterplan, which will continue to enrich the local urban landscape and provide a comprehensive backdrop that is set back from the estuarine landscape.

13.7 Monitoring

No monitoring of landscape and visual effects is required during the Operational Phase of the proposed Project. 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

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

There is an inter-relationship between **landscape and visual** and **human health.** Landscape and visual effects may impact residential properties located near the proposed Project, during the Construction Phase. Impacts are likely to arise from construction plant, incomplete building structures, perimeter hoardings and contractors compound areas. However, the visual impact will be *short to medium* in duration and is not considered significant.

There is an inter-relationship between **landscape and visual** and **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.

There is an inter-relationship between **landscape and visual** and **local natural** and **built heritage.** Local natural and built heritage, which can contribute to the existing landscape. However, 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 1km 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 immediately east 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.

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 surrounding it, including within other parts of the Baldoyle-Stapolin LAP area, 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. Stapolin Square would not be delivered as a major public open space, which is a key component of the wider masterplan for this area, with a significant detrimental effect upon public amenity likely as a result. The Site is central to the masterplan area for residential-led development in the Baldoyle Stapolin LAP area, 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.

13.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties compiling this chapter of the EIAR.

14 Cultural Heritage, Archaeology & Architectural

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared 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).

This chapter describes and assesses the cultural and heritage, archaeological and architectural environment of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

The purpose of the study is to assess the possible significance of the receiving archaeological and cultural heritage environment, to identify and evaluate the significance of the impact of the proposed Project on this environment, and to suggest any ameliorative measures that might be appropriate.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013(as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

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 (refer to Section 14.13). The Site forms Growth Area No. 1 (GA1), as designated in the Baldoyle-Stapolin Local Area Plan 2013 (as extended).

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 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 Project.

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, refer to Section 14.2 of this chapter. An initial cultural heritage appraisal was conducted by Kilfeather[193] 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[194], assessed the overall area of the Baldoyle-Stapolin Lands. In 2003 and 2004, the Baldoyle-Stapolin Lands were subject to a geophysical survey[195], with areas associated with Phases I and II being archaeologically tested and monitored[196].

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 Culture, Heritage and the Gaeltacht (DCHG);
- 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 Record of Monuments and Places in 1994 (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, DCHG), which is available online at www.archaeology.ie and includes both RMP and SMR sites. Those sites

193 Kilfeather, A. (2000).
194 Reilly and Sutton, M. (2002).
195 Leigh, J. (2003).
196 Phelan, S. (2004a) (2004b).

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),* Fingal 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 (May 2013) and a number of other published and unpublished documentary sources outlined in the references (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 (www.osi-maps.ie); and
- Aerial imagery (Google Earth 2001-2020, Bing 2013; OSi 1995, 2000, 2006);
- Reports of previous assessments within the Site of the proposed Project as listed in the references section (Section 14.13).

14.2.2 Standards and Guidelines

The following legislation, standards and guidelines were consulted to inform the assessment:

- 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*).
- 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.*
- National Monuments (Amendments) Acts, 1930-2014, as amended.
- The Planning and Development Act 2000, as amended.
- Heritage Act 1995.
- Department of Arts, Heritage, Gaeltacht and Islands (1999). *Frameworks 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.
- Minister for Arts, Heritage and the Gaeltacht (June 2000). *Code of Practice between the National Roads Authority (NRA*).
- 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.*
- The Council of Europe's Convention for the Protection of the Architectural Heritage of Europe signed at Granada in 1985, was ratified by Ireland in 1991.
- European Convention on the Protection of the Archaeological Heritage 1992 (the Valletta Convention) was ratified by Ireland in 1997.
- The UNESCO World Heritage Convention, 1972.
- ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005.
- 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 *Draft National Landscape Strategy* (NLS) was launched in July 2014).
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties – *A publication of the International Council on Monuments and Sites* (January 2011).
- 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 (2011). *Proposals for Irelands Landscapes; and International Council on Monuments and Sites.*
- ICOMOS (2011). *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*.

Excerpts from the relevant legislation are contained in Appendix A14.2, Volume 3 of this EIAR.

14.3 Baseline Environment

14.3.1 Archaeological and Historical Background

The Site 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[197] and Portmarnock Football Club (Robswall townland)[198]. 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[199].

There is a significant body of Neolithic (c. 4,000BC - c. 2,300BC) 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

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[197] Stout, G. and Stout, M., (1992).
[198] Keeling, D. and Keeley, D. (1994).
[199] Keeling, D. and Keeley, D. (1994). Purcell, A. (1999).

quality[200]. 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. 2400-1800BC) burial sites are recorded in 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 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[201]. 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[202] and was subject to further testing in 2008[203]. 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[204].

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[205]. The fulacht fiadh or burnt mound is the most common prehistoric monument in Ireland, with over 4500 known sites[206] 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.

[200] Cooney. (2000).
[201] Shiel, D., Shields, A. and Stephens, C. (2000).
[202] Wallace, A. (2000b).
[203] Moriarty, pers. comm
[204] Moriarty, pers. Comm.
[205] OPW files
[206] Waddell, J. (1998).

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[207]. 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 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[208].

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[209]. 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 brow of drumlins and for the most part, avoid the extreme low and uplands. They also show a preference for the most productive soils[210] and usually command a good view of the surrounding landscape. Stout[211] (1997) has shown that the majority

[207] Brindley A.L and Lanting J.N. (1990).
[208] Stout (1997).
[209] Kinsella (2007).
[210] Stout (1997).
[211] Stout (1997).

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[212].

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[213]. 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.

[212] Kerr, T. (2007).
[213] Swan (1988).

A possible example of an ecclesiastical settlement is recorded in the wider area in Balgriffin Park townland, c.1.5km north-west of the 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[214]. 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[215] (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[216]. 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

[214] Ronan (1941).
[215] Hurley, M.J. (1983).
[216] Ball, F. E., (1920).

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[217], 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"[218].

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.

[217] De Courcy, J.W., (1996).
[218] Joyce, St. John W. (1912).

Further medieval secular activity is known at Baldoyle village c. 1.1km to the south-east, which was reputedly the location of a Viking base for many years, was 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 land ringed by high walls[219].

14.3.2 Recorded Archaeological Monuments (RMP / SMR Sites)

There are no RMP sites recorded within the Site or its immediate vicinity. The nearest RMP sites are recorded in Grange townland, to the west and north-west of the proposed Project and comprise two

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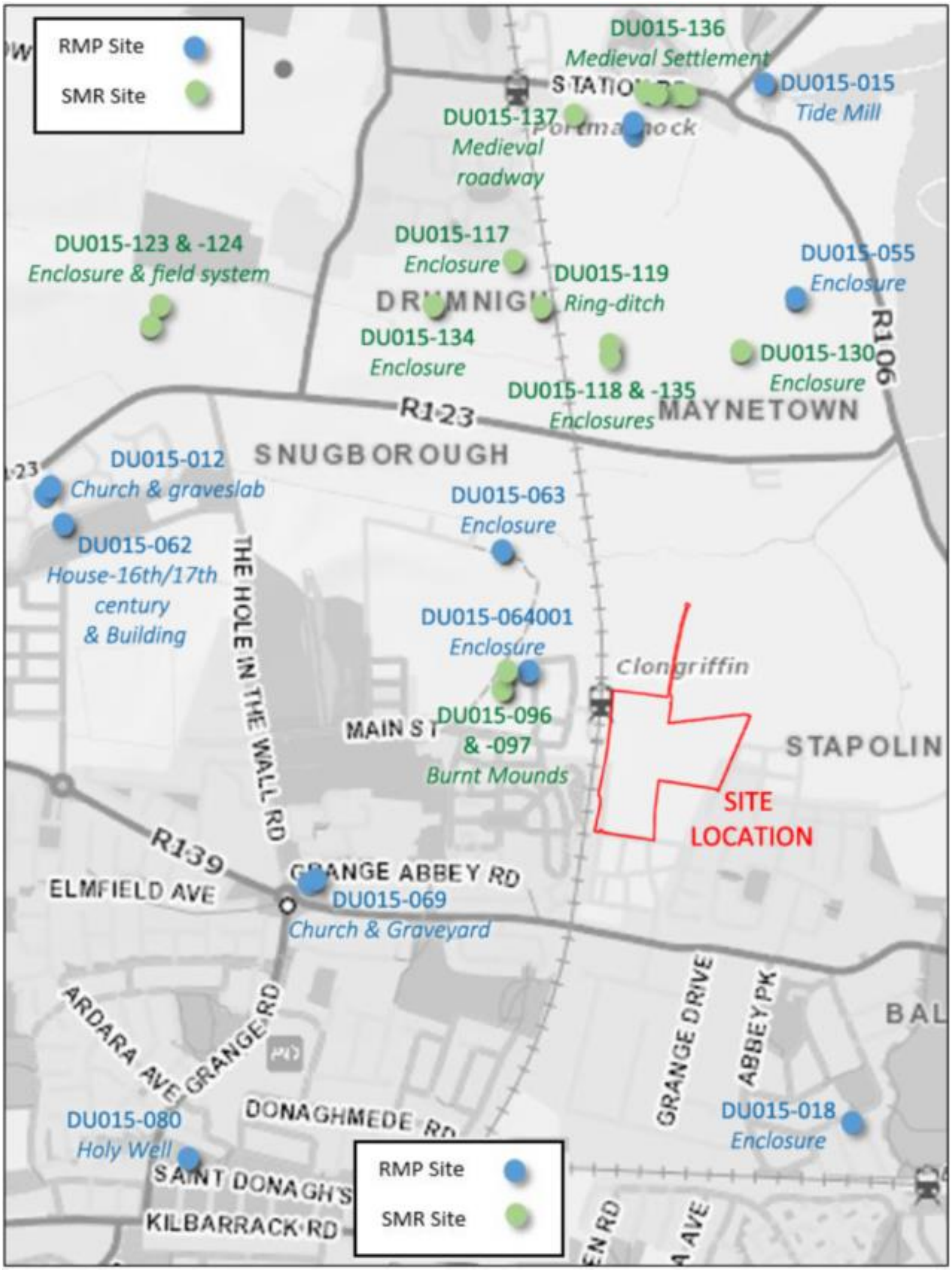
[219] McCullough, N. & Mulvin, V. (1987).

enclosure sites, both of which are now built over, and a redundant record (DU015-063, -064001 & -064002; Figure 14.1 and Table 14.1). The closest of these is the enclosure site DU015-064001, which is c. 210m from the proposed Project.

Figure 14.1: RMP and SMR Sites within c. 1.5km of the Proposed Project



In addition to the RMP sites recorded within c. 1.5km of the Site, archaeological investigations in the surrounding townlands have identified numerous other 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[220], along with the locations for the statutorily designated RMP sites.

The RMP and SMR sites located within c. 1.5km of the Site are listed in Table 14.1 and depicted on Figure 14.1.

Additional detail for each of the sites is contained in Appendix A14.1, Volume 3 of this EIAR and the sites are discussed in the context of the archaeological and historical background.

[220] Available at: www.archaeology.ie

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. 1.4km NW
RMP DU015-012002	Graveslab	Balgriffin Park	c. 1.4km NW
RMP DU015-018	Enclosure	Baldoyle	c. 870m SE
RMP DU015-055	Enclosure	Maynetown	c. 1km NE
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 (Coolock By., Malahide ED)	c. 345m NW
RMP DU015-064001	Enclosure	Grange (Coolock By., Malahide ED)	c. 415m NW
RMP DU015-064002	Redundant record	Grange (Coolock By., Malahide ED)	c. 415m NW
RMP DU015-069001	Church	Baldoyle	c. 880m SW
RMP DU015-069002	Graveyard	Baldoyle	c. 880m SW
RMP DU015-080	Ritual site - holy well	Kilbarrack Upper	c. 1.4km SW
SMR DU015-096	Burnt mound	Grange (Coolock By., Malahide ED)	c. 210m W
SMR DU015-097	Burnt mound	Grange (Coolock By., Malahide ED)	c. 210m W
SMR DU015-117	Enclosure	Drumnigh	c. 1.1km NW
SMR DU015-118	Enclosure	Drumnigh	c. 935m N
SMR DU015-119	Ring-ditch	Drumnigh	c. 950m NW
SMR DU015-123	Enclosure	Saint Doolaghs	c. 1.4km NW
SMR DU015-124	Field system	Saint Doolaghs	c. 1.4km NW
SMR DU015-130	Enclosure	Maynetown	c. 880m NE
SMR DU015-134	Enclosure	Drumnigh	c. 1km NW
SMR DU015-135	Enclosure	Drumnigh	c. 935m N

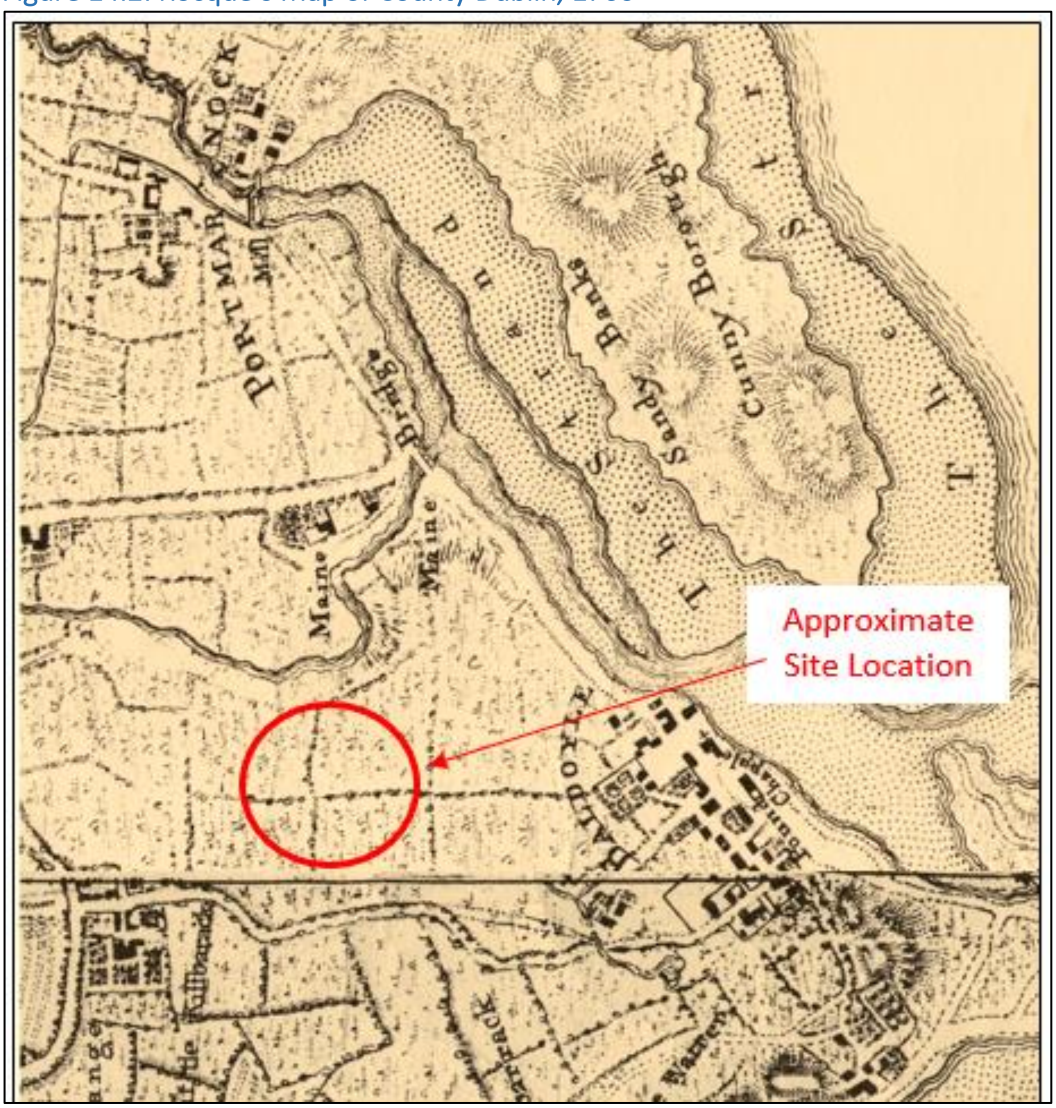
14.3.3 Cartographic Analysis

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.

Rocque's map of County Dublin (refer to Figure 14.2), dating to 1760, represents the earliest cartographic source showing the study area in any detail. The lands within and around the Site are shown as open greenfields. 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).

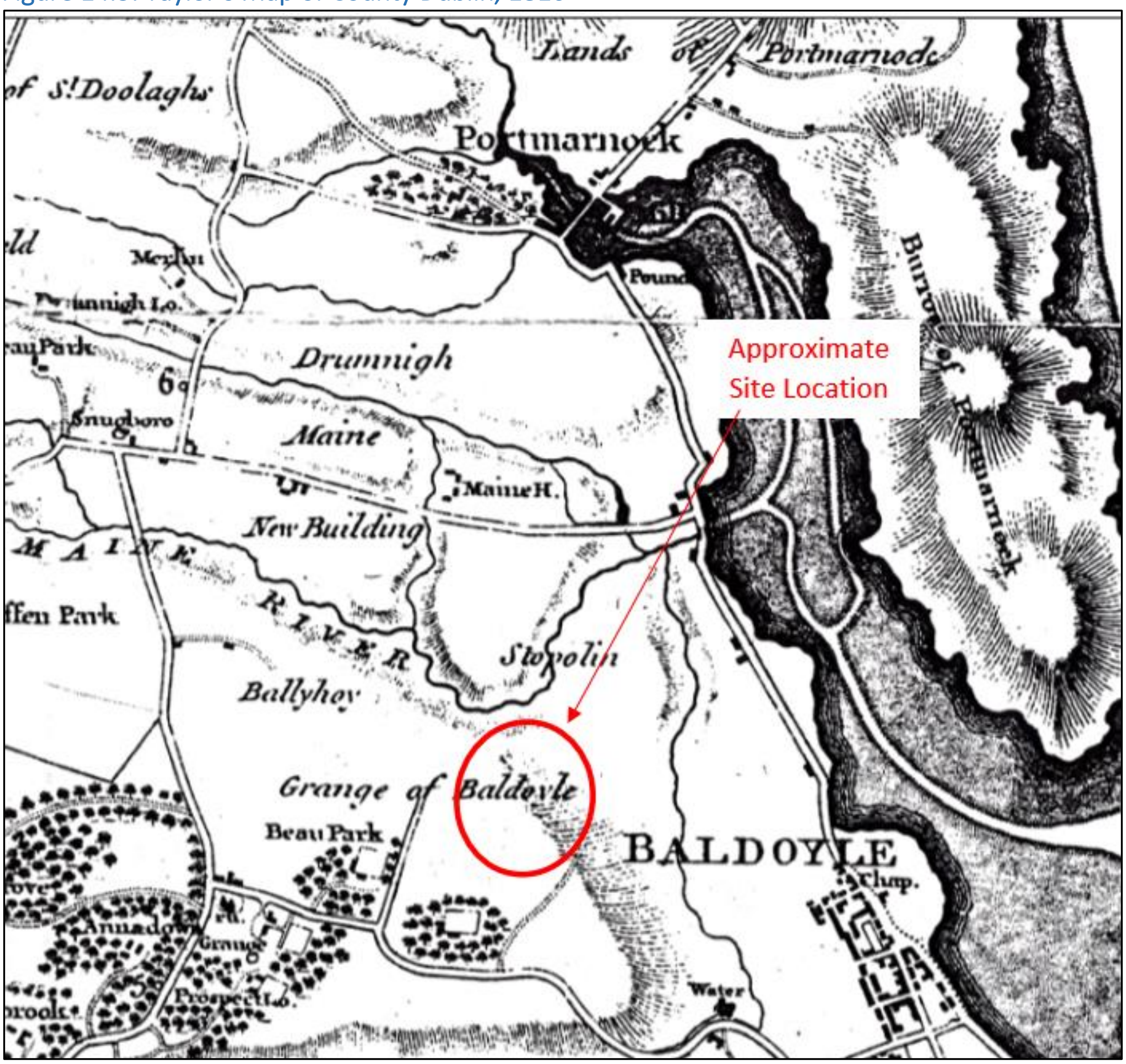
Figure 14.2: Rocque's Map of County Dublin, 1760



14.3.3.2 Taylor's Map of the Environs of Dublin, 1816

Taylor's 1816 map (refer to 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 Site.

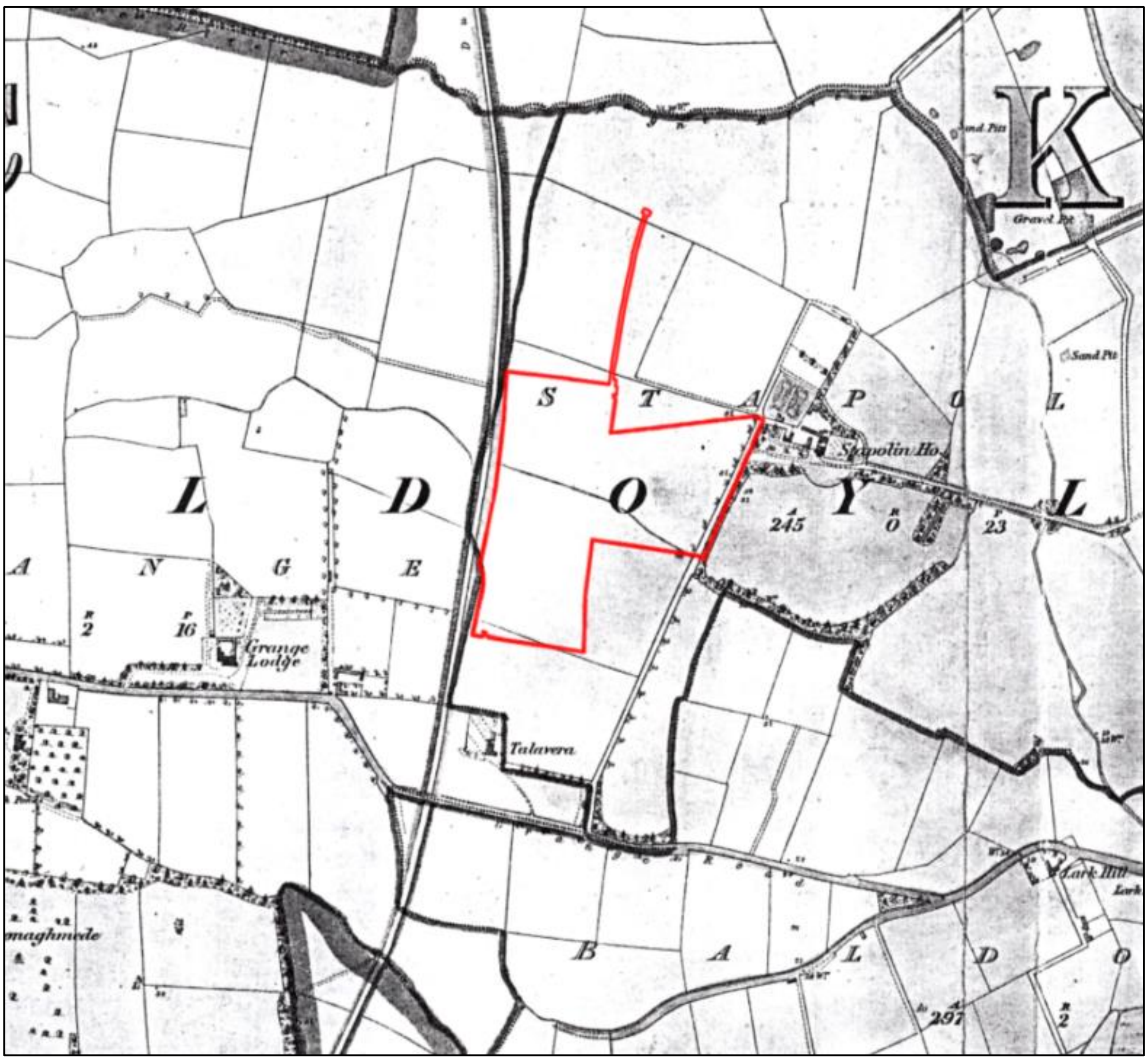
Figure 14.3: Taylor's Map of County Dublin, 1816



14.3.3.3 First Edition Ordnance Survey Map, 1843

The first edition Ordnance Survey (OS) six-inch map of 1843 (refer to Figure 14.4) depicts the lands within 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 Site. The principal avenue leading northwards to the house from the Grange Road runs along the north-eastern boundary of the 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 Site.

Figure 14.4: First edition six-inch Ordnance Survey map, 1843 (approximate Site location in red)

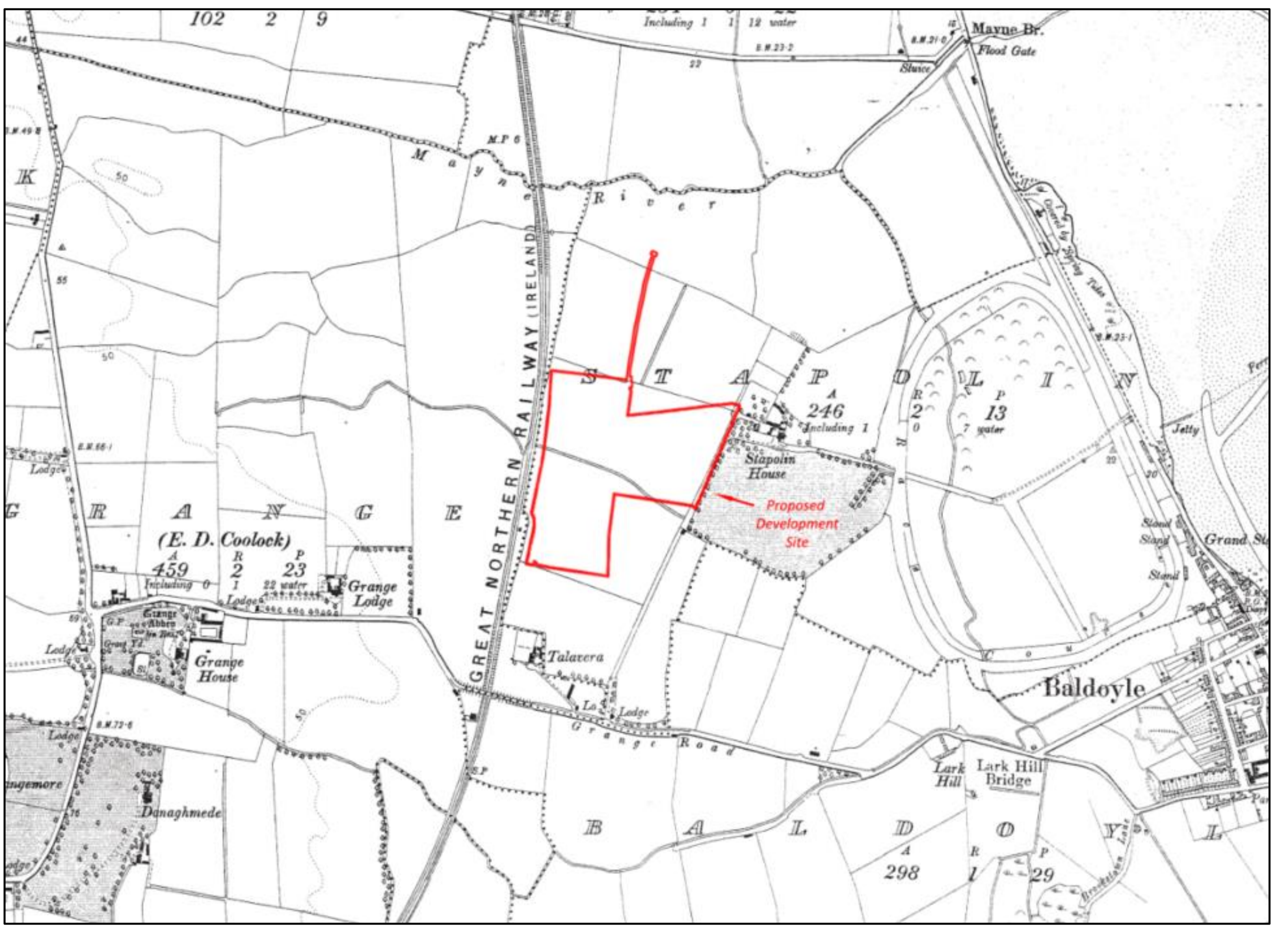


14.3.3.4 Revised Edition Ordnance Survey Maps, 1864, 1906-09 & 1935-8

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 Site on the revised edition OS maps of 1864, 1906-09 (refer to 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 revision but not on the first edition map (refer to Figures 14.4 & 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[221].

Figure 14.5: Revised edition 25-inch Ordnance Survey map, 1906-09 (approx. Site location in red)



221 Bennett, D. (1991).

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 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 or 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[222].

14.3.5 Previous Archaeological Investigations

14.3.5.1 Previous Archaeological Investigations within the Site

The proposed Project area 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; refer to 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 (refer to Figure 14.6).

A non-invasive field survey of the Baldoyle-Stapolin Lands was first undertaken in January 2000[223]. 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 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[224]. Nothing now remains of the former Stapolin House and its associated yards, outbuildings or landscaped grounds.

[222] Bennett, D. (1991).
[223] Reilly and Sutton, M. (2002).
[224] Reilly and Sutton, M. (2002).

A systematic finds retrieval walkover was undertaken in October 2000 in recently ploughed fields on the south side of the Mayne Road[225]. 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 Site) undertaken in 2003[226]. The majority 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 (refer to Figure 14.6).

[225] Reilly and Sutton, M. (2002).
[226] Leigh, J. (2003). Nicholls, J. (2002).

Figure 14.6: Results of Geophysical Survey and Location of Archaeological Test Trenches

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[227]. No testing was undertaken within the current application area. The geophysical anomalies located to the north-east of the 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 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, Appendix A14.1, Volume 3). 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 in 2007 and 2011[228]. 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 Site) and disturbance from drainage infrastructure[229]. No visible features of archaeological potential were identified within the area.

14.3.5.2 Previous Archaeological Investigations in the Immediate Vicinity of the Site

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

[227] Phelan, S. (2004a) and (2004b).
[228] Murphy 2007 & Courtney 2011
[229] Courtney 2011).

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 (refer to Figure 14.1).

The 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 Site, the discoveries in Grange townland suggest that similar discrete archaeological sites or features might still be uncovered within the boundaries of the proposed Project.

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 associated with the development are visible within the proposed Project area, as are dumps of construction material. The site of Stapolin House is obscured by a cluster of trees (refer to Figure 14.7).

Figure 14.7: The Site on Recent Aerial Imagery[230]

14.3.7 Cultural and Industrial Heritage

No features of cultural or industrial heritage interest were identified within the Site.

The railway line located outside of the Site to the west has associations with industrial heritage in Fingal. The Dublin and Drogheda Railway began operating in 1844 and there were stations at Balbriggan (FIHS0040), Skerries (FIHS0223), Rush and Lusk (FIHS0353), Donabate (FIHS0671), Malahide (FIHS0656) and Portmarnock (FIHS0627) within Fingal. Both Balbriggan and Malahide stations were designed by George Papworth. Shortly after the opening of the line a branch line was constructed to Howth (FIHS1019), opening in 1846. There was one other station along this branch line at Sutton and Baldoyle (FIHS0889). The Fingal Industrial Heritage Survey (FIHS) does not include the railway line itself as an item

[230] Google Earth (2020).

of industrial heritage interest, though it does list the 19th century stations located along it; none of the stations 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 Site or in 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 south-east, 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 the open tracts of land surviving from the estates.

14.3.8.2 Stapolin House

The open space area to the north-east of the 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 (refer to 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 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 (refer to 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. 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 Site, was inspected during the 2011 field survey[231]. 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 Impact of the Proposed Project

The proposed Project is located within an area which, until the end of the 20th century, had been open greenfields 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

[231] Courtney (2011).

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 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 already constructed within the study area.

A geophysical survey was undertaken within the 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 (in the areas adjacent to the Site), revealing 19th century deposits associated with the former Stapolin House to the north-east and confirming that the anomalies to the north were modern features. The testing failed to uncover any features of an archaeological nature. The anomalies identified within the 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, Appendix A14.1 in Volume 3).

Notwithstanding the disturbed nature of the Site and the results of the archaeological investigations in the immediately adjacent areas, 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. Ground disturbance works associated with the proposed Project will have a *negative, moderate, permanent* impact on any such remains that survive below ground.

No architectural, cultural or industrial heritage impacts were identified in relation to the Site.

14.5 Mitigation Measures

14.5.1 Construction Phase

Monitoring of topsoil-stripping within the entire Site 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 a comprehensive archaeological mitigation measure.

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 the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological importance identified. The archaeologist will 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 Site will have no impact on the cultural heritage environment of the area, as it is anticipated that any impact to archaeological features would be encountered at the Site preparation stage and resolved prior to the Operational Phase. No architectural, cultural or industrial heritage impacts were identified in relation to the proposed Project. As such, no remedial or reductive measures are required for the Operational Phase.

14.6 Residual Impacts

No residual impacts were identified during the assessment process.

14.7 Monitoring

There will be no requirement for monitoring post-construction.

14.8 Reinstatement

There will be no requirement for reinstatement.

14.9 Interactions

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

However, no interactions were identified during the assessment process in relation to cultural heritage, archaeology and architecture.

14.10 Cumulative Impacts

No cumulative impacts were identified in relation to the proposed Project with regard to archaeological, cultural, industrial, or architectural heritage. Refer to Chapter 21 (Cumulative impacts).

14.11 'Do-Nothing' Impact

In the '*do-nothing'* scenario the Site would not be redeveloped and therefore there would be no adverse impacts to any as yet undiscovered subsurface archaeological deposits, features or finds, nor to any features of architectural heritage, cultural heritage or historic interest.

14.12 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered during the assessment process.

15 Microclimate - Daylight / Sunlight

15.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Carlota Álvarez, Energy & Sustainability Engineer of 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) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

The aim of the analysis is to record and analyse the following impacts:

- impact of the proposed Project on daylight levels within the proposed Project and any likely significant effects on the environment; and
- impact on daylight levels to the existing adjacent buildings due to the proposed Project and any likely significant effects on the environment.

15.2 Daylight Access Impact Analysis

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 – Guidelines for Planning Authorities*[232] outlines 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*

[232] DHPLG (2020).

> *standards of daylight provision."* They also outline 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."*

The *Fingal Development Plan (2017-2023)* outlines 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."*

The *Sustainable Residential Development in Urban Areas*[233], outlines 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."*

The *Urban Development and Building Heights - Guidelines for Planning Authorities*[234] outlines the following:

> *"At the scale of the site / building:*

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[233] DHLGH (2009a).
[234] DHPLG (2018c).

- *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."*

15.2.2 Methodology

In considering the development potential and the quality of amenity for the surrounding properties as well as for the new development once the scheme has been implemented, 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 is the primary reference for this matter. The guide gives 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 access are quantified based on the definitions stated in the Draft EPA Guidelines[235]. The list of definitions given below is taken from Table 3.3 in this document. Some commentary is also added below on what these definitions might imply in the case of impact on daylight access.

- Imperceptible Impact: An effect capable of measurement but without noticeable consequences.
- Not significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.
- Slight Impact: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- Moderate Impact: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- Significant Impact: 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 Impact: An effect which obliterates sensitive characteristics.

The range of possible impacts listed above are referred to when discussing the results of the daylight analysis.

15.2.2.1 Daylight Assessment Methodology for Dwellings within the Proposed Project

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 sky conditions, whilst '*Sunlight*' refers specifically to the light coming directly from the sun.

[235] EPA (2017).

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)*[236]".

For new developments, the BRE Guide and BS 8206-02, 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 is an excerpt from BS 8206-02 outlining 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 Daylight Factors

Table 2 **Minimum average daylight factor**

Room type	**Minimum average daylight factor** %
Bedrooms	1
Living rooms	1.5
Kitchens	2

Where one room serves 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%.

BS 8206 outlines that for a room that serves more than one purpose, the minimum ADF should be that for the room type with the highest value. For example, in a combined living/kitchen spaces, the minimum recommended ADF value should be 2%.

[236] The British Standard 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 the BS 8206, this standard has been used throughout the report.

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 Guidelines for Planning Authorities*[237], which are as follows:

- **Amenity spaces**: the guidance set out in the *Sustainable Urban Housing: Design Standards for New Apartment* document states that private amenity spaces shall be provided in the form of balconies at the upper levels. It is also stated that 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 proposed apartments of the Shoreline GA1 development during the assessment carried out for the initial pre-planning stage submitted in June 2020. The assessment completed for the pre planning meeting indicated a pass rate of 97.3% 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 92%. 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 scheme, with the only change being the benchmark to which the compliance rate is calculated.

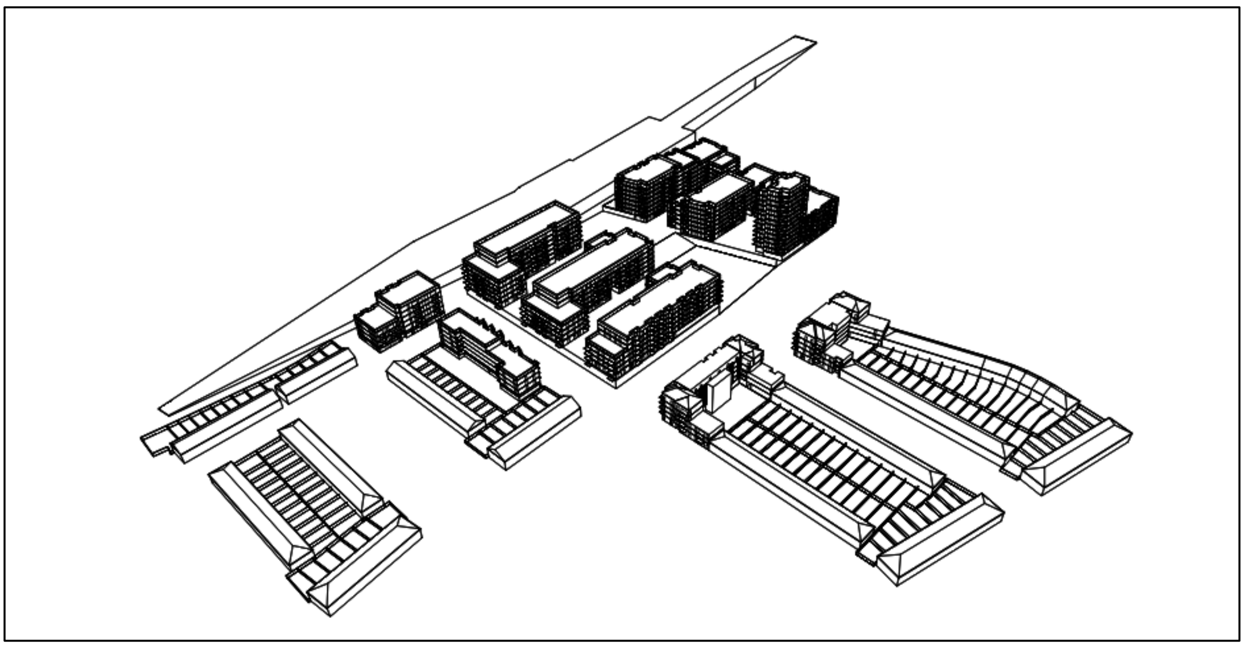
[237] DHPLG (2020).

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 development, in the *Integrated Environmental Solutions Virtual Environment (IES VE) software package*. A number of computer simulations were then undertaken in the IES VE software package to ascertain the ADFs achieved within the dwellings of the proposed Project.

An image of for the proposed Project taken from the model is illustrated in Figure 15.1. The daylight impact analysis has been assessed on 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



15.2.2.1 Daylight Assessment Methodology for Existing Dwellings Adjacent to the Site

15.2.2.1.1 Identifying Sensitive Receptors

In order to undertake the assessment of any 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.
- Other sensitive receptors includes gardens and open spaces on adjacent properties to the new scheme, 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.

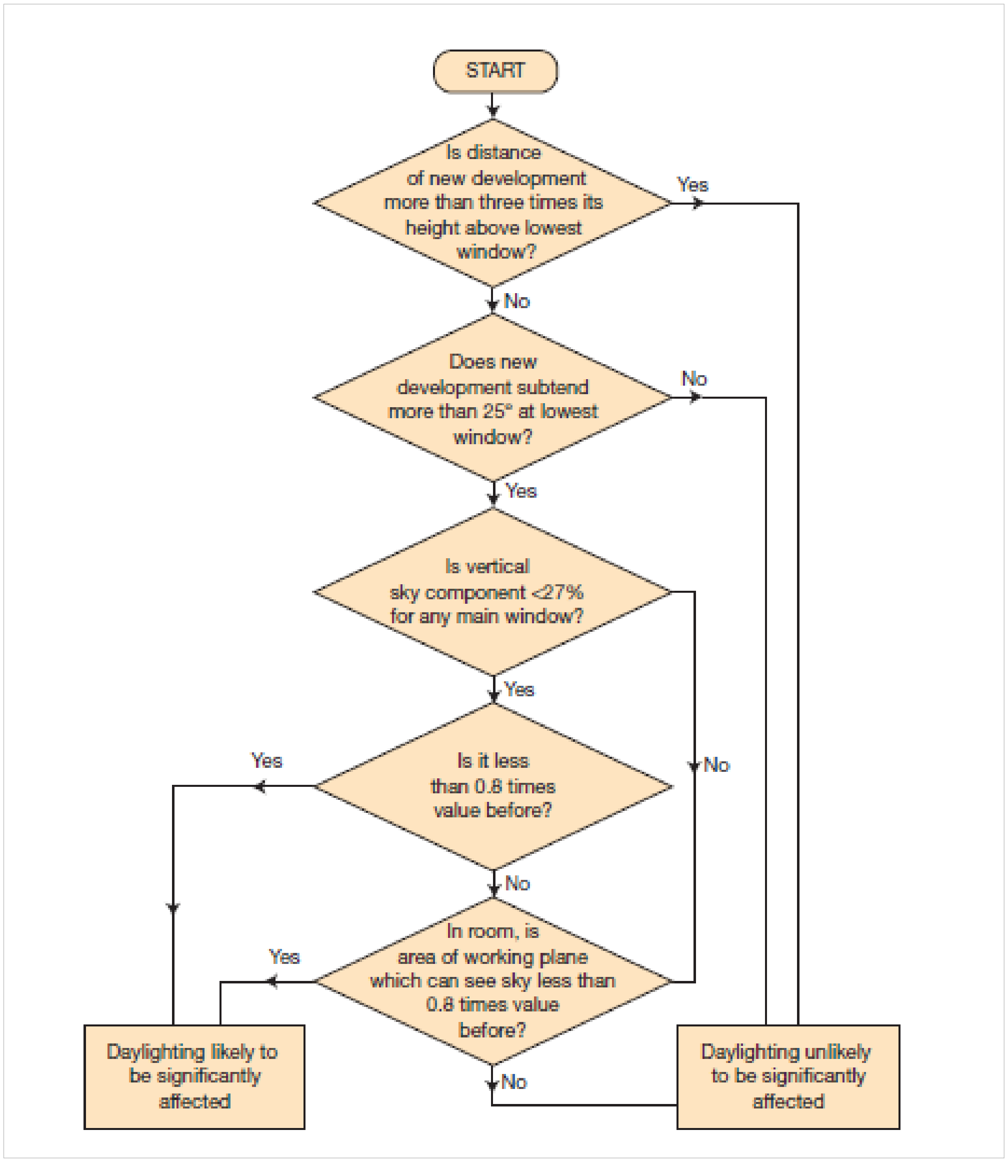
Similarly, amenities and open spaces are selected on the basis of being in the immediate vicinity of the proposed Project. The primary purpose of a daylight, sunlight and overshadowing assessment is to determine the likely loss of light to adjacent buildings resulting from the construction of the proposed 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.

15.2.2.1.2 Assessment Criteria for Existing Adjacent Properties

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 outlines the criteria to be assessed, as per the *BRE Guidelines*, in order to ascertain any potential impact to adjacent buildings from the proposed Project.

Figure 15.2: Daylight Assessment Methodology



As per the flow matrix, the loss of light to existing windows is not required to be analysed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing windows. Otherwise, BRE guideline provide three main methods for assessing daylight availability.

15.2.2.1.3 Step 1 - 25° Line Criteria

In the first instance, if a proposed development falls beneath a 25° angle taken from a point 1.6 metres above ground level (ABL) from any adjacent properties, then the *BRE Guidelines* say that no further analysis is required in relation to impact on surrounding properties as adequate skylight will still be available. If the proposed Project extends beyond the 25° line then further analysis is required (Step 2).

15.2.2.1.4 Step 2 - Vertical Sky Component

The second method is known as the 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* set out two guidelines for the VSC:

- If the VSC at the centre of the existing window exceeds 27% with the new development in place, then enough sky light should still be reaching the existing window.
- If the VSC with the 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.
- 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 n*egligible*.

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.

15.2.2.1.5 Step 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 is considered more appropriate.

15.2.3 Characteristics of the Proposed Project

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046). The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

Figure 15.3: Proposed Site Masterplan showing Red Line Boundary[238]

[238] Henry J Lyons (2021). Site Masterplan. Drawing No. STP0011 GA1

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 also analysed. Figure 15.4 illustrates the adjoining buildings to the development that were analysed and Table 15.2 describes the adjacent buildings.

Figure 15.4: Properties Adjacent to the Proposed Project

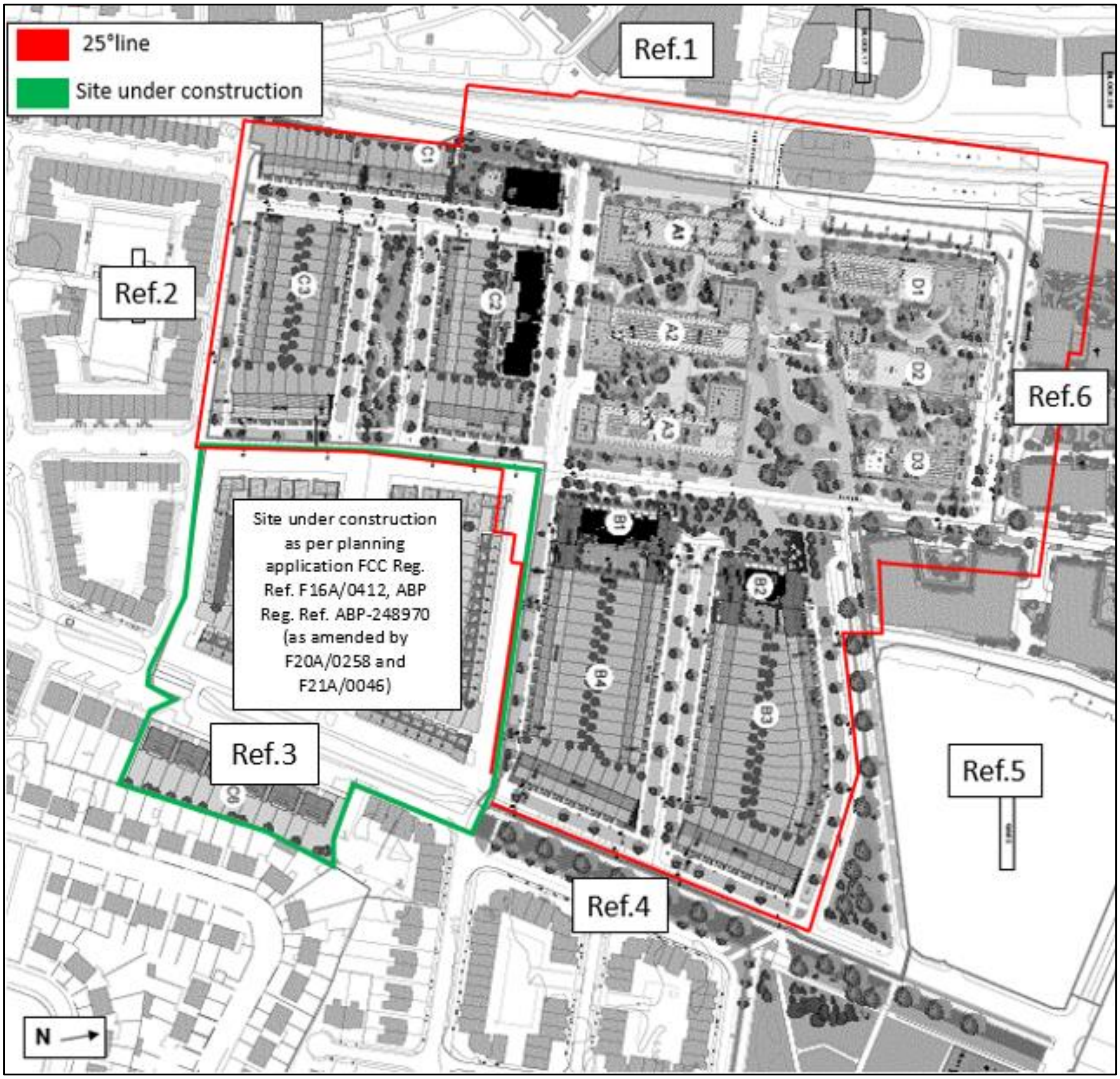


Table 15.2: Sensitive Receptors

Development Ref.	Development Name	Impact Perceived
Ref. 1	Clongriffin and Marrsfield Developments	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, imperceptible impact.
Ref. 2	Properties at Myrtle Avenue	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, imperceptible impact.
Ref. 3	Site under construction as per planning application FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046)	The distance is substantial from the proposed Project with the majority in compliance with the 25⁰ line criteria except for the north-west corner that falls inside the line. This area has been selected for VSC analysis. Imperceptible impact is perceived to those properties falling outside the 25⁰ line.
Ref. 4	Red Arches Drive Properties	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, imperceptible impact.
Ref. 5	Growth Area 2 (FCC Reg. Ref. F11A/0290 (/E1), PL06F.239732 – GA2)	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, imperceptible impact.
Ref. 6	Shoreline GA3 – Site subject to separate SHD process	A daylight and sunlight EIAR chapter is being carried out for the separate subject application where the impact of GA1 will be taken into account within the calculations.

15.2.4 Baseline Environment

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha. 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 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.

The Site is bound by the Dublin-Belfast / DART train line and Clongriffin train station to the west. The Site is also bound by existing residential areas at Myrtle and Red Arches to the south and east respectively.

Figure 15.5: Aerial Image of Proposed Site [239]

15.2.5 Potential Impact 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 daylight levels within the proposed Project and any likely significant effects on the environment; and

[239] Google Earth (2020).

- impact on daylight levels to the existing adjacent buildings due to the proposed Project proposed Project and any likely significant effects on the environment.

15.2.5.1 Construction Phase

The analysis considers both the daylight impact to future residents, and the impact to existing adjacent properties as a result of the proposed Project. 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.*

15.2.5.2 Operational Phase

As previously noted, the performance targets set out in the *BRE Guidelines* 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."*

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 development is a positive for the Site. The analysis has shown the majority of properties are a substantial distance from the proposed Project and demonstrates that those located in closer proximity are in line with BRE recommendations. Therefore, no impact will be experienced to any adjacent properties in relation to daylight due to the proposed Project and 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 development and the adjacent buildings, the methodology outlined in Sections 15.2.1.1 and 15.2.1.2 of this chapter has been followed.

15.2.5.2.1 Methodology for Selection of Rooms for Daylight Modelling

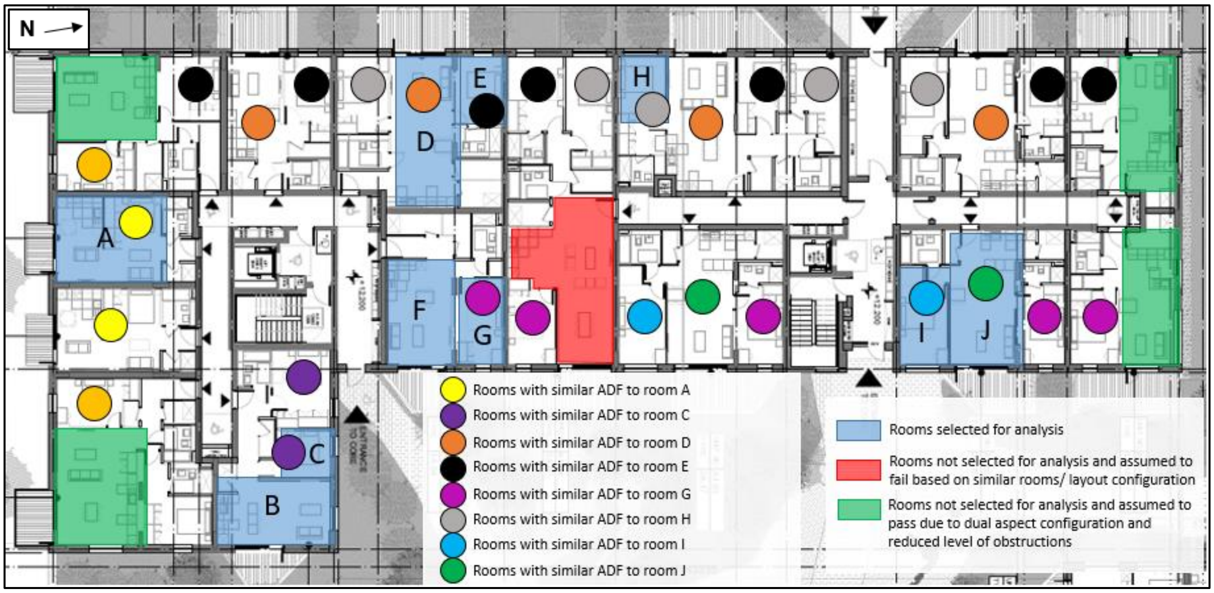
In line with common industry approach, units presented at the lower levels have been selected for analysis. Units are selected at the lower levels on the basis that they will receive the lowest levels of daylight due to their location, obstruction and position within the development. Another factor in 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 show if 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 15.6 illustrates an example of the rationale applied within Block A1 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 15.6, 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 15.6: Example of Room's Assumption in West Façade of Block A1



15.2.5.2.2 Daylight Reflectance

The surface reflectance values outlined in Table 15.3 have been used in the analysis

Table 15.3: Surface Reflectance Values

Surface Type	Reflectance (%)
External Wall	40
Internal Partitions	70
Ceiling	70
Floor	40
Adjacent Buildings	40
Glazing Transmittance	70

15.2.5.2.3 Daylight Impact 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 15.7: Block A1 Level 01 - Average Daylight Factor Assessed Rooms

Table 15.4: Block A1 Level 01 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Studio	2.0	2.5	Yes
B	Living Room / Kitchen	2.0	1.8	No
C	Bedroom	1.0	2.3	Yes
D	Living Room / Kitchen	2.0	3.2	Yes
E	Bedroom	1.0	2.2	Yes
F	Living Room / Kitchen	2.0	1.5	No
G	Bedroom	1.0	1.0	Yes
H	Bedroom	1.0	2.4	Yes
I	Bedroom	1.0	2.1	Yes
J	Living Room / Kitchen	2.0	1.5	No

Figure 15.8: Block A1 Level 02 - Average Daylight Factor Assessed Rooms

Table 15.5: Block A1 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	2.7	Yes
B	Living Room / Kitchen	2.0	1.0	No
C	Bedroom	1.0	1.3	Yes
D	Living Room / Kitchen	2.0	1.0	No
E	Living Room / Kitchen	2.0	2.8	Yes
F	Bedroom	1.0	2.8	Yes
G	Living Room / Kitchen	2.0	2.1	Yes

Figure 15.9: Block A1 Level 03 - Average Daylight Factor Assessed Rooms

Table 15.6: Block A1 Level 03 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.2	No
B	Living Room / Kitchen	2.0	1.2	No

Figure 15.10: Block A1 Level 04 - Average Daylight Factor Assessed Rooms

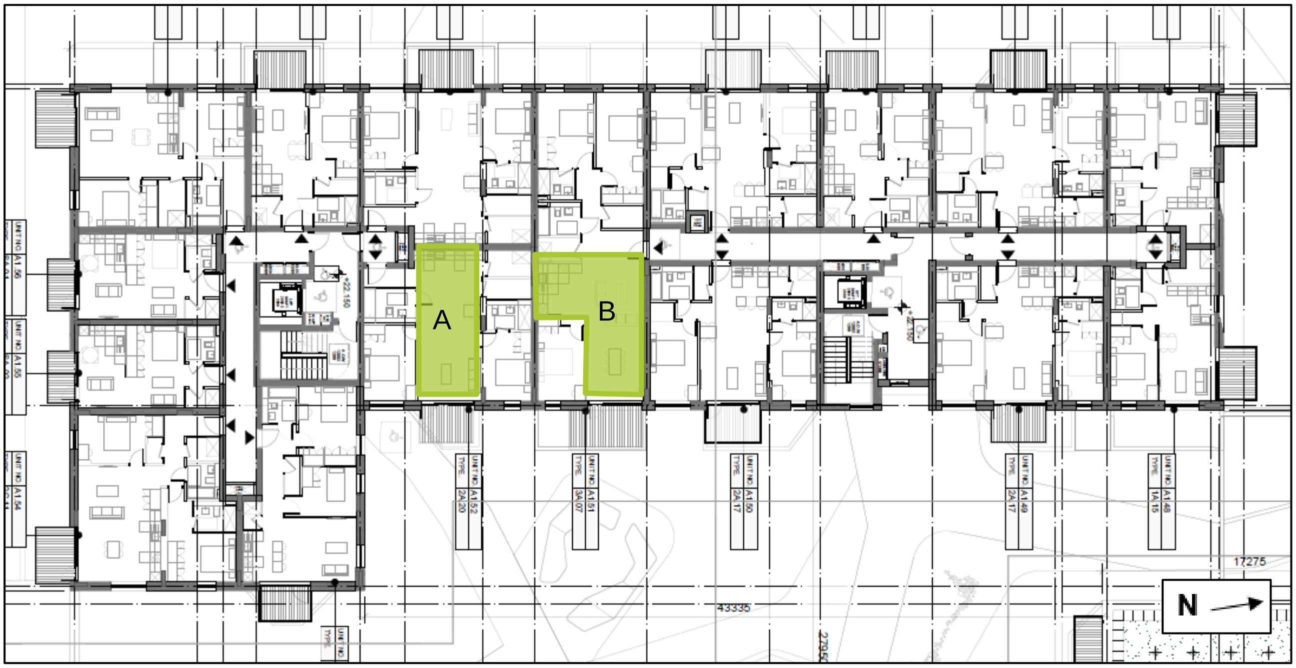


Table 15.7: Block A1 Level 04 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.7	No
B	Living Room / Kitchen	2.0	1.5	No

Figure 15.11: Block A1 Level 05 - Average Daylight Factor Assessed Rooms

Table 15.8: Block A1 Level 05 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.6	Yes
B	Living Room / Kitchen	2.0	2.3	Yes

Figure 15.12: Block A2 Level 01 - Average Daylight Factor Assessed Rooms

Table 15.9: Block A2 Level 01 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	3.6	Yes
B	Bedroom	1.0	1.7	Yes
C	Living Room / Kitchen	2.0	1.9	No
D	Bedroom	1.0	2.5	Yes
E	Bedroom	1.0	1.2	Yes
F	Living Room / Kitchen	2.0	1.5	No
G	Bedroom	1.0	1.6	Yes
H	Living Room / Kitchen	2.0	3.1	Yes
I	Bedroom	1.0	2.3	Yes

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
J	Bedroom	1.0	1.5	Yes
K	Living Room / Kitchen	2.0	1.7	No
L	Studio	2.0	2.3	Yes
M	Living Room / Kitchen	2.0	2.3	Yes
N	Bedroom	1.0	1.4	Yes
O	Living Room / Kitchen	2.0	1.4	No
P	Bedroom	1.0	2.6	Yes
Q	Living Room / Kitchen	2.0	1.8	No
R	Bedroom	1.0	2.8	Yes

Figure 15.13: Block A2 Level 02 - Average Daylight Factor Assessed Rooms

Table 15.10: Block A2 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.2	No
B	Bedroom	1.0	3.3	Yes
C	Living Room / Kitchen	2.0	0.9	No
D	Bedroom	1.0	3.4	Yes
E	Living Room / Kitchen	2.0	1.8	No
F	Living Room / Kitchen	2.0	2.0	Yes

Figure 15.14: Block A2 Level 03 - Average Daylight Factor Assessed Rooms

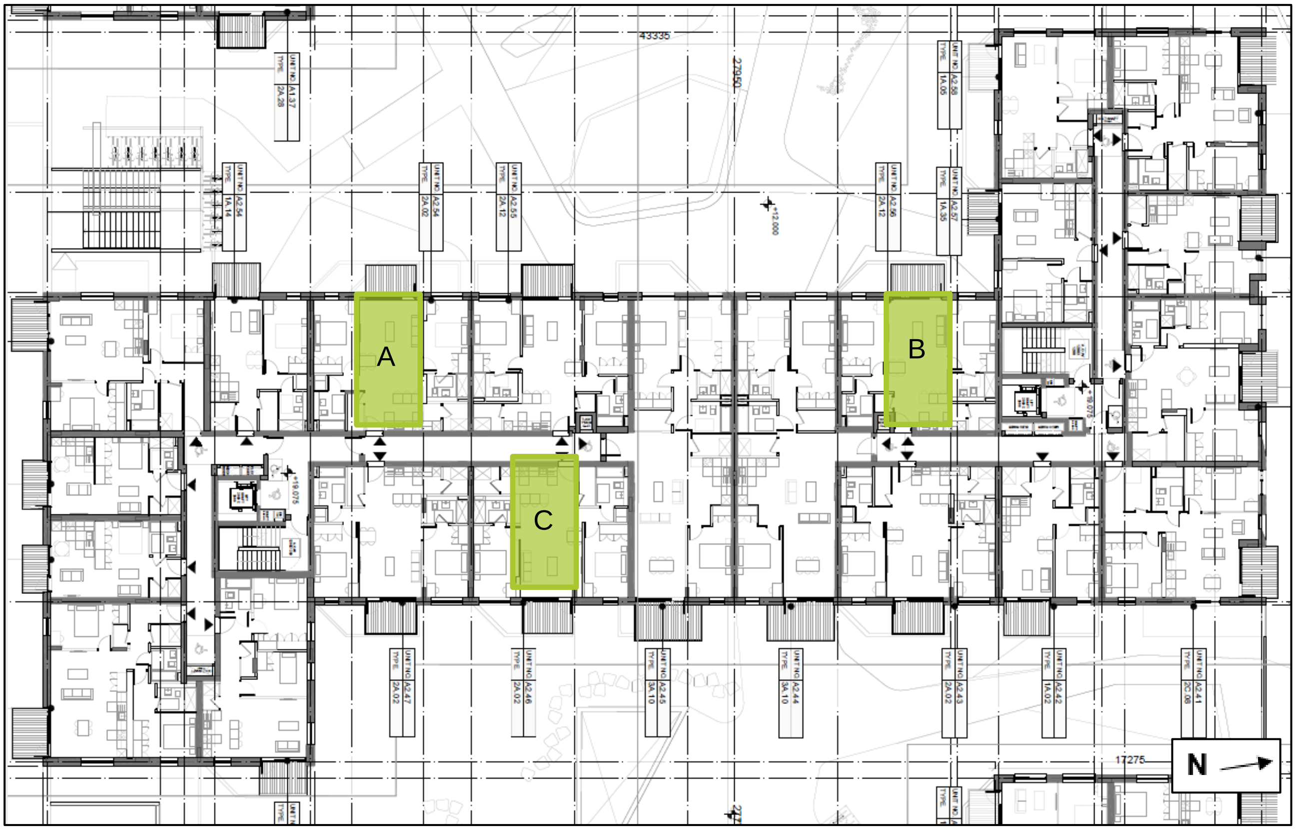


Table 15.11: Block A2 Level 03 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.6	No
B	Living Room / Kitchen	2.0	1.3	No
C	Living Room / Kitchen	2.0	2.2	Yes

Figure 15.15: Block A2 Level 04 - Average Daylight Factor Assessed Rooms

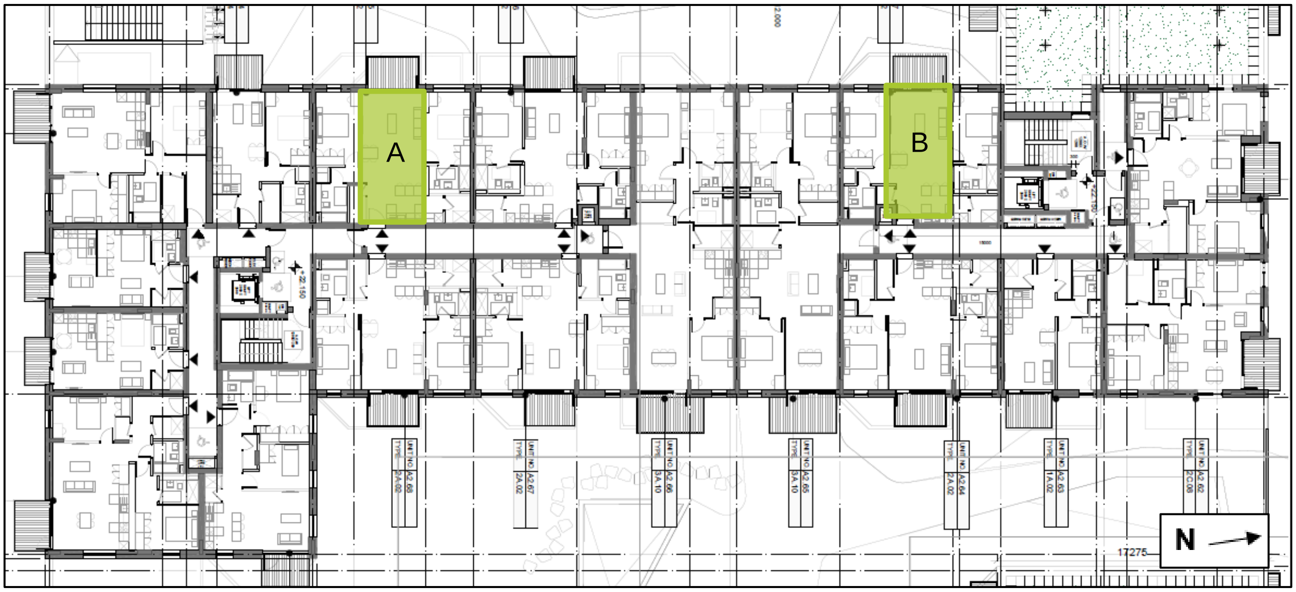


Table 15.12: Block A2 Level 04 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.0	Yes
B	Living Room / Kitchen	2.0	1.7	No

Figure 15.16: Block A2 Level 05 - Average Daylight Factor Assessed Rooms

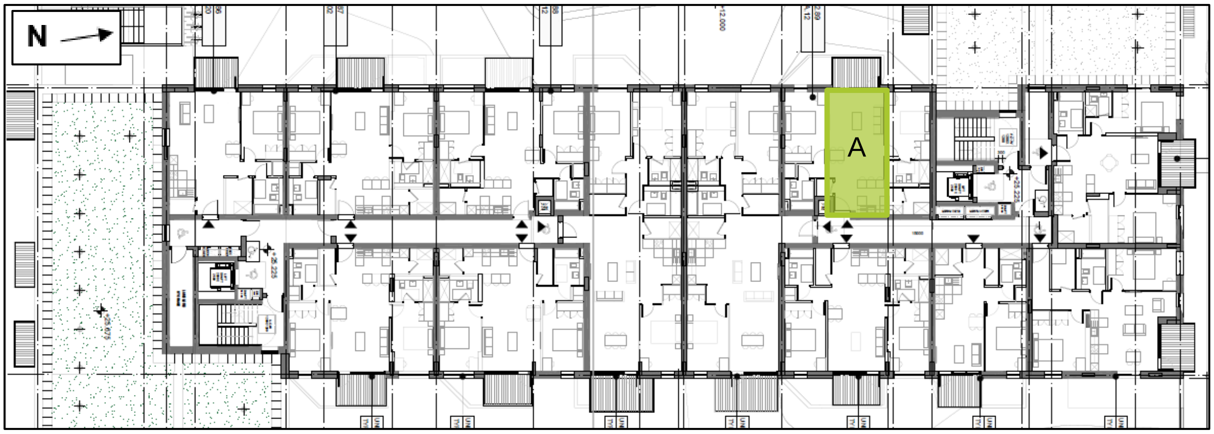


Table 15.13: Block A2 Level 05 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.3	Yes

Figure 15.17: Block A3 Level 01 - Average Daylight Factor Assessed Rooms

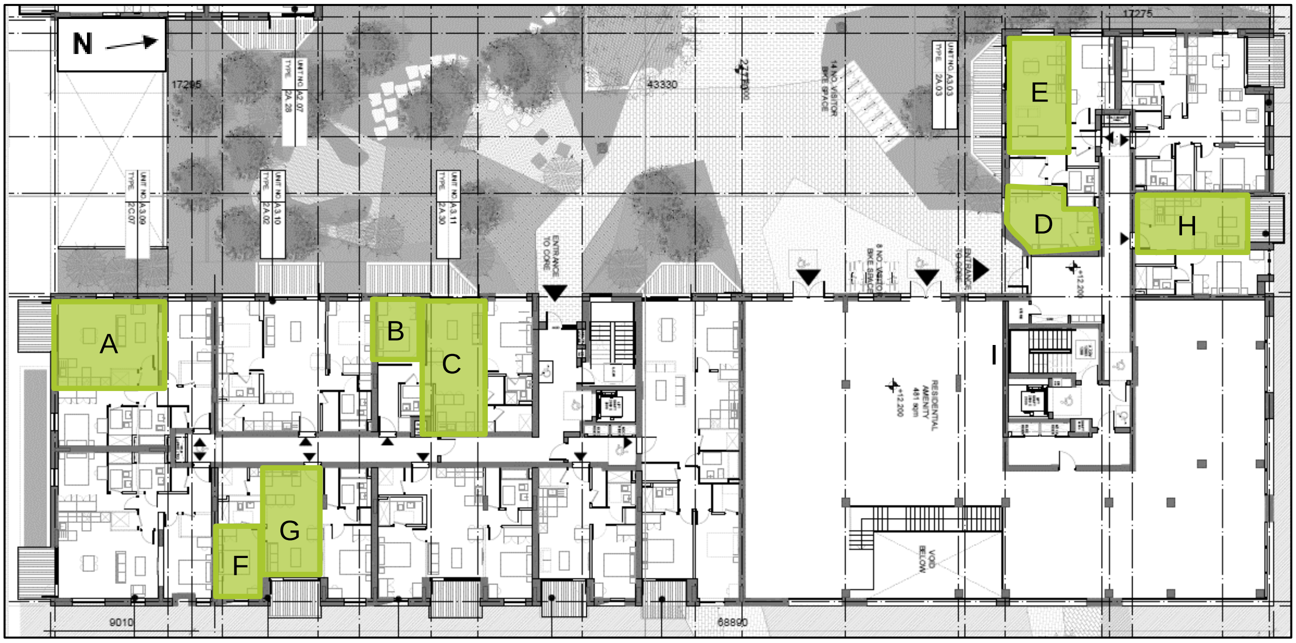


Table 15.14: Block A3 Level 01 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.1	Yes
B	Bedroom	1.0	2.5	Yes
C	Living Room / Kitchen	2.0	1.5	No
D	Bedroom	1.0	1.0	Yes
E	Living Room / Kitchen	2.0	3.1	Yes
F	Bedroom	1.0	1.7	Yes
G	Living Room / Kitchen	2.0	1.8	No
H	Living Room / Kitchen	2.0	1.5	No

Figure 15.18: Block A3 Level 02 - Average Daylight Factor Assessed Rooms

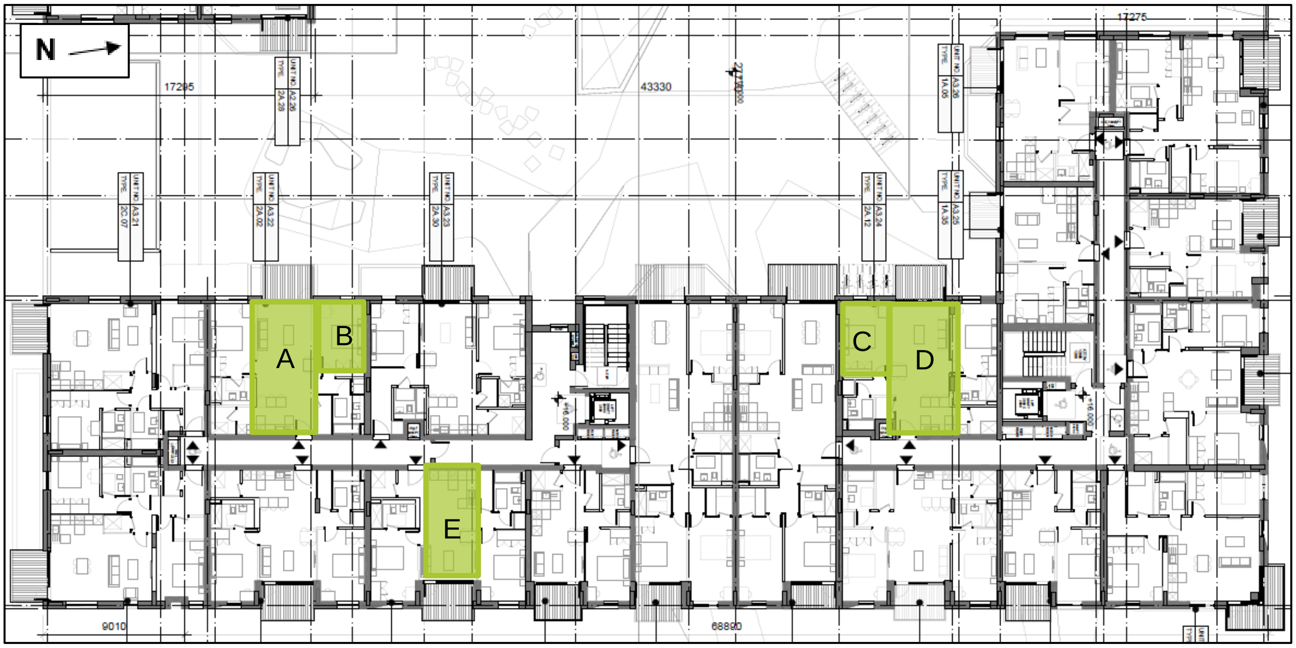


Table 15.15: Block A3 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.4	No
B	Bedroom	1.0	1.8	Yes
C	Bedroom	1.0	1.7	Yes
D	Living Room / Kitchen	2.0	1.2	No
E	Living Room / Kitchen	2.0	1.5	No

Figure 15.19: Block A3 Level 03 - Average Daylight Factor Assessed Rooms

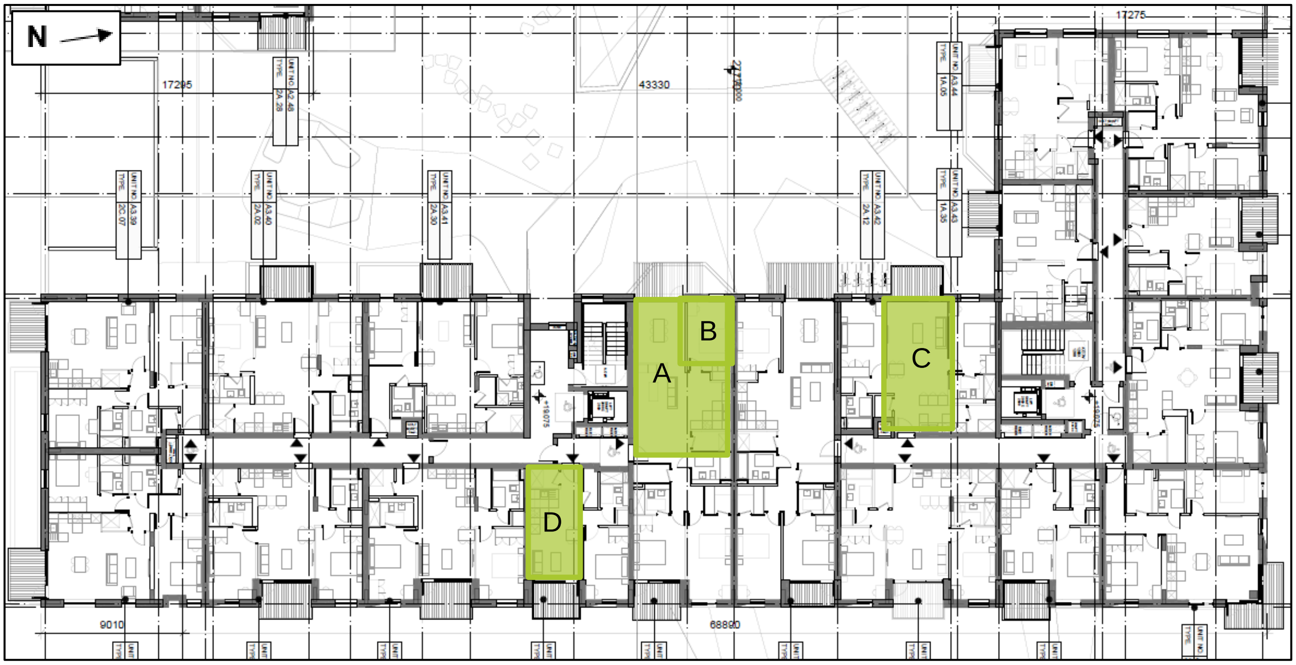


Table 15.16: Block A3 Level 03 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.8	No
B	Bedroom	1.0	2.1	Yes
C	Living Room / Kitchen	2.0	1.6	No
D	Living Room / Kitchen	2.0	1.9	No

Figure 15.20: Block A3 Level 04 - Average Daylight Factor Assessed Rooms

Table 15.17: Block A3 Level 04 - Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.4	Yes
B	Living Room / Kitchen	2.0	2.2	Yes
C	Living Room / Kitchen	2.0	2.6	Yes

Figure 15.21: Block D1 Level 01 – Average Daylight Factor Assessed Rooms

Table 15.18: Block D1 Level 01 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	3.6	Yes
B	Living Room / Kitchen	2.0	2.2	Yes
C	Bedroom	1.0	2.5	Yes
D	Bedroom	1.0	1.8	Yes
E	Living Room / Kitchen	2.0	1.6	No
F	Bedroom	1.0	1.5	Yes
G	Living Room / Kitchen	2.0	1.2	No
H	Bedroom	1.0	0.8	No
I	Living Room / Kitchen	2.0	2.6	Yes
J	Bedroom	1.0	2.7	Yes

Figure 15.22 Block D1 Level 02 – Average Daylight Factor Assessed Rooms

Table 15.19: Block D1 Level 02 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	3.1	Yes
B	Living Room / Kitchen	2.0	1.7	No
C	Bedroom	1.0	1.1	Yes
D	Living Room / Kitchen	2.0	1.0	No
E	Living Room / Kitchen	2.0	0.9	No
F	Bedroom	1.0	1.0	Yes

Figure 15.23: Block D1 Level 03 – Average Daylight Factor Assessed Rooms

Table 15.20: Block D1 Level 03 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.2	Yes
B	Living Room / Kitchen	2.0	1.3	No
C	Living Room / Kitchen	2.0	1.1	No

Figure 15.24: Block D1 Level 04 – Average Daylight Factor Assessed Rooms

Table 15.21: Block D1 Level 04 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.6	No
B	Living Room / Kitchen	2.0	1.5	No

Figure 15.25: Block D1 Level 05 – Average Daylight Factor Assessed Rooms

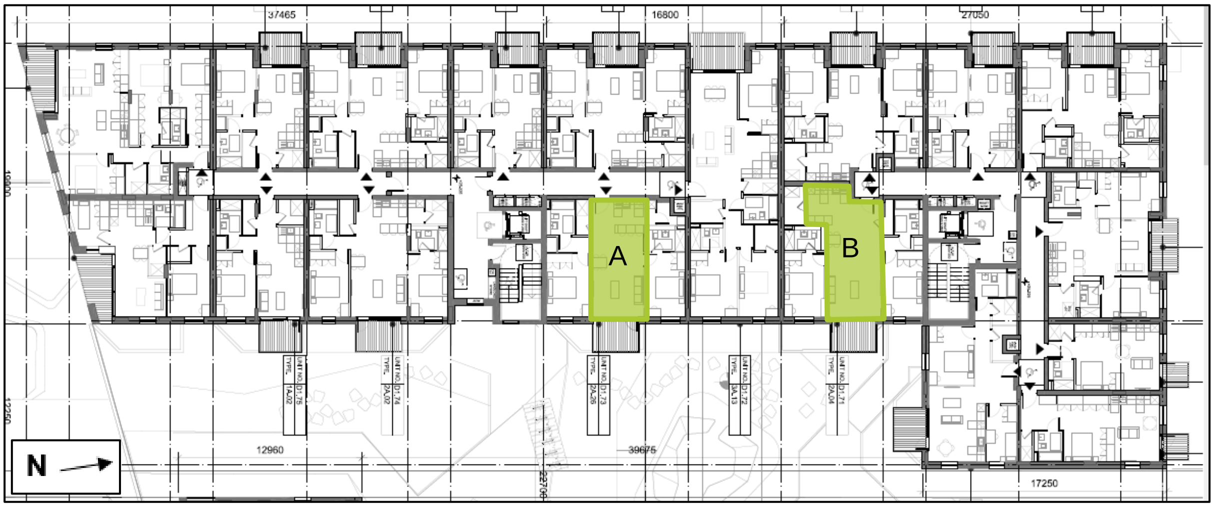


Table 15.22: Block D1 Level 05 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.4	Yes
B	Living Room / Kitchen	2.0	2.2	Yes

Figure 15.26: Block D2 Level 00 – Average Daylight Factor Assessed Rooms

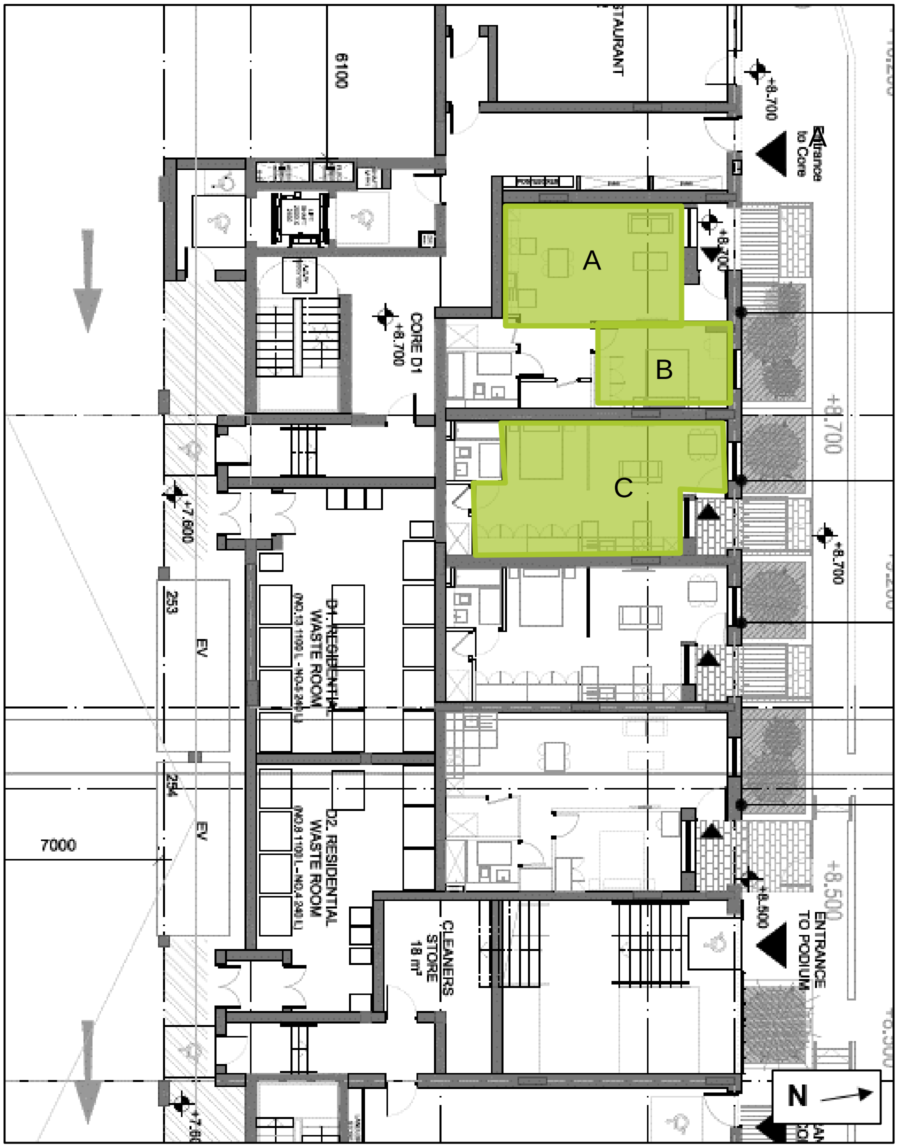


Table 15.23: Block D2 Level 00 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.6	No
B	Bedroom	1.0	2.9	Yes
C	Studio	2.0	3.3	Yes

Figure 15.27: Block D2 Level 01 – Average Daylight Factor Assessed Rooms

Table 15.24: Block D2 Level 01 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	2.0	Yes
B	Living Room / Kitchen	2.0	1.1	No
C	Bedroom	1.0	2.4	Yes
D	Living Room / Kitchen	2.0	1.1	No
E	Bedroom	1.0	1.0	Yes
F	Living Room / Kitchen	2.0	5.2	Yes
G	Living Room / Kitchen	2.0	1.7	No
H	Bedroom	1.0	1.0	Yes
I	Living Room / Kitchen	2.0	1.5	No
J	Bedroom	1.0	1.0	Yes
K	Bedroom	1.0	3.3	Yes
L	Living Room / Kitchen	2.0	4.3	Yes

Figure 15.28: Block D2 Level 02 - Average Daylight Factor Assessed Rooms

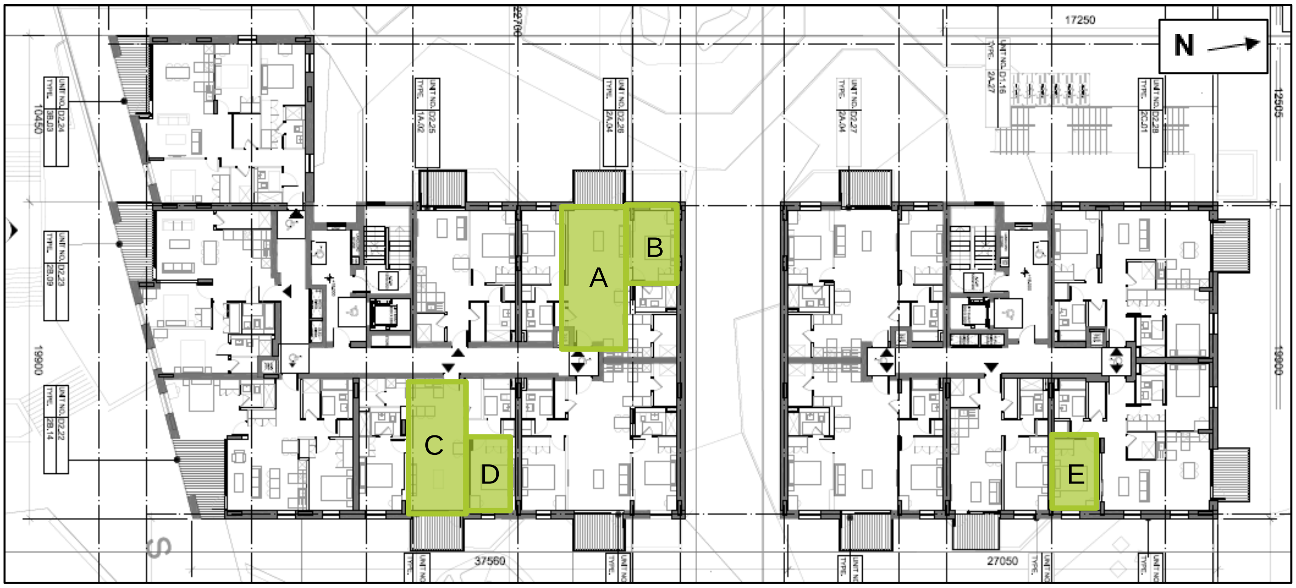


Table 15.25: Block D2 Level 02 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	0.9	No
B	Bedroom	1.0	1.5	Yes
C	Living Room / Kitchen	2.0	1.4	No
D	Bedroom	1.0	1.1	Yes
E	Bedroom	1.0	1.7	Yes

Figure 15.29: Block D2 Level 03 - Average Daylight Factor Assessed Rooms

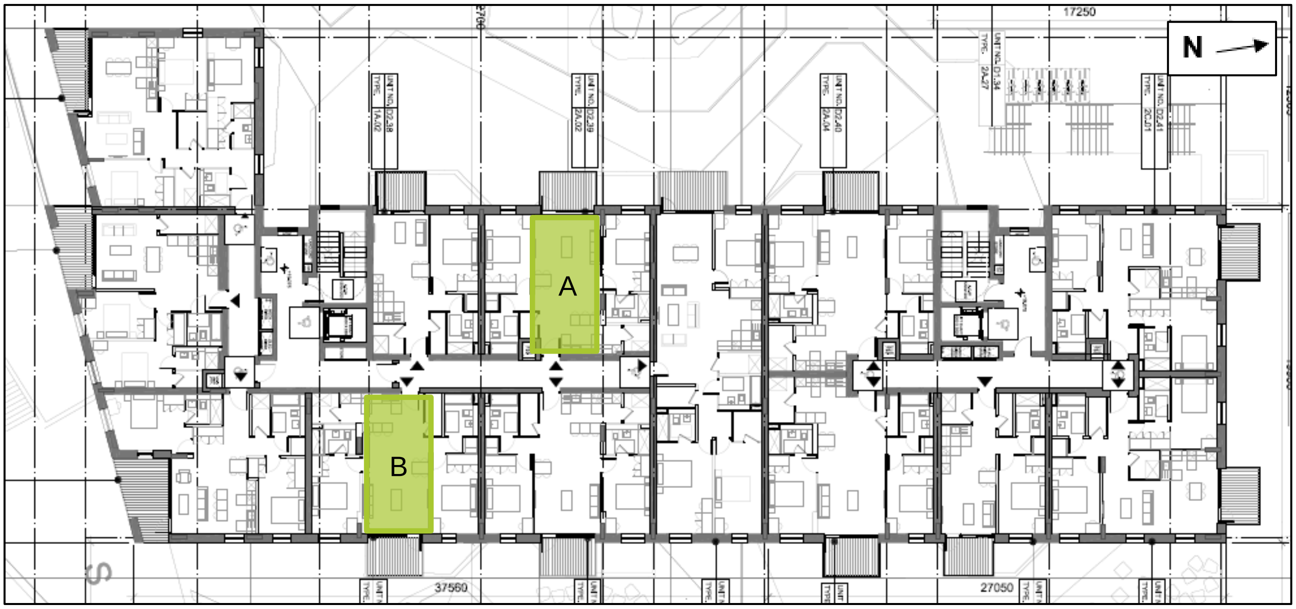


Table 15.26: Block D2 Level 03 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.0	No
B	Living Room / Kitchen	2.0	1.6	No

Figure 15.30: Block D2 Level 04 – Average Daylight Factor Assessed Rooms

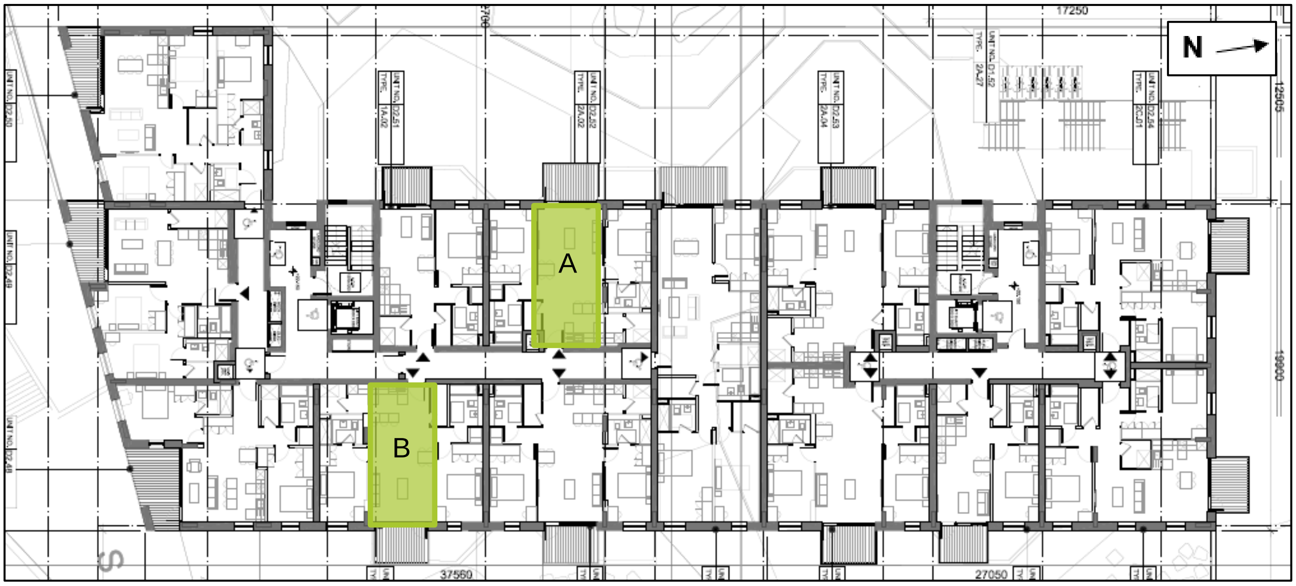


Table 15.27: Block D2 Level 04 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.4	No
B	Living Room / Kitchen	2.0	2.1	Yes

Figure 15.31: Block D2 Level 05 – Average Daylight Factor Assessed Rooms

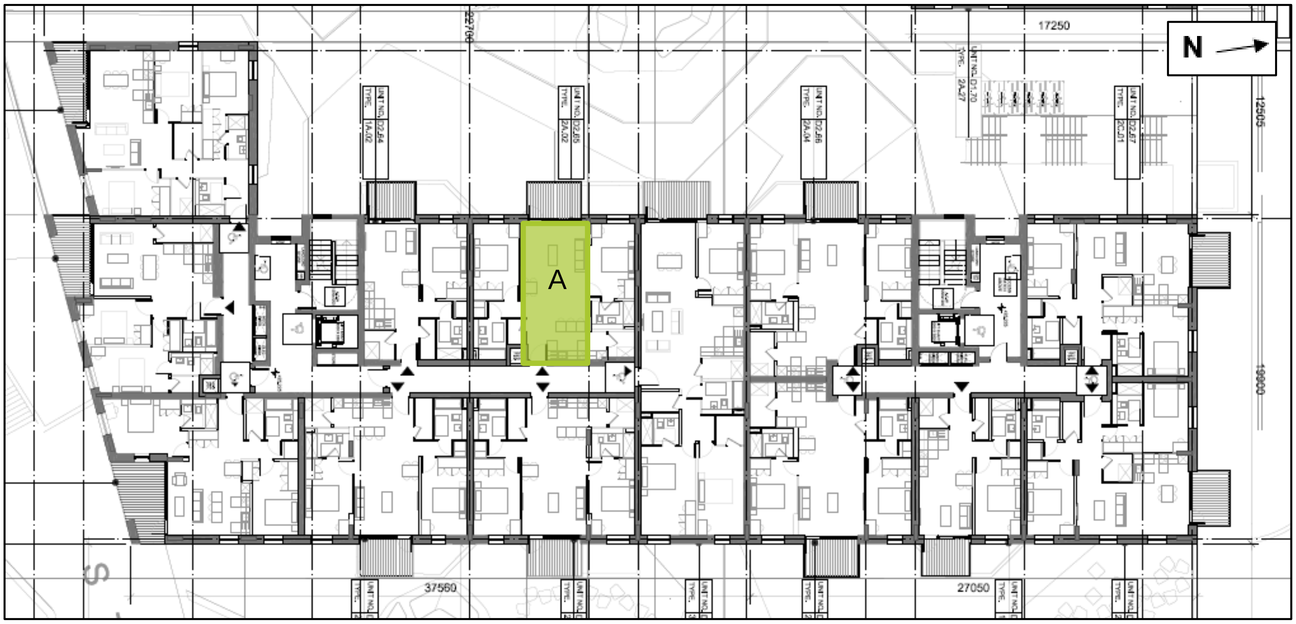


Table 15.28: Block D2 Level 05 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.7	No

Figure 15.32: Block D2 Level 06 – Average Daylight Factor Assessed Rooms

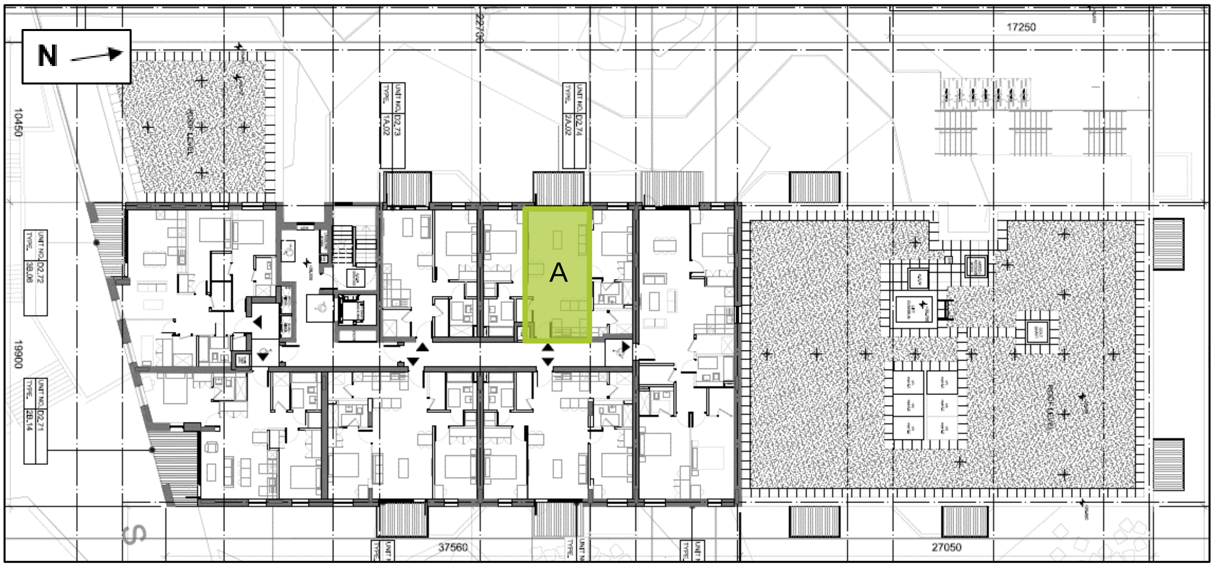


Table 15.29: Block D2 Level 06 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.5	Yes

Figure 15.33: Block D3 Level 01 – Average Daylight Factor Assessed Rooms

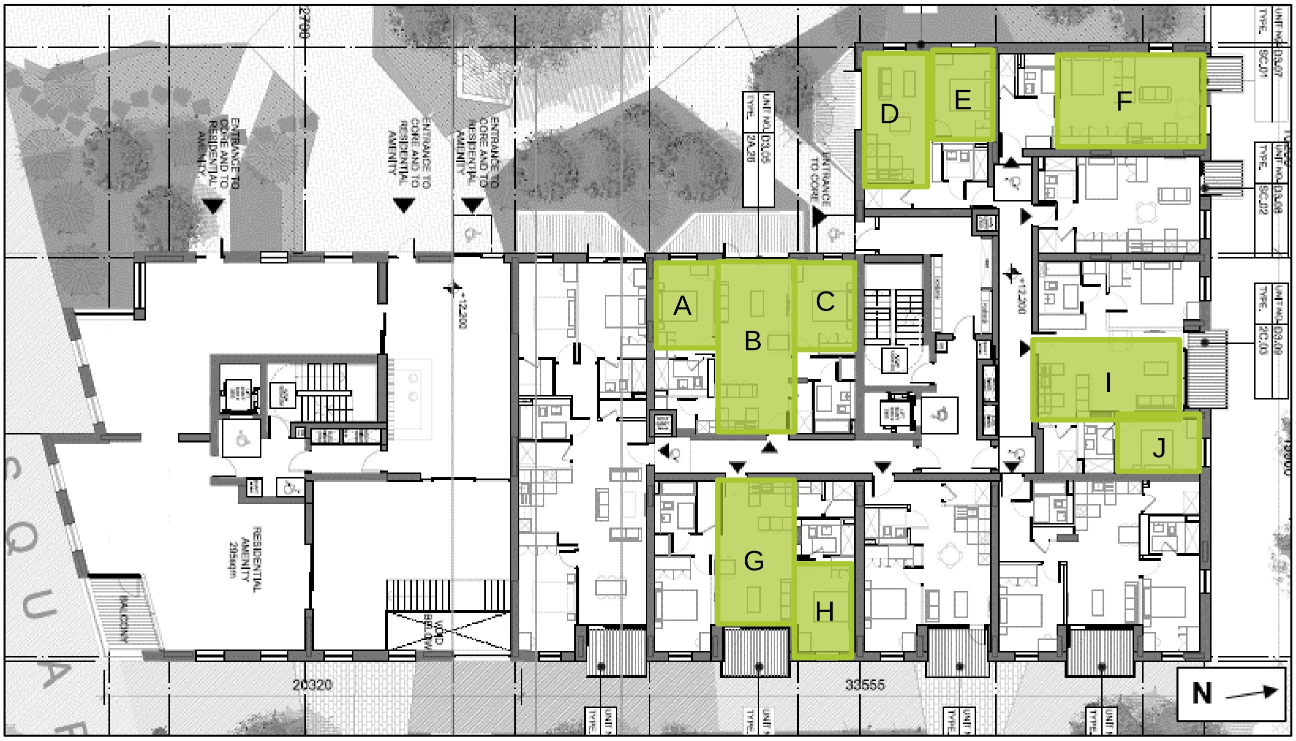


Table 15.30: Block D3 Level 01 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	1.4	Yes
B	Living Room / Kitchen	2.0	1.0	No
C	Bedroom	1.0	1.0	Yes
D	Living Room / Kitchen	2.0	2.5	Yes
E	Bedroom	1.0	1.5	Yes
F	Living Room / Kitchen	2.0	3.1	Yes
G	Living Room / Kitchen	2.0	3.3	Yes
H	Bedroom	1.0	2.1	Yes
I	Living Room / Kitchen	2.0	2.6	Yes
J	Bedroom	1.0	2.7	Yes

Figure 15.34: Block D3 Level 02 – Average Daylight Factor Assessed Rooms

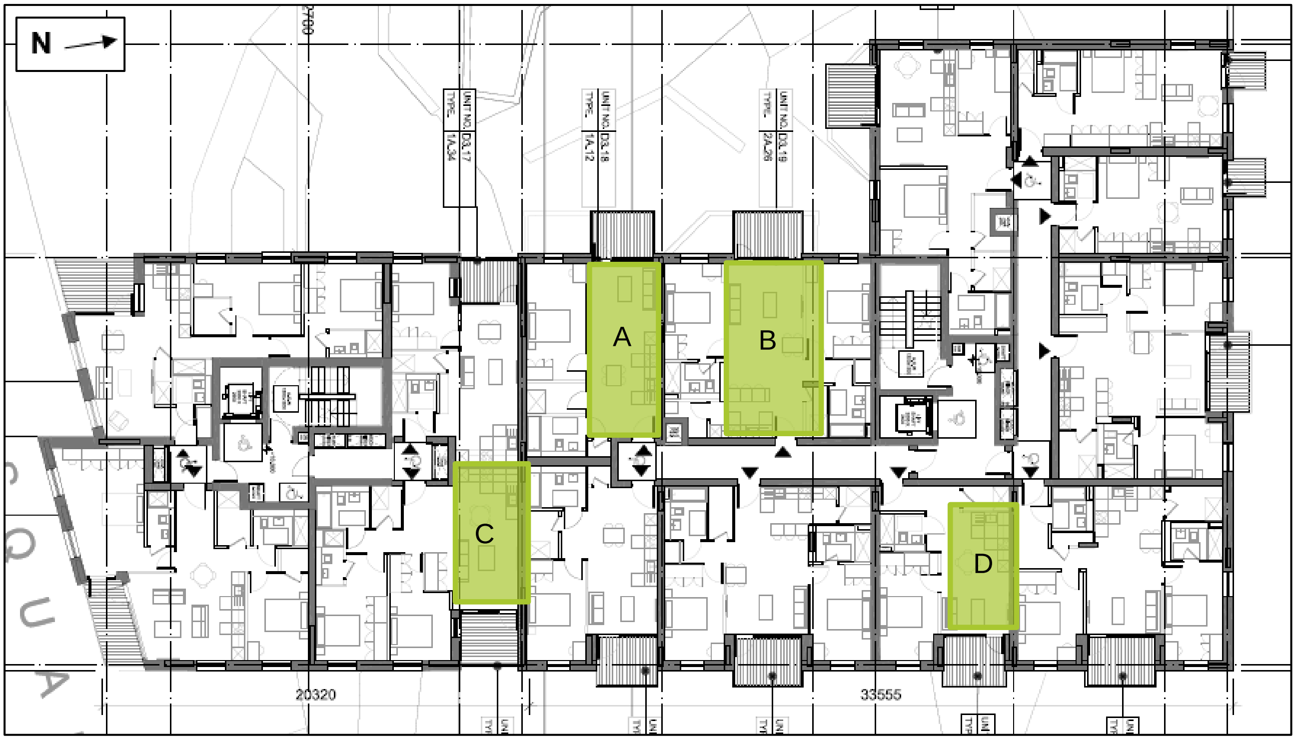


Table 15.31: Block D3 Level 02 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.0	No
B	Living Room / Kitchen	2.0	0.9	No
C	Living Room / Kitchen	2.0	1.5	No
D	Living Room / Kitchen	2.0	1.7	No

Figure 15.35: Block D3 Level 03 – Average Daylight Factor Assessed Rooms

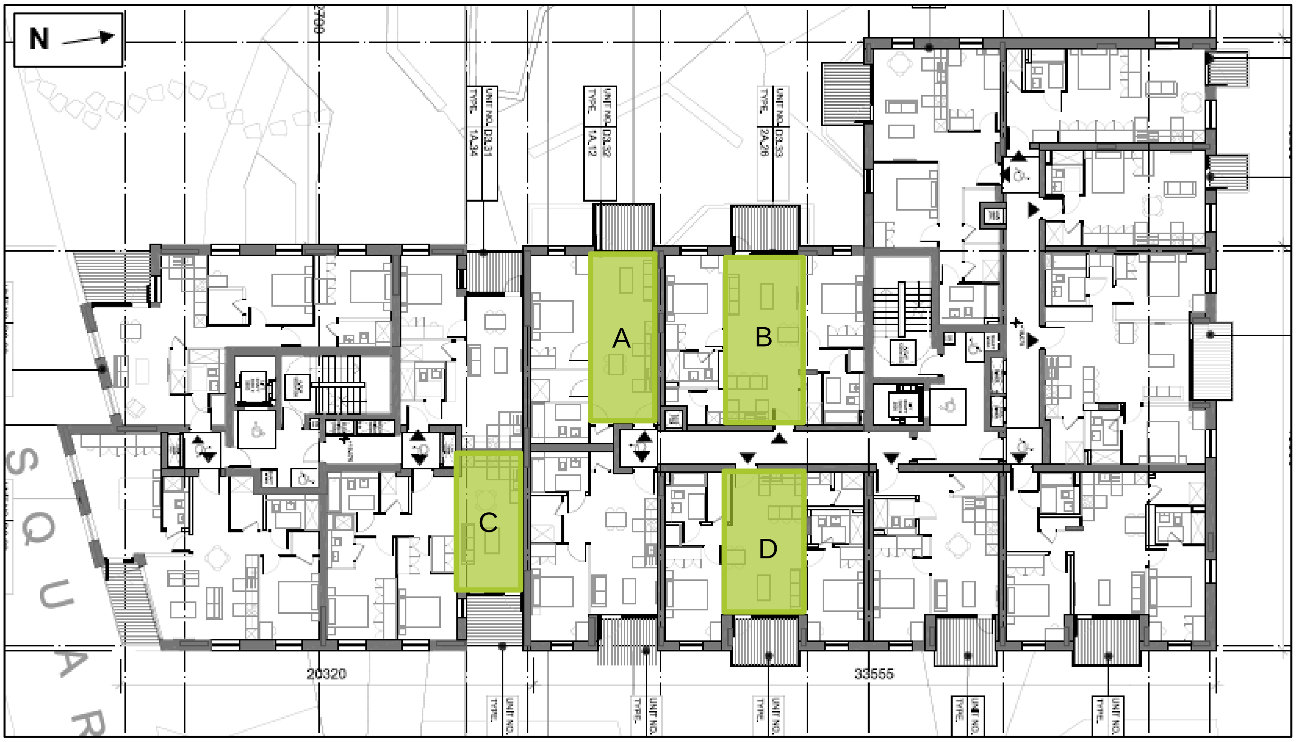


Table 15.32: Block D3 Level 03 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.4	No
B	Living Room / Kitchen	2.0	1.3	No
B	Living Room / Kitchen	2.0	2.1	Yes
B	Living Room / Kitchen	2.0	2.6	Yes

Figure 15.36: Block D3 Level 04 – Average Daylight Factor Assessed Rooms

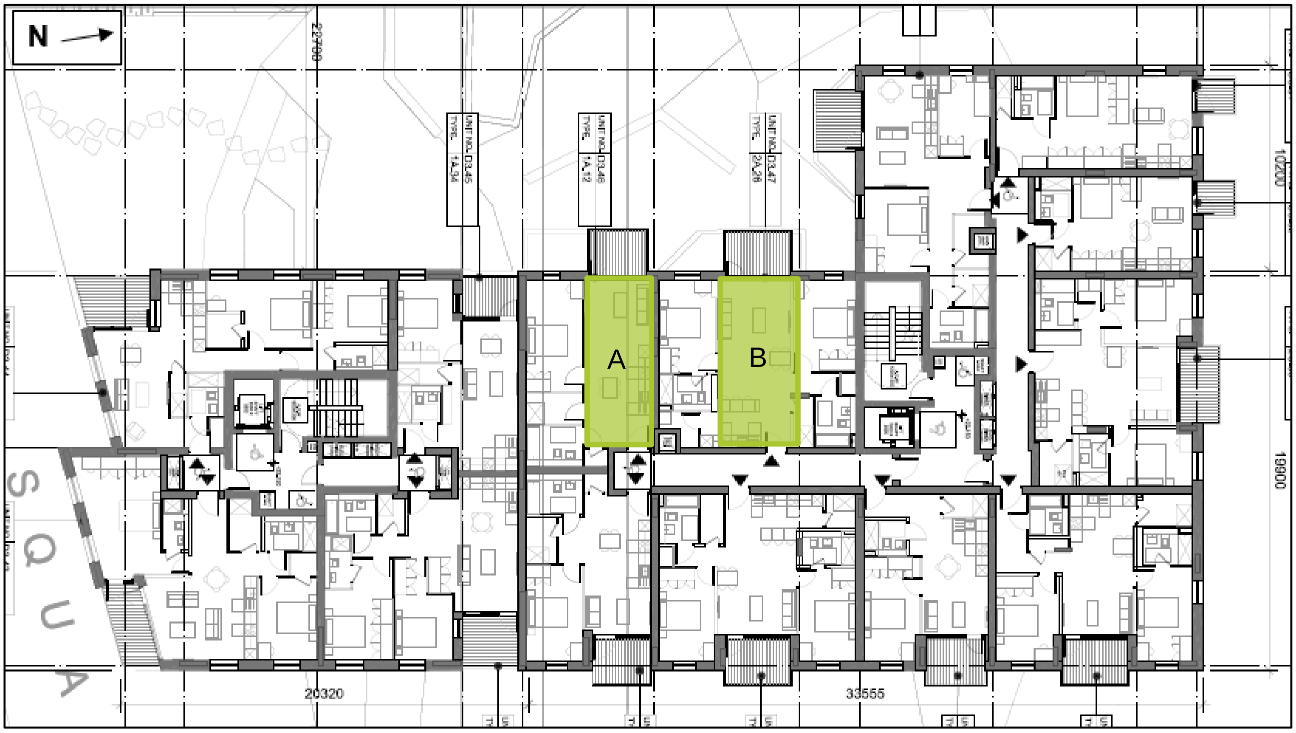


Table 15.33: Block D3 Level 04 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	1.6	No
B	Living Room / Kitchen	2.0	1.7	No

Figure 15.37: Block D3 Level 05 – Average Daylight Factor Assessed Rooms

Table 15.34: Block D3 Level 05 – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.5	Yes
B	Living Room / Kitchen	2.0	2.6	Yes

Figure 15.38: Blocks B1 and B2 Ground Floor Level – Average Daylight Factor Assessed Rooms

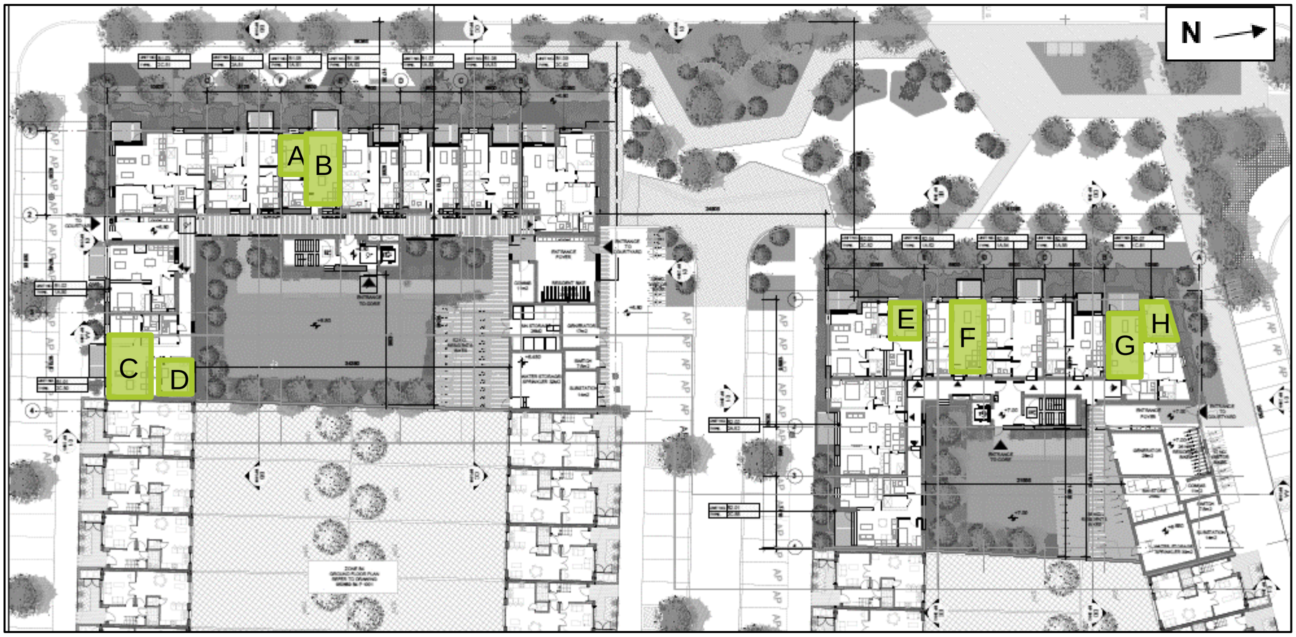


Table 15.35: Blocks B1 and B2 Ground Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	2.5	Yes
B	Living Room / Kitchen	2.0	1.8	No
C	Living Room / Kitchen	2.0	2.5	Yes
D	Bedroom	1.0	1.0	Yes
E	Bedroom	1.0	3.2	Yes
F	Living Room / Kitchen	2.0	2.9	Yes
G	Living Room / Kitchen	2.0	2.0	Yes
H	Bedroom	1.0	2.7	Yes

Figure 15.39: Blocks B1 and B2 First Floor Level – Average Daylight Factor Assessed Rooms

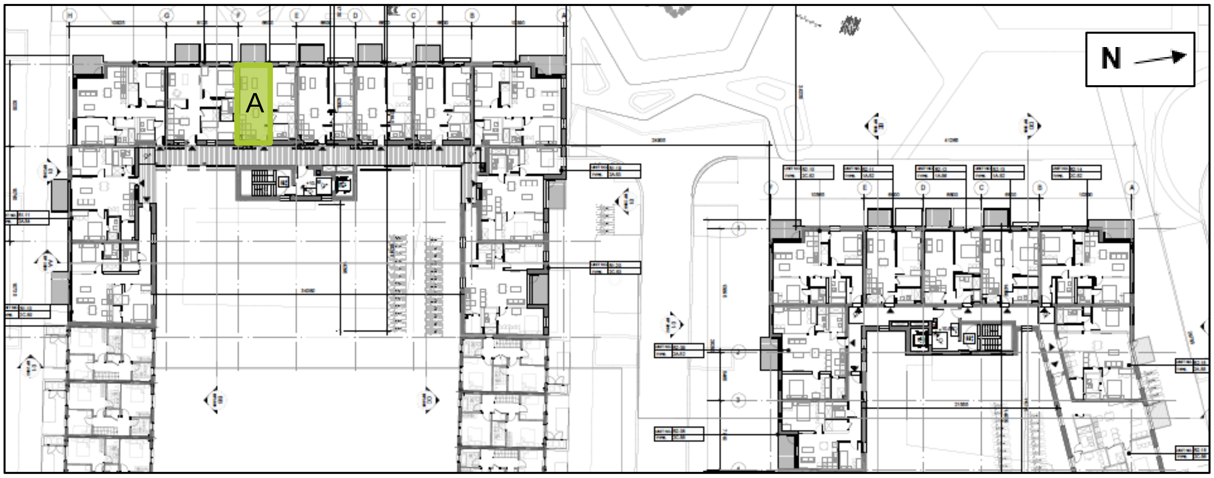


Table 15.36: Blocks B1 and B2 First Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Living Room / Kitchen	2.0	2.1	Yes

Figure 15.40: Block C1a Ground Floor Level – Average Daylight Factor Assessed Rooms

Table 15.37: Block C1a Ground Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	2.6	Yes
B	Living Room / Kitchen	2.0	3.5	Yes
C	Bedroom	1.0	1.9	Yes
D	Living Room / Kitchen	2.0	2.4	Yes
E	Bedroom	1.0	2.2	Yes

Figure 15.41: Block C2a Ground Floor Level – Average Daylight Factor Assessed Rooms

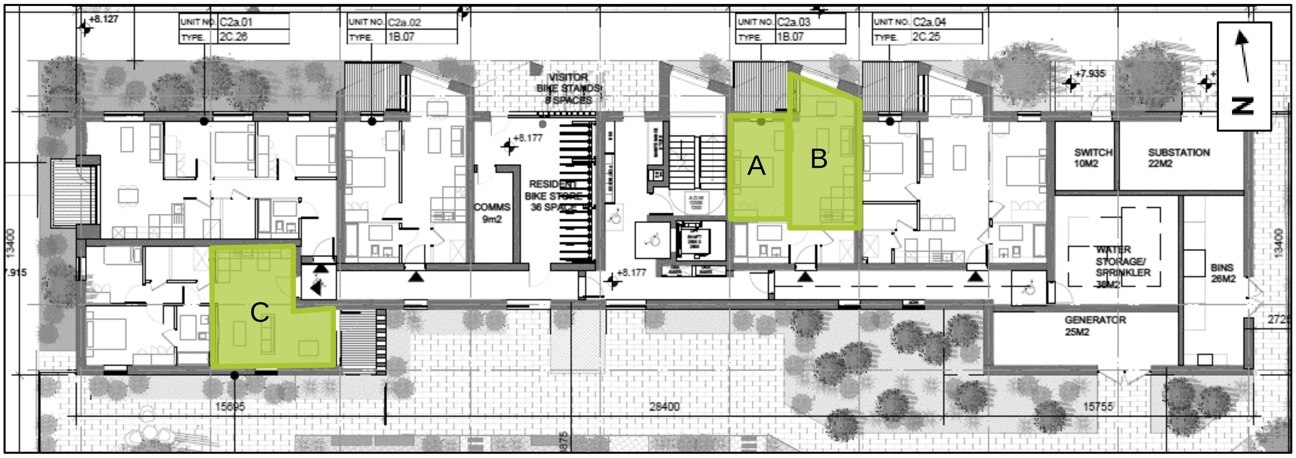


Table 15.38: Block C2a Ground Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	0.8	No
B	Living Room / Kitchen	2.0	2.2	Yes
C	Living Room / Kitchen	2.0	1.8	No

Figure 15.42: Block C2a First Floor Level – Average Daylight Factor Assessed Rooms

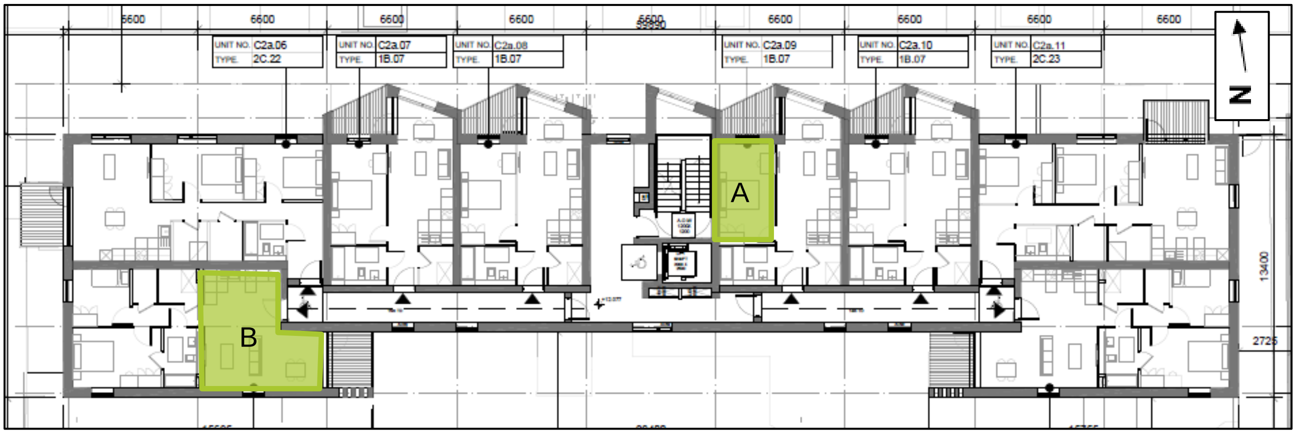


Table 15.39: Block C2a First Floor Level – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A	Bedroom	1.0	1.0	Yes
B	Living Room / Kitchen	2.0	2.2	Yes

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 2,017 rooms that comprise the development, only 155 fall marginally short of the BRE Guidelines and BS 8206 recommendations, therefore a 92% compliance rate is achieved across the development.

Table 15.40: Percentage of Compliance

Total No. of Rooms	No. Living/ Kitchen Rooms Not Compliant with BS 8206 Guidelines (2.0% ADF)	No. Bedrooms Not Compliant with BS 8206 Guidelines (1.0% ADF)	Total No. Rooms Not Compliant with BS 8206 Guidelines	% of compliance with BS 8206
2,017	151	4	155	92%

As outlined in Section 15.2.2.1, for this final application report, 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 97.3% when compared to a 1.5% ADF benchmark for living/kitchens was achieved. The 2% ADF benchmark was also assessed at the pre-planning stage and showed a compliance rate of 92% 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 scheme, 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/ kitchen.

Table 15.41: Percentage of Compliance Based on 1.5% ADF Benchmark for Living / Kitchen Spaces

Total No. of Rooms	No. Living/ Kitchen Rooms Not Compliant with 1.5% Benchmark	No. Bedrooms Not Compliant with BS 8206 Guidelines (1.0% ADF)	Total No. Rooms Not Compliant with ADF target	% of compliance
2,017	51	4	55	97.3%

15.2.5.2.4 Rooms within Apartments Falling Below Compliance and Compensatory Measures Introduced

As previously stated, of the 2,017 rooms that comprise the development, only 155 fall short of the *BRE Guidelines* and *BS 8206 recommendations*, therefore a 92% compliance rate is achieved across the development.

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 are typically located to the rear of the open space. It must be noted that the apartments within the Shoreline GA1 development 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. The same rationale can be applied to those bedrooms falling short of compliance, their daylight levels will begin to drop off as you move towards the back of the room, where the wardrobe and circulation spaces are located.

Figure 15.43 - Block D2 Level 02 – 'Worst Case' Living Room – Assessment with ADF Contours

It is worth emphasising again the fact that the guidelines for daylight are not mandatory and that the *Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities* (December 2020) outlines 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."*

In line with the objectives of the *Sustainable Urban Housing: Design Standards for New Apartments*[240], the proposed Project seeks to balance ADF compliance with quality urban design and landscape. 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

[240] DHPLG (2020).

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.

Figure 15.44: CGI View of Landscape

15.2.5.2.5 Daylight Impact Results for Houses within the Proposed Project

A selection of houses considered to be representative of the units across the Site were selected for analysis. The following figure illustrates the houses that were analysed within Plot B4, which was selected as 'worst case' due to their location. All houses selected for analysis are in compliance with BRE Guideline recommendations, therefore, it can be stated that all houses within the proposed Project will achieve daylight levels in line with the BRE recommendations.

Figure 15.45: Selection of Houses

Figure 15.46: Ground Floor Rooms for House A and B - Average Daylight Factor Assessed Rooms

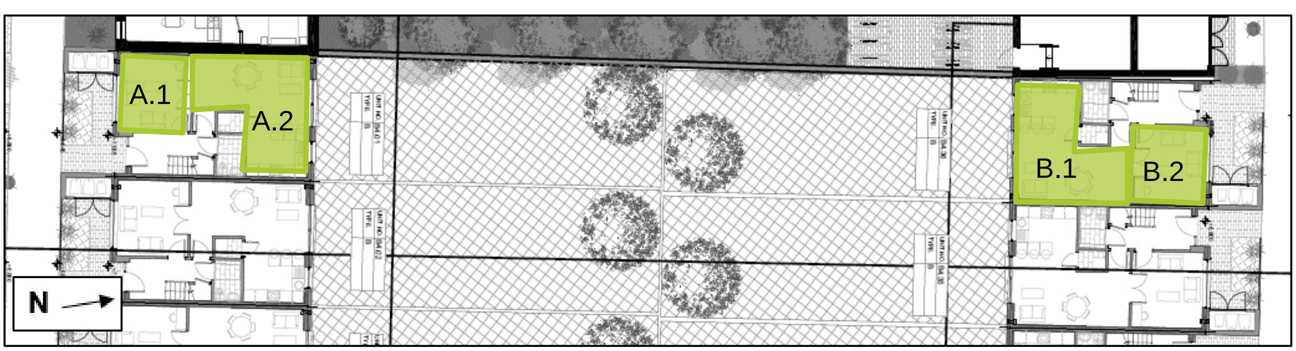


Table 15.42: Ground Floor Rooms for House A and B – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A.1	Living Room	1.5	4.2	Yes
A.2	Kitchen	2.0	2.5	Yes
B.1	Kitchen	2.0	2.2	Yes
B.2	Living Room	1.5	3.2	Yes

Figure 15.47: Ground Floor Rooms for House C - Average Daylight Factor Assessed Rooms

Table 15.43: Ground Floor Rooms for House C – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
C.1	Kitchen	2.0	2.5	Yes
C.2	Living Room	1.5	4.3	Yes

Figure 15.48: First Floor Rooms for House A and B - Average Daylight Factor Assessed Rooms

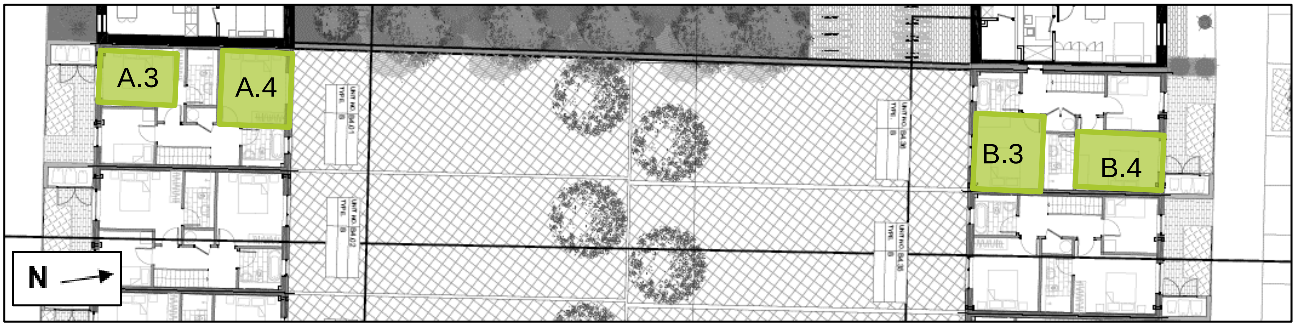


Table 15.44: First Floor Rooms for House A and B – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
A.3	Bedroom	1.0	2.7	Yes
A.4	Bedroom	1.0	2.5	Yes
B.3	Bedroom	1.0	2.7	Yes
B.4	Bedroom	1.0	2.0	Yes

Figure 15.49: First Floor Rooms for House C - Average Daylight Factor Assessed Rooms

Table 15.45: First Floor Rooms for House C – Average Daylight Factor Results

Room Ref.	Room Type	Minimum Recommended ADF Target in BS 8206 Guideline (%)	ADF Results Achieved (%)	Meets Minimum Recommended ADF Target in BS 8206 Guideline (%)
C.1	Bedroom	1.0	3.1	Yes
C.2	Bedroom	1.0	3.1	Yes
C.3	Bedroom	1.0	3.3	Yes
C.4	Bedroom	1.0	3.4	Yes

15.2.5.3 Impact to Adjacent Properties from the Proposed Project

In addition to assessing the impacts to the future inhabitants of the proposed Project, the impact on existing adjacent properties external to the development has also been analysed.

25 º 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 1.6m above ground to the highest point on the proposed structures. As illustrated below, all adjacent properties fall outside the

25º line criteria. Therefore the distance to the proposed Project is substantial and no further analysis is required.

As illustrated below, all adjacent properties with the exception of the north-west corner of sensitive receptor Ref. 3 and sensitive receptor Ref. 6 fall outside the 25º line criteria. Therefore the distance to the proposed Project is substantial and further analysis is only required for the north-west corner of sensitive receptor Ref. 3. Sensitive receptor Ref. 6 is subject to a separate SHD application. The daylight / sunlight analysis that is being carried out for this application includes the impact of GA1. Therefore, sensitive receptor Ref. 6 was not selected for further analysis as the impact of GA1 will be accounted for within the daylight / sunlight results included within this application.

Figure 15.50: Properties adjacent to the Proposed Project

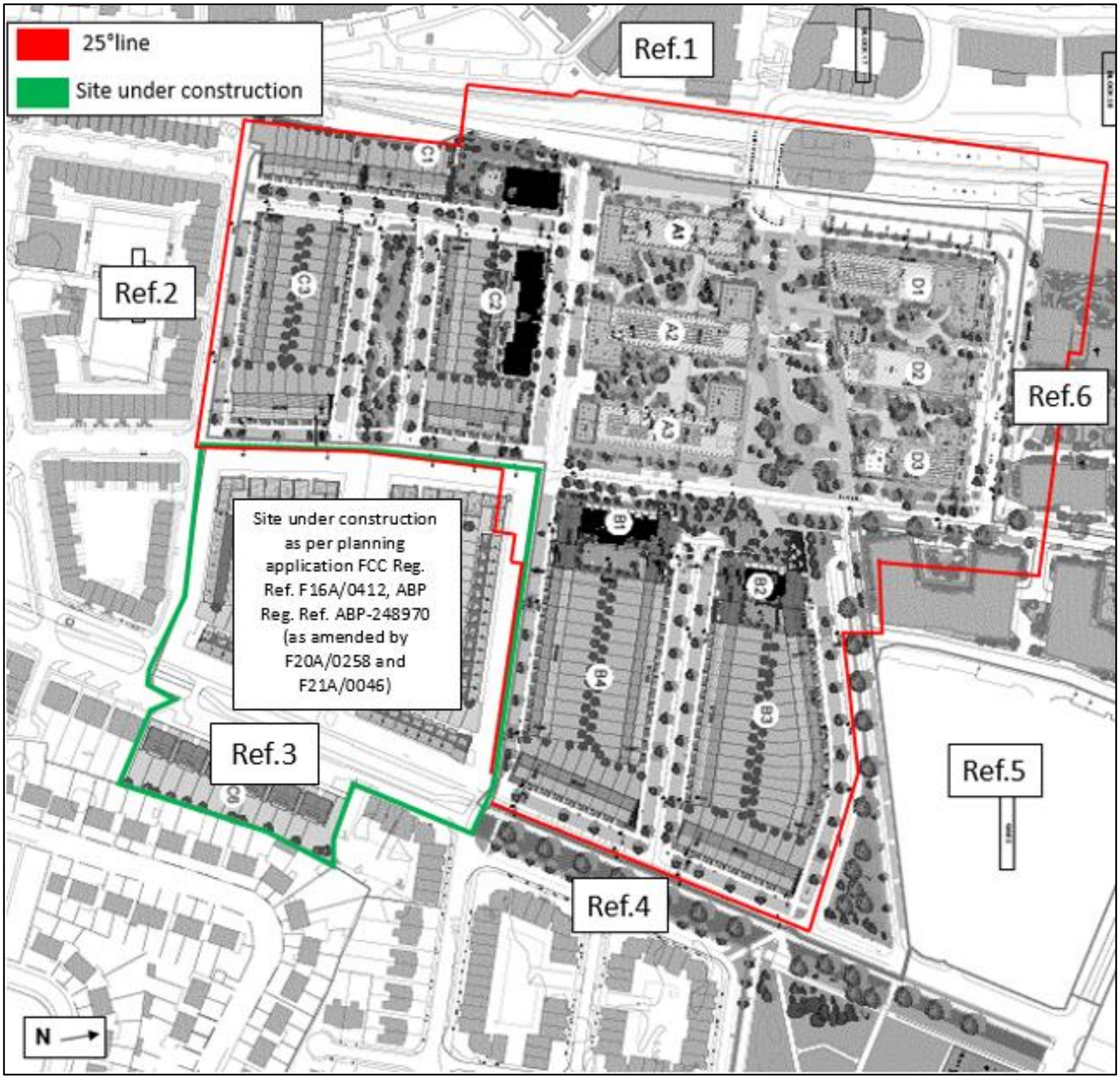


Table 15.46: Sensitive Receptors

Development Ref.	Development Name	Impact Perceived
Ref. 1	Clongriffin and Marrsfield Developments	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, *imperceptible* impact.
Ref. 2	Properties at Myrtle Avenue	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, *imperceptible* impact.
Ref. 3	Site under construction as per planning application FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046)	The distance is substantial from the proposed Project with the majority in compliance with the 25⁰ line criteria except for the north-west corner that falls inside the line. This area has been selected for VSC analysis. *Imperceptible* impact is perceived to those properties falling outside the 25⁰ line.
Ref. 4	Red Arches Drive Properties	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, *imperceptible* impact.
Ref. 5	Growth Area 2 (FCC Reg. Ref. F11A/0290 (/E1), PL06F.239732 – GA2)	The distance is substantial from the proposed Project and in compliance with the 25⁰ line criteria. Therefore, *imperceptible* impact.
Ref. 6	Shoreline GA3 – Site subject to separate SHD process	A daylight and sunlight EIAR chapter is being carried out for the separate subject application where the impact of GA1 will be taken into account within the calculations.

VSC > 27%

The analysis has shown the north-west corner in sensitive receptor Ref. 3 will achieve a VSC value above 27% once the proposed Project is built. Therefore, excellent levels of daylight will still be achieved with *imperceptible* impact. Windows at the lower level have been selected as 'worst case' scenario.

Figure 15.51: Sensitive receptor ref. 3 – Window references

Table 15.47: VSC Results

Window Ref.	VSC received once the proposed Project is built (%)	Meets BRE Guidelines VSC>27%
1	28.7	Yes
2	28.1	Yes

15.2.5.4 Potential Cumulative Impacts

In the context of daylight, the long-term cumulative impacts are considered *imperceptible* for the 92% of rooms within the apartment blocks and 100% of the houses within 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 *non-significant* for the remaining 8% of rooms within the apartment blocks as compensatory measures have been implemented, as documented within this report. The proposed Project does not impact any adjacent properties in accordance with BRE Guidelines.

15.2.5.5 "Do-Nothing" Impact

In a "Do-Nothing" scenario, no buildings will be constructed and therefore the impact will be imperceptible on the adjoining properties and surrounding properties, with neutral effect as existing daylight levels will remain unchanged.

15.2.6 Mitigation Measures

15.2.6.1 Construction Phase

Remedial measures during the Construction Phase in relation to daylight are not considered to be required.

15.2.6.2 Operational Phase

Imperceptible impact with *neutral, long-term* effect is expected for 92% of rooms within apartment blocks and 100% of the houses within the proposed Project in relation to the daylight levels experienced by the future inhabitants of the proposed Project and to the existing inhabitants of the adjoining sites, therefore no remedial or reductive measures are considered to be required. *Non-significant* impact with *neutral, long-term* effect is expected for the remaining 8% of rooms within apartment blocks of the proposed Project.

15.2.6.3 'Worst Case' Scenario

Apartment units considered 'worst case' have been selected for analysis and deemed representative of the apartment units across the development. 'Worst case' units are those 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.

15.2.7 Residual Impact

Imperceptible impact with *neutral, long-term* effect is expected for 92% of rooms within apartment blocks and 100% of the houses within the proposed Project in relation to the daylight levels experienced by the future inhabitants of the proposed Project and to the existing inhabitants of the adjoining sites. *Non-significant* impact with *neutral, long-term* effect is expected for the remaining 8% of rooms within apartment blocks of the proposed Project. No remedial or reductive measures are considered to be required, therefore, there will be no residual impacts during the Operational Phase in respect of daylight.

15.2.8 Monitoring

No on-going monitoring is required in relation to daylight during the Construction Phase or the Operational Phase.

15.2.9 Reinstatement

Reinstatement is not pertinent to the assessment of impacts on daylight in the case of the proposed Project.

15.3 Sunlight Access Impact Analysis

15.3.1 Methodology

In considering the development potential and the quality of amenity for the surrounding properties as well as for the new development once the scheme has been implemented, 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 is the primary reference for this matter. The guide gives 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 sunlight access are quantified based on the definitions stated in the *Draft EPA Guidelines*[241]. The list of definitions given below is taken from Table 3.3 in this document. Some commentary is also added below on what these definitions might imply in the case of impact on sunlight access.

- **Imperceptible Impact**: An effect capable of measurement but without noticeable consequences.

[241] EPA (2017).

- **Not significant**: An effect which causes noticeable changes in the character of the environment but without significant consequences.
- **Slight Impact**: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Moderate Impact**: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- **Significant Impact**: 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 Impact**: An effect which obliterates sensitive characteristics.

The range of possible impacts listed above are referred to when discussing the results of the sunlight analysis.

15.3.1.1 Sunlight Assessment Methodology

In terms of sunlight assessment, two analysis 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 annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21st September and 21st March.

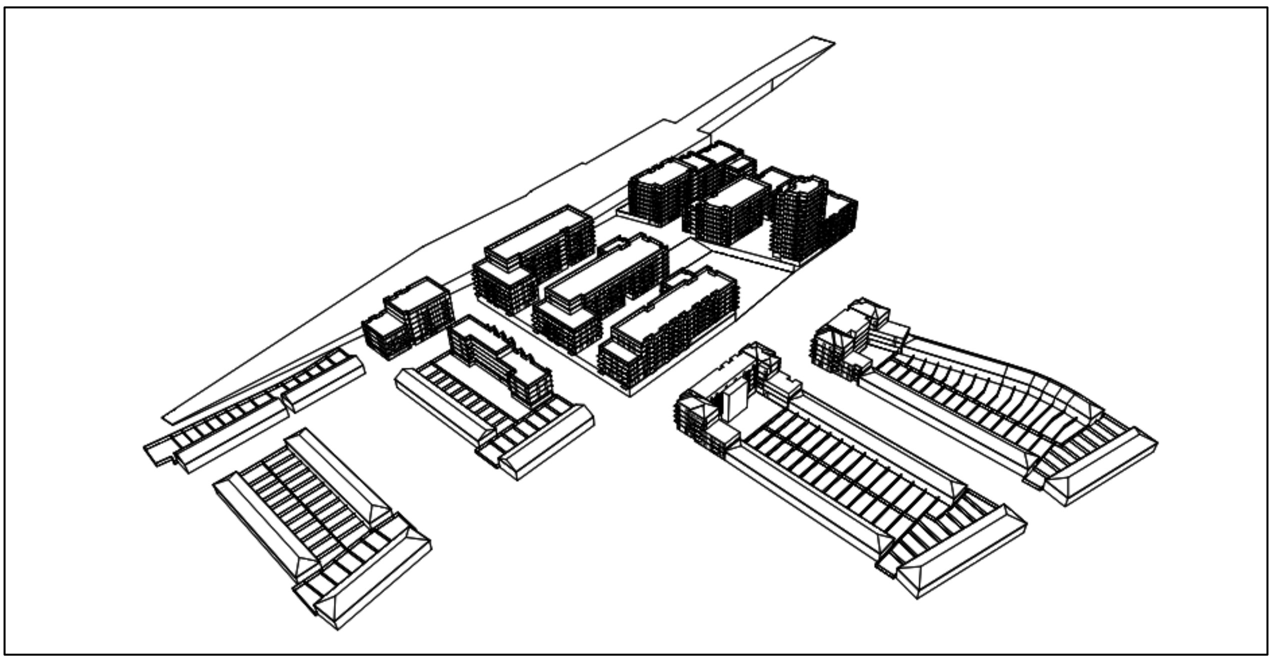
In relation to the amenity open space, *BRE Guidelines* recommend that for an external amenity space to appear adequately sunlit throughout the year, at least half of the garden or amenity space should receive at least two hours of sunlight on March 21st.

In order to analyse the sunlight requirements for the proposed Project a detailed 3D model was constructed of the entire development, in the Integrated Environmental Solutions Virtual Environment (IES VE) software package. A number of computer simulations were then undertaken in the IES VE software package to ascertain the sunlight hours being achieved. An image of the proposed Project taken from the model is illustrated in Figure 15.52.

The sunlight impact analysis has been assessed on the entire proposed Project including 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 1.6m above ground to the highest point on the proposed structures. The properties falling inside this line are selected for analysis.

Figure 15.52: IES VE Model of the Proposed Project



15.3.1.2 Sunlight Assessment Methodology for Existing Dwellings Adjacent to the Site

15.3.1.2.1 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.
- Other sensitive receptors includes gardens and open spaces on adjacent properties to the new scheme, 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 playground
- Outdoor swimming pools and paddling pools
- Siting out areas such as those between non-domestic buildings and in public squares
- 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.

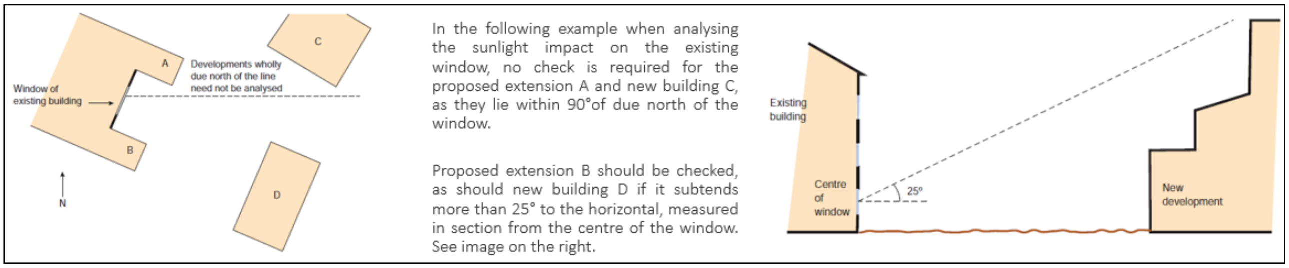
Therefore, in this case, the proposed Project is identified as the potential source of impact. The sensitive receptors identified for this study are windows of habitable rooms facing, and within, the Site where the occupants have a reasonable expectation of daylight as well as open spaces with an expectation of sunlight.

15.3.1.2.2 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 Annual Probable Sunlight Hours (APSH) analysis is carried out.

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 15.53.

Figure 15.53: BRE extract of the methodology for room selection - APSH



The sunlight within adjacent properties may be adversely affected if the centre of the window:

- Receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between September 21st and March 21st.
- Receives less than 80% of its former sunlight hours during either period.
- Has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

It terms of sunlight to surrounding open spaces, BRE Guidelines outlines 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

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

Figure 15.54 illustrates the development masterplan.

Figure 15.54: Proposed Site Masterplan showing Red Line Boundary[242]

[242] Henry J Lyons (2021). Site Masterplan. Drawing No. STP0011 GA1

15.3.2.1 Existing Adjacent Properties

As part of the analysis, the impact to the existing adjoining properties due to the proposed Project was also analysed. Figure 15.55 illustrates the adjoining buildings to the development that were analysed and Table 15.48 describes the adjacent buildings.

Figure 15.55: Properties Adjacent to the Proposed Project

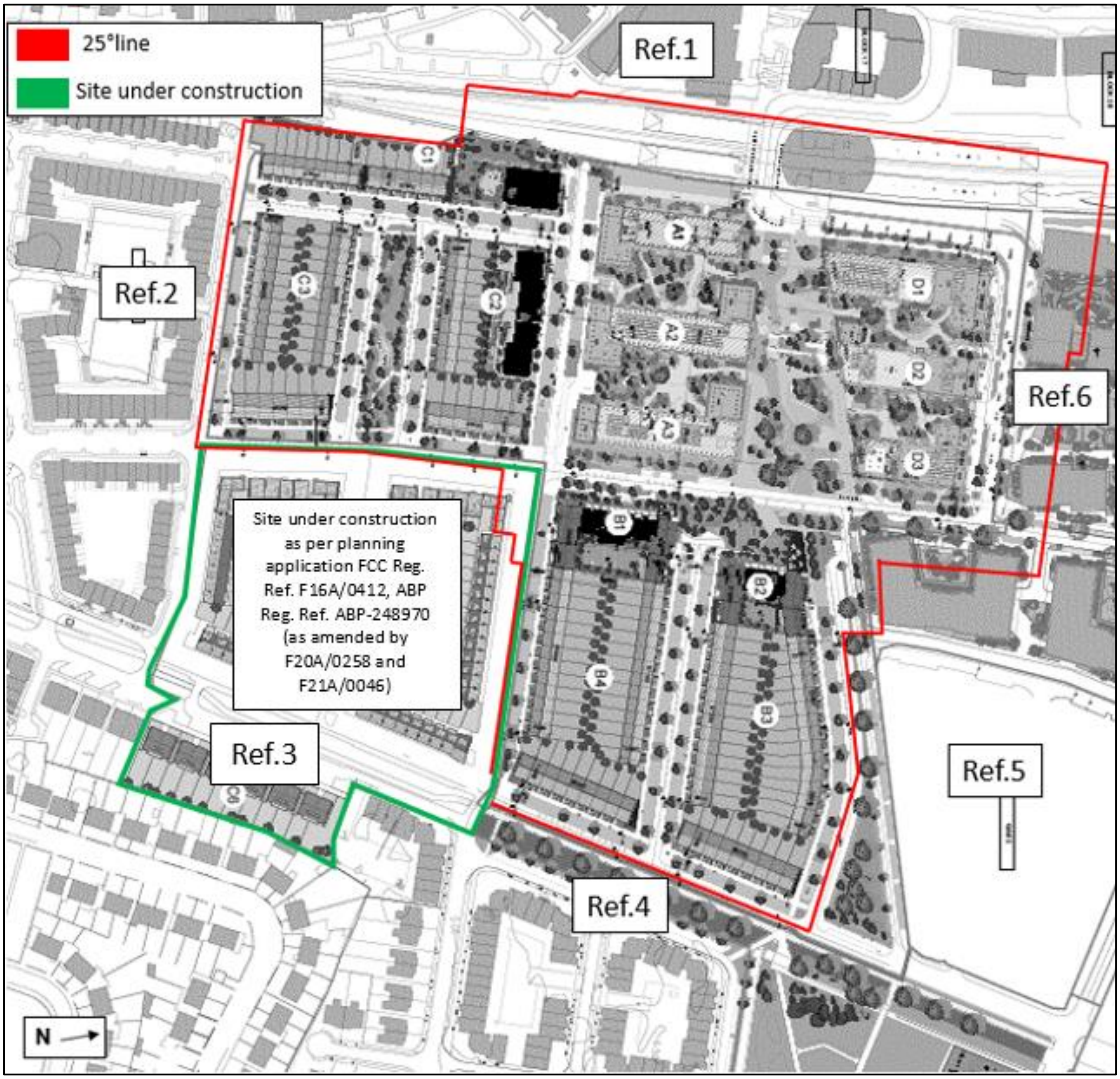


Table 15.48: Sensitive Receptors

Development Ref.	Development Name	Impact Perceived
Ref. 1	Clongriffin and Marrsfield Developments	The distance is substantial from the proposed Project and in compliance with the 25^{o} line criteria. Therefore, imperceptible impact.
Ref. 2	Properties at Myrtle Avenue	The distance is substantial from the proposed Project and in compliance with the 25^{o} line criteria. Therefore, imperceptible impact.
Ref. 3	Site under construction as per planning application FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046)	The distance is substantial from the proposed Project with the majority in compliance with the 25^{o} line criteria except for the north-west corner that falls inside the line. Imperceptible impact will be perceived for those properties falling outside the 25^{o} line. In relation to the north-west corner, due to its orientation, imperceptible impact will be perceived by this property.
Ref. 4	Red Arches Drive Properties	The distance is substantial from the proposed Project and in compliance with the 25^{o} line criteria. Therefore, imperceptible impact.
Ref. 5	Growth Area No. 2 (GA2) (FCC Reg. Ref. F11A/0290 (/E1), PL06F.239732 – GA2)	The distance is substantial from the proposed Project and in compliance with the 25^{o} line criteria. Therefore, imperceptible impact.
Ref. 6	Shoreline GA3 - Site subject to separate SHD process	A daylight and sunlight EIAR chapter is being carried out for the separate subject application where the impact of GA1 will be taken into account within the calculations.

15.3.3 Baseline Environment

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha. 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 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.

The Site is bound by the Dublin-Belfast / DART train line and Clongriffin train station to the west. The Site is also bound by existing residential areas at Myrtle and Red Arches to the south and east respectively.

Figure 15.56: Aerial Image of Proposed Site [243]

15.3.4 Potential Impact 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

[243] Google Earth (2020).

- impact on sunlight levels to the existing adjacent buildings due to the proposed Project proposed Project and any likely significant effects on the environment.

15.3.4.1 Construction Phase

The analysis considers both the sunlight impact to future residents, and the impact to existing adjacent properties as a result of the proposed Project. 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 i*mperceptible* with *no short or long-term* effects.

15.3.4.2 Operational Phase

As previously noted, the performance targets set out in the *BRE Guidelines* should be used with a degree of flexibility as per the extract below from the *BRE Guidelines*:

> *"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."*

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 development is a positive for the Site. There will be no impacts experienced to adjacent properties in relation to sunlight due to the proposed Project, and therefore the impact to the existing properties in the adjoining development will be *imperceptible* with a *neutral long-term effect*.

To assess the potential impact of the proposed Project during the Operational Phase in terms of sunlight access, for both the properties within the development and the adjacent buildings, the methodology outlined in Section 15.3.1.1.1 of this report has been followed.

15.3.4.2.1 Sunlight Impact Results for Apartments within the Proposed Project (APSH Assessment)

To determine the amount of sunlight that is received by windows within the proposed Project, the Annual Probable Sunlight Hours (APSH) calculation method as outlined in the *BRE Guidelines* has 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. *BRE Guidelines* also state that sunlight is less important in bedrooms and kitchens, however, all windows to occupied rooms within the development have been included within the analysis.

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 annual probable sunlight hours, including at least 5% of annual probable sunlight hours 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 *Sustainable Urban Housing: Design Standards for New Apartments* 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 would be 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 annual probable sunlight hours 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 the majority of windows still achieve acceptable levels of sunlight across the proposed Project.

Table 15.49: 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	53%	67%	61%	73%

The results from the analysis have shown that for the annual period, 53% of the analysed windows achieve the recommended APSH values stated in the *BRE Guidelines*, while 67% 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, 61% and 73% of the analysed windows achieve this alternative value, showing that acceptable levels of sunlight will be achieved across the development. The shortfall in compliance can be attributed to the projection of balconies and to the north facing windows.

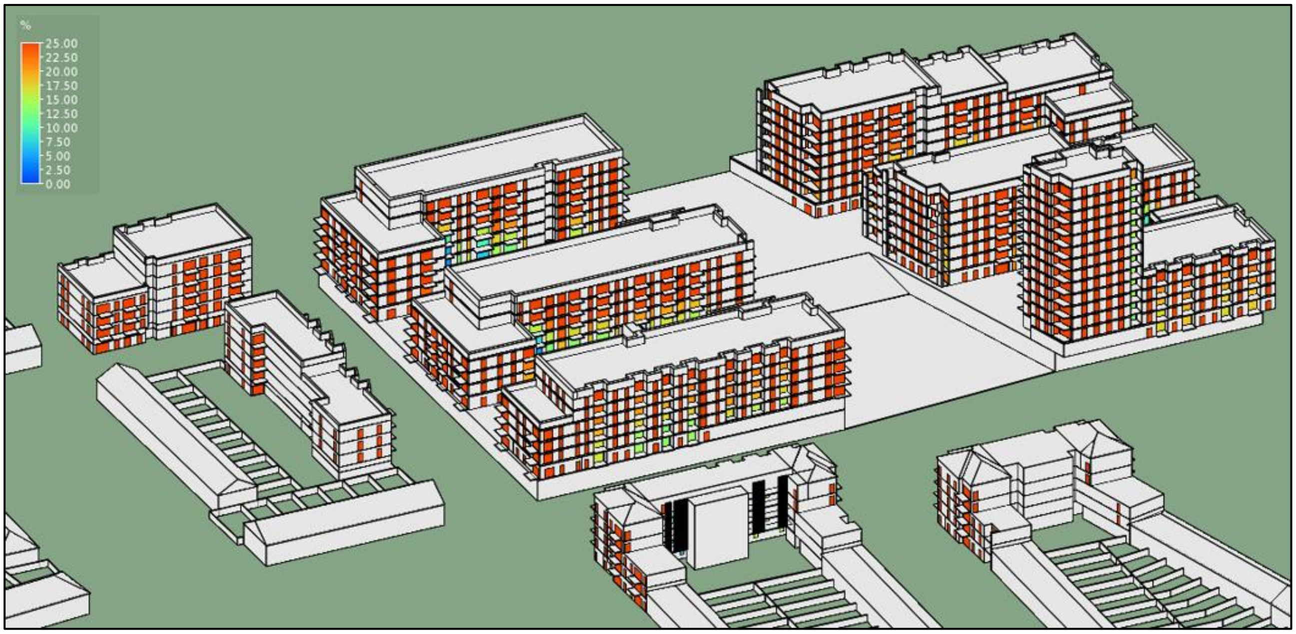
It must be noted that the results within this chapter should be treated with certain degree of flexibility, based on the following statement in the *BRE Guidelines*:

> *"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".*

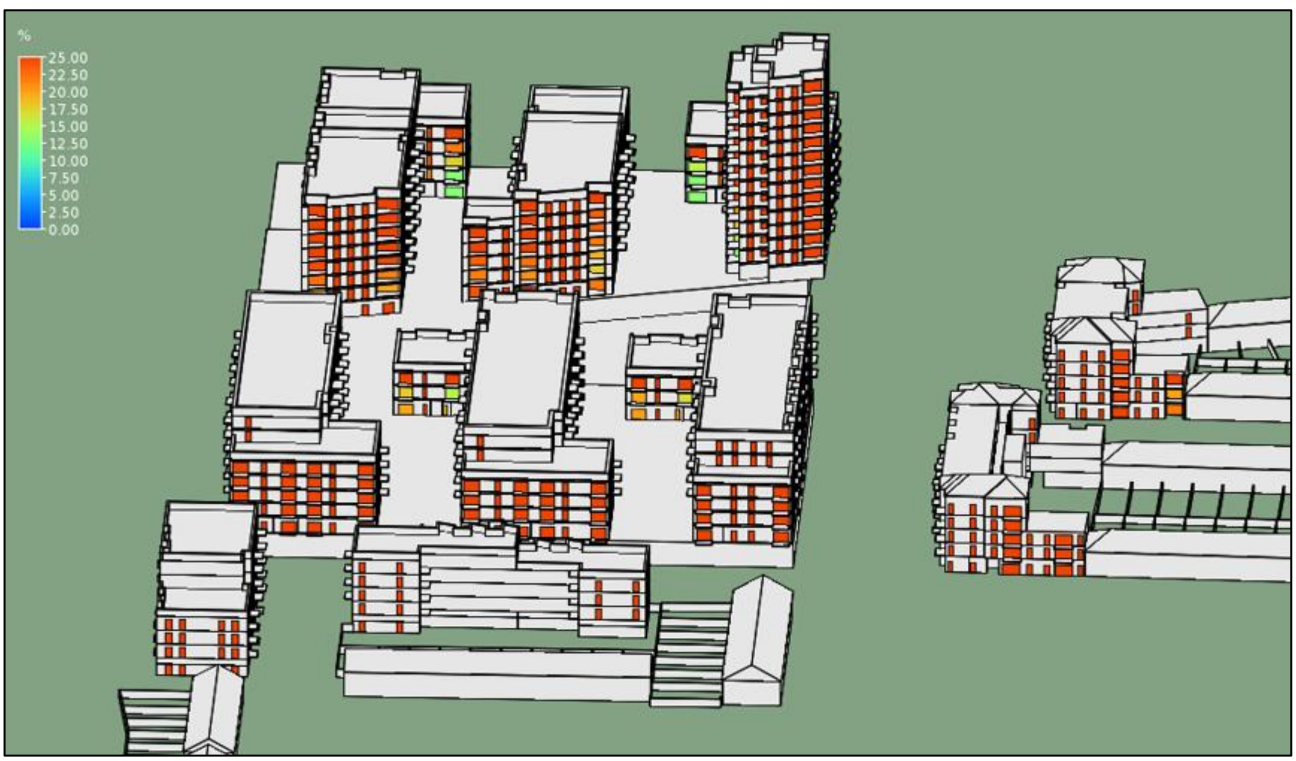
The following images illustrate the sunlight levels achieved within the proposed Project.

Figure 15.57: APSH - East Elevation



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.58: APSH – South Elevation

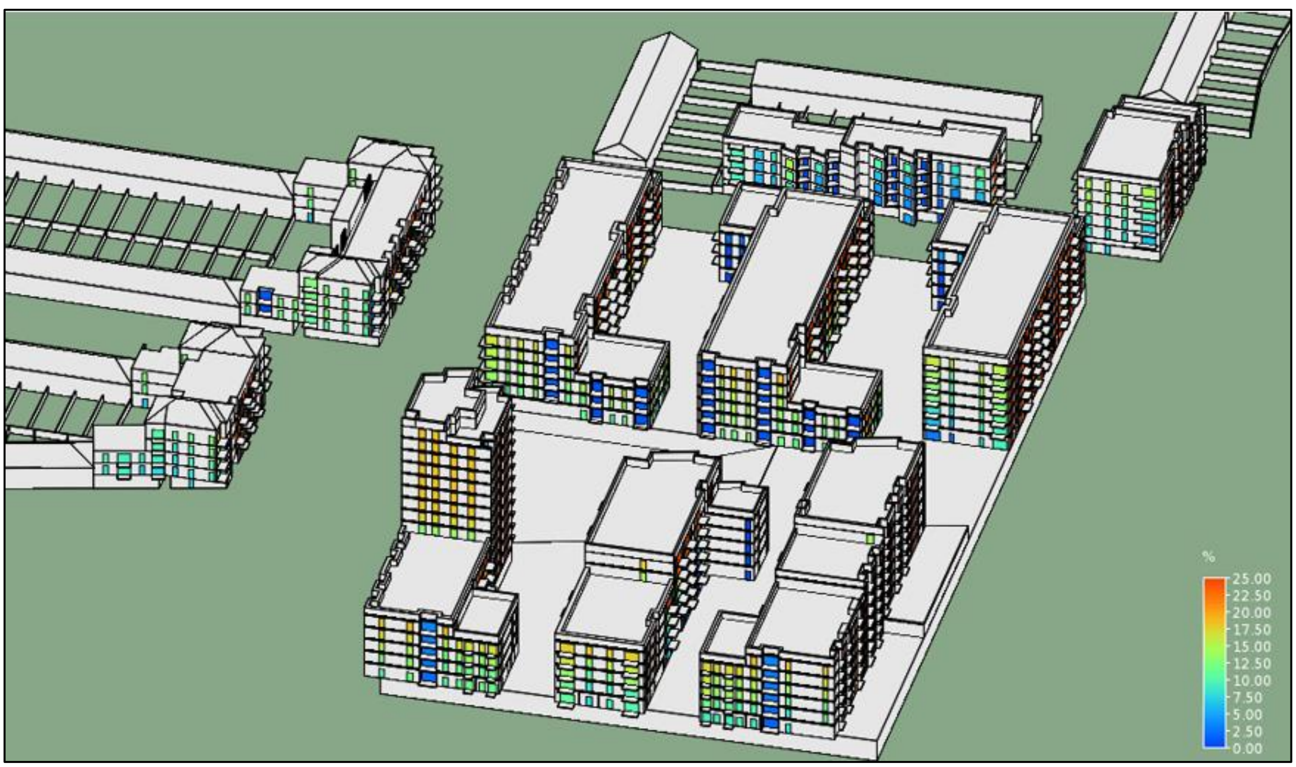


*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.59: APSH - West Elevation

*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.60: APSH – North Elevation



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

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 *Sustainable Urban Housing: Design Standards for New Apartments* document outlines 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. Therefore, 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.

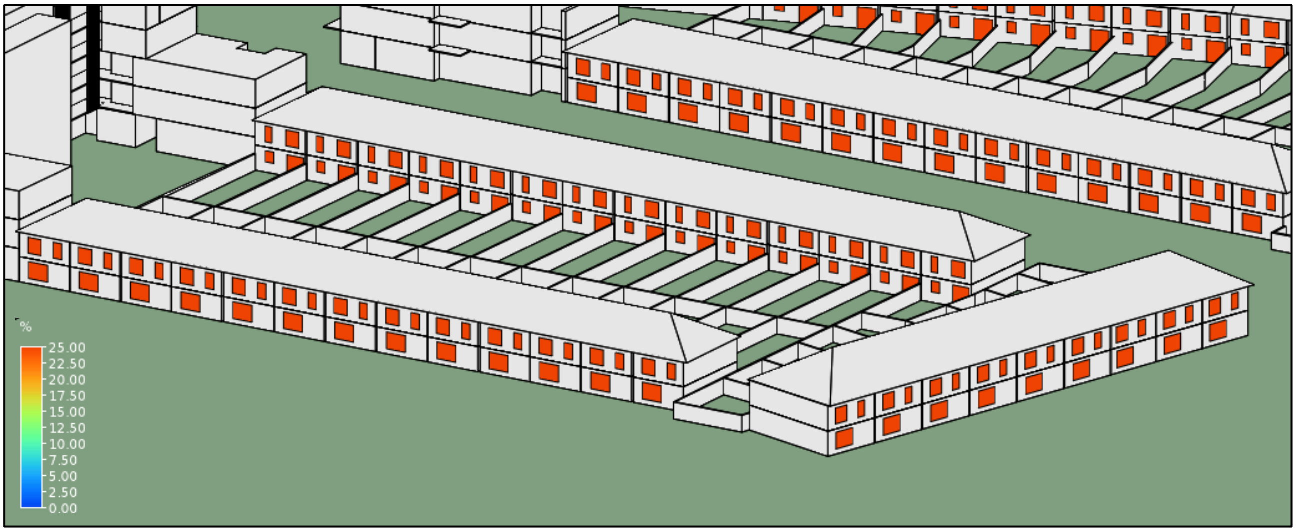
The following table outlines the APSH results for the houses. Since balconies are not present, the only windows falling short of compliance are those with a north orientation. Even though some windows are slightly under the recommended values, the houses have been provided with high-quality private gardens and excellent daylight levels within the internal spaces.

Table 15.50: APSH Summary Table – Houses

	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	66%	66%	66%	72%

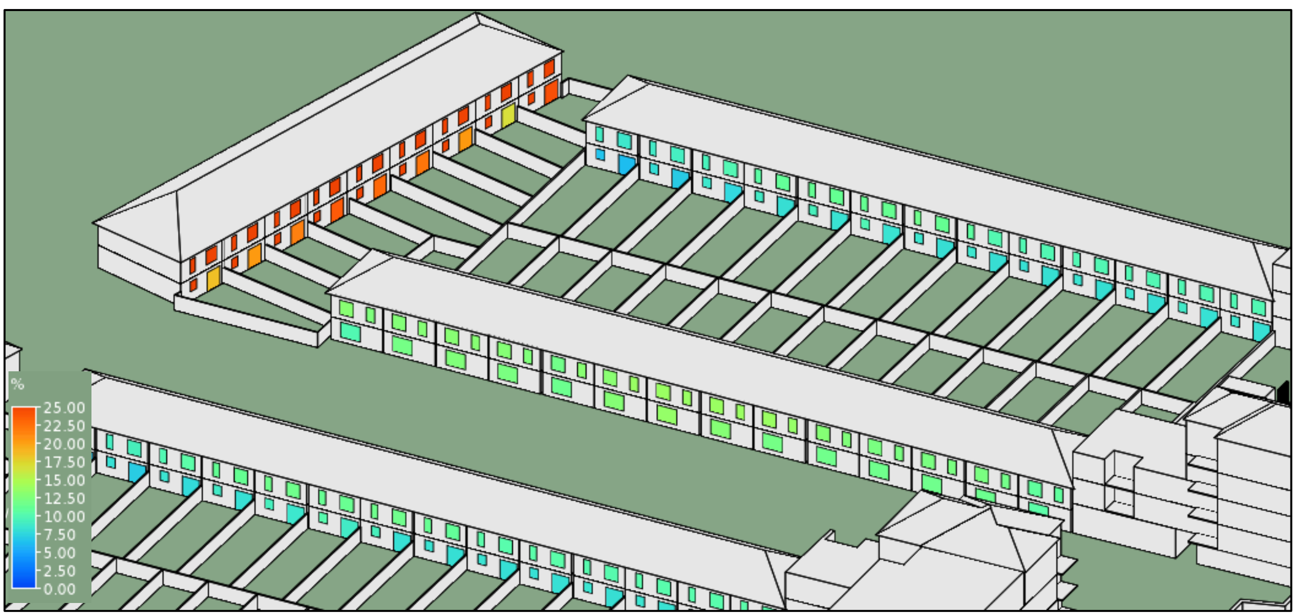
The following figures illustrate the APSH levels for the annual period in a sample of 'worst case' houses within plot B3.

Figure 15.61: APSH - South-east Elevation



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.62: APSH - North-west Elevation



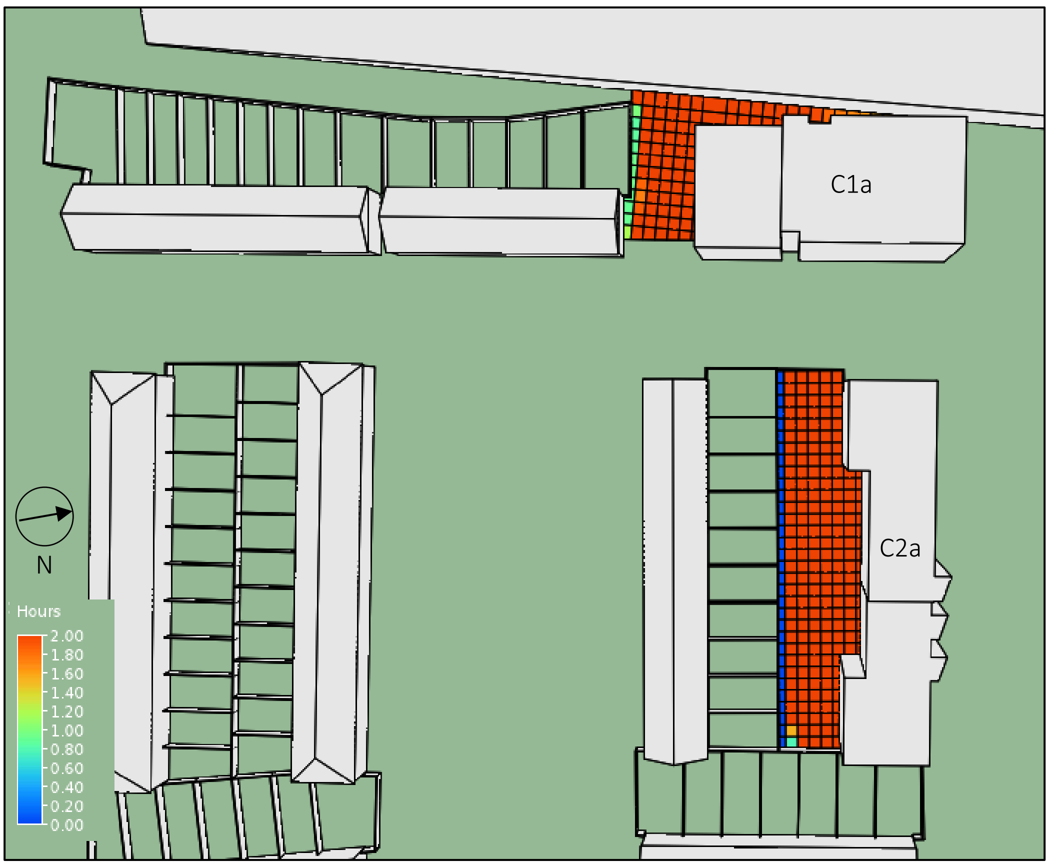
*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

15.3.4.2.2 Sunlight Impact Results for Amenity Spaces within the Proposed Project

The sunlight analysis has been undertaken in the IES VE 3D modelling software package. The entire development along with the amenity spaces has been constructed within the software. The analysis undertaken for the communal open spaces is illustrated in Figures 15.63, 15.64 and 15.65.

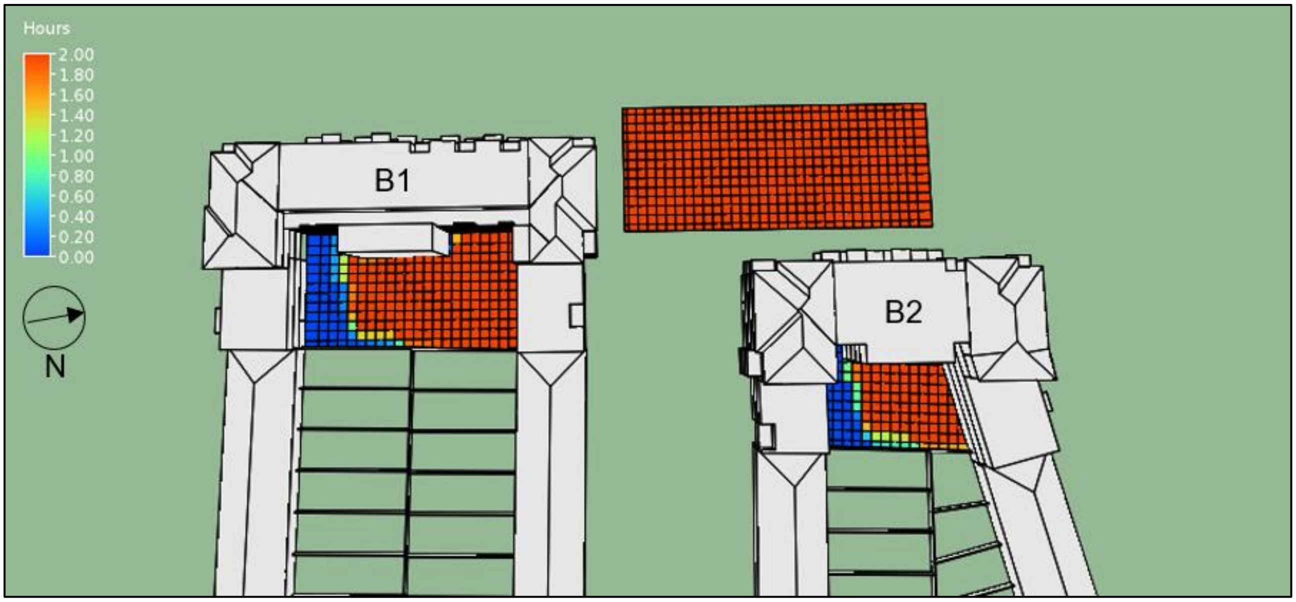
The red squares illustrated in the images represent the areas that are receiving two or more hours of sunlight on the 21st March. Table 15.51 outlines the percentage of each amenity area receiving at least two hours of sunlight on March 21st. All communal amenity spaces receive the recommended values with more than 50% of the area achieving adequate sunlight, therefore, compliance with *BRE Guidelines* is achieved.

Figure 15.63: Communal Amenity Spaces to Blocks C1a and C2a – hours of sunlight on March 21st



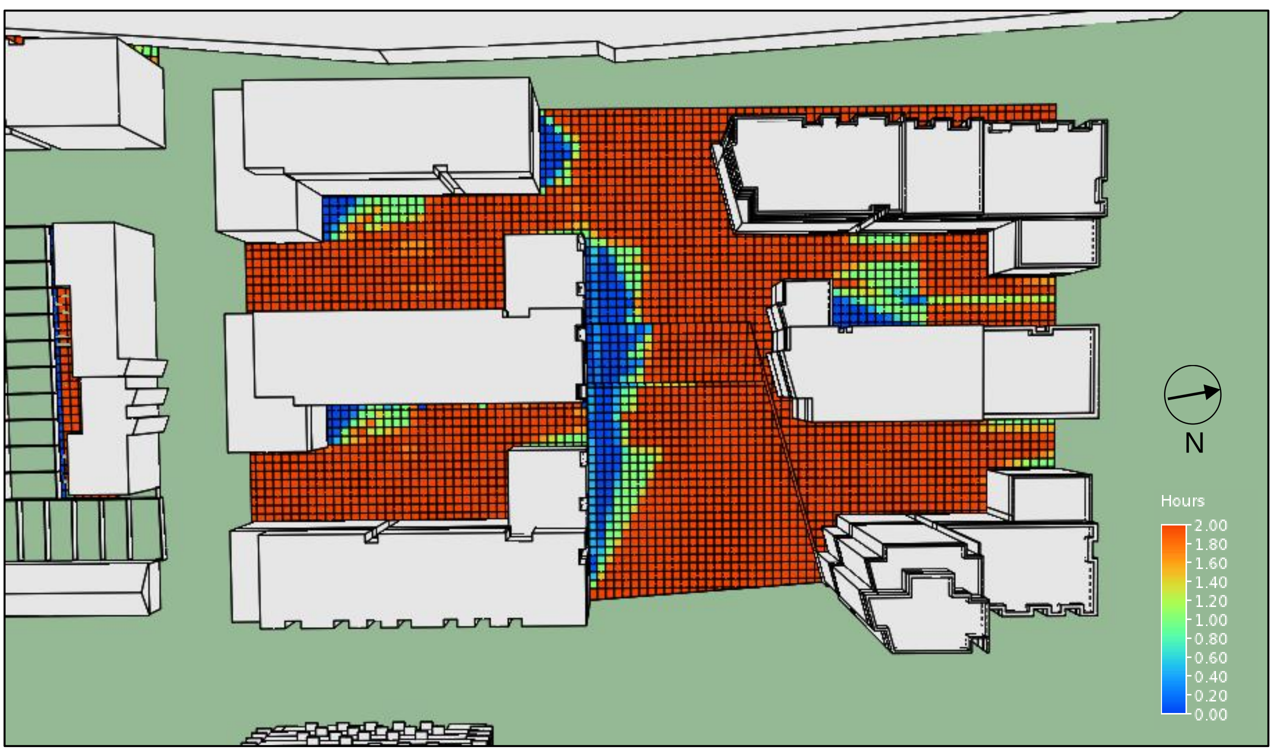
*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.64: Communal Amenity Spaces to Blocks B1 and B2 – hours of sunlight on March 21st



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.65: Communal Amenity Spaces to Stapolin Square – hours of sunlight on March 21st



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

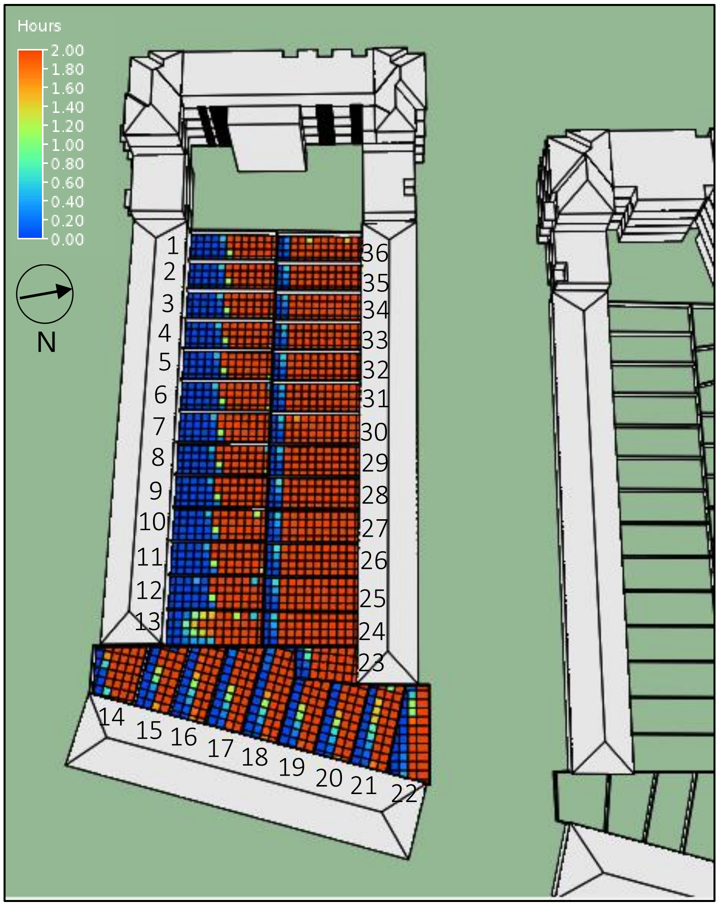
Table 15.51: Sunlight results - Apartments

Garden	Percentage of area receiving ≥ 2hours sunlight on March 21st	Meets compliance with BRE Guidelines
G.1 – Block C1a	87%	Yes
G.2 – Block C2a	92%	Yes
G.3 – Block B1	68%	Yes
G.4 – Block B2	65%	Yes
G.5 – Stapolin Square	84%	Yes

In order to analyse the sunlight within the private gardens to houses, a 'worst case' plot has been chosen for assessment. The 'worst case' gardens are those presenting an obstruction to east, west and / or south. The plot selected was B4, since the apartments at Stapolin Square are located to the west and is closest to the apartments. Plot B3 is located further away from the Stapolin Square apartments, as well as located in front of the centre of the court yard, allowing the sun to penetrate between blocks and reaching the private gardens. Plots C1, C2 and C3 are located to the south of all apartments blocks, therefore, no *impact will be perceived*.

Table 15.52 outlines the percentage of each private garden receiving at least two hours sunlight on March 21st. All gardens receive the recommended values in more than 50% of the area, therefore, compliance with *BRE Guidelines* is achieved.

Figure 15.66: Private Amenity Spaces to houses (Plot B4) – hours of sunlight on March 21st



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Table 15.52: Sunlight results – Apartments

Garden	Percentage of area receiving ≥ 2hours sunlight on March 21st	Meets compliance with BRE Guidelines
G.1	56%	Yes
G.2	56%	Yes
G.3	56%	Yes
G.4	56%	Yes
G.5	56%	Yes
G.6	56%	Yes
G.7	56%	Yes
G.8	56%	Yes

Garden	Percentage of area receiving ≥ 2hours sunlight on March 21st	Meets compliance with BRE Guidelines
G.9	56%	Yes
G.10	56%	Yes
G.11	56%	Yes
G.12	56%	Yes
G.13	57%	Yes
G.14	77%	Yes
G.15	62%	Yes
G.16	60%	Yes
G.17	65%	Yes
G.18	66%	Yes
G.19	64%	Yes
G.20	63%	Yes
G.21	54%	Yes
G.22	58%	Yes
G.23	83%	Yes
G. 24	87%	Yes
G.25	87%	Yes
G.26	87%	Yes
G.27	87%	Yes
G.28	87%	Yes
G.29	87%	Yes
G.30	87%	Yes
G.31	87%	Yes
G.32	87%	Yes
G.33	87%	Yes
G.34	87%	Yes

Garden	Percentage of area receiving ≥ 2hours sunlight on March 21st	Meets compliance with BRE Guidelines
G.35	87%	Yes
G.36	87%	Yes

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 15.67: Overshadowing Image on March 21st at 8 a.m. and 9 a.m.

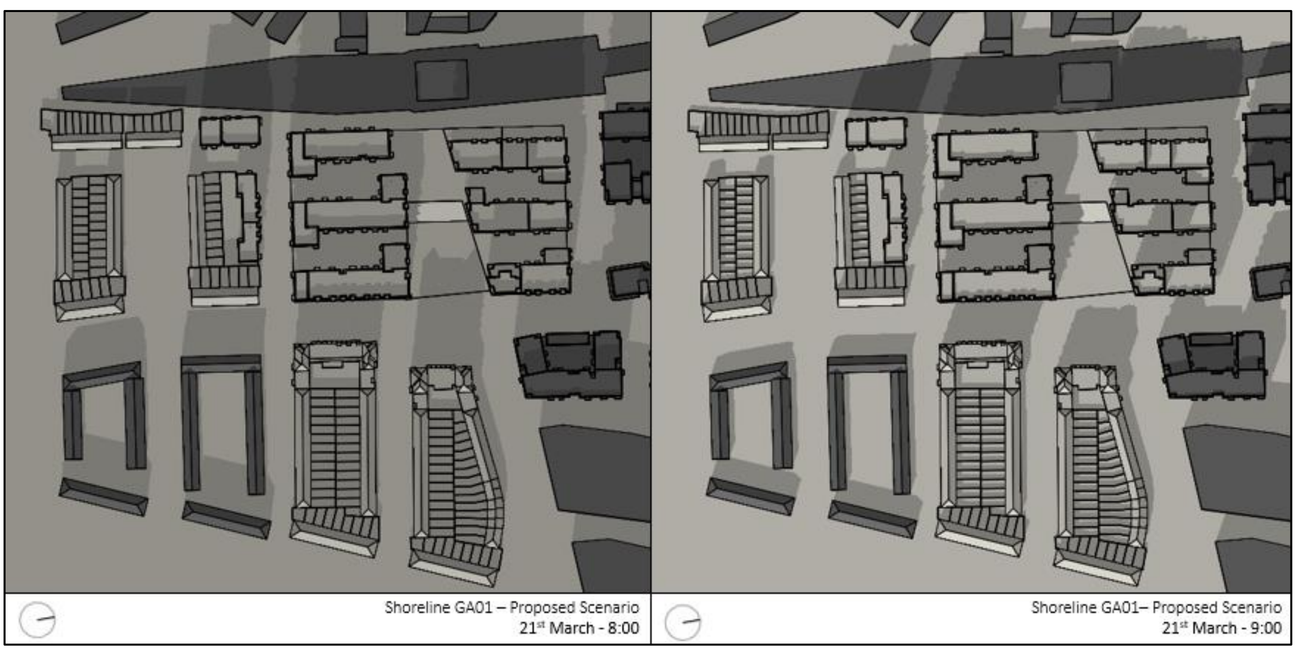


Figure 15.68: Overshadowing Image on March 21st at 10 a.m. and 11 a.m.

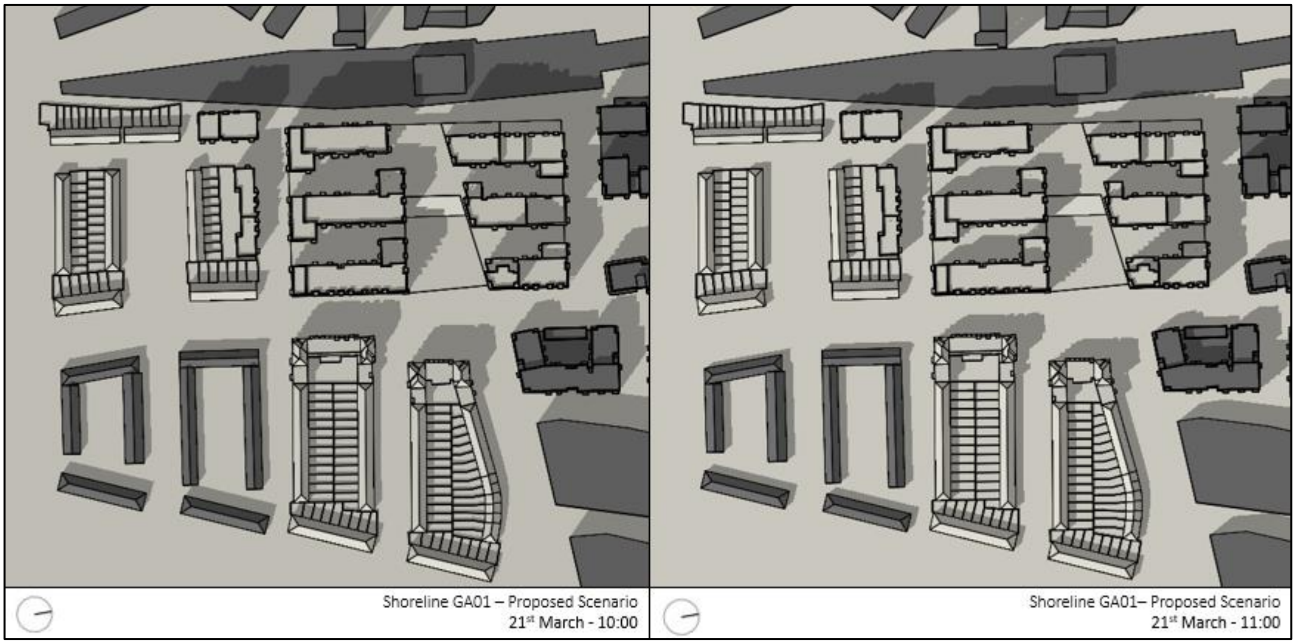


Figure 15.69: Overshadowing Image on March 21st at 12 p.m. and 1 p.m.

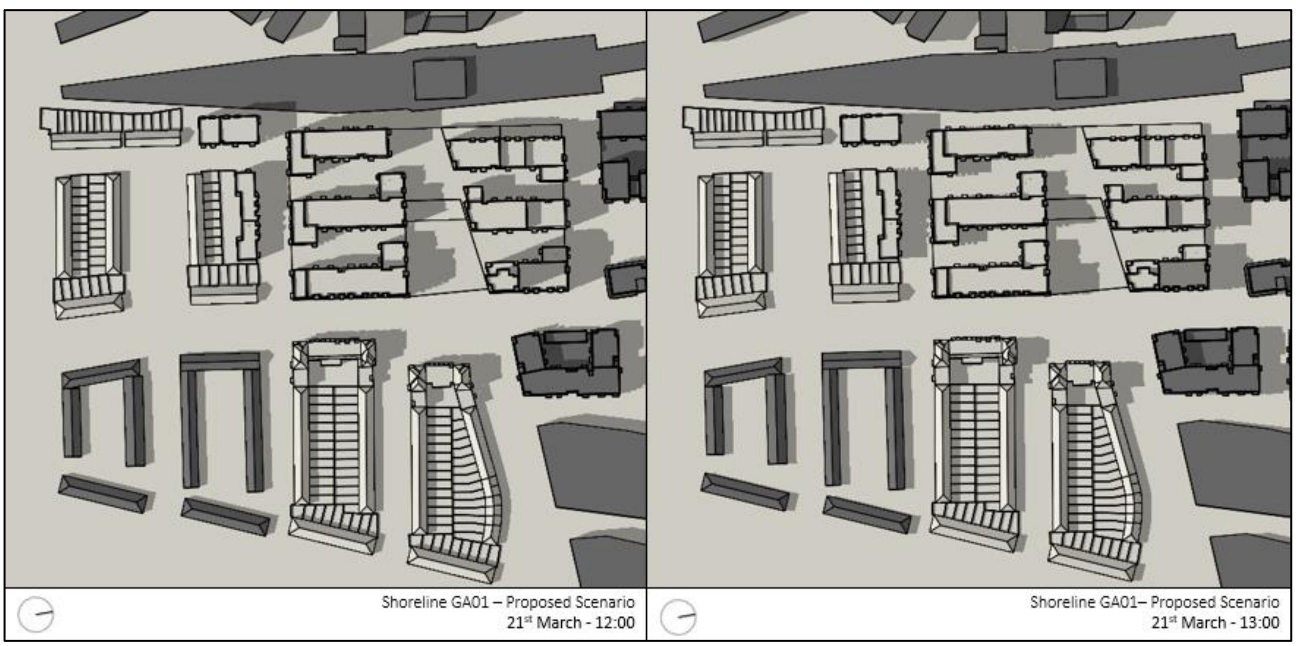


Figure 15.70: Overshadowing Image on March 21st at 2 p.m. and 3 p.m.

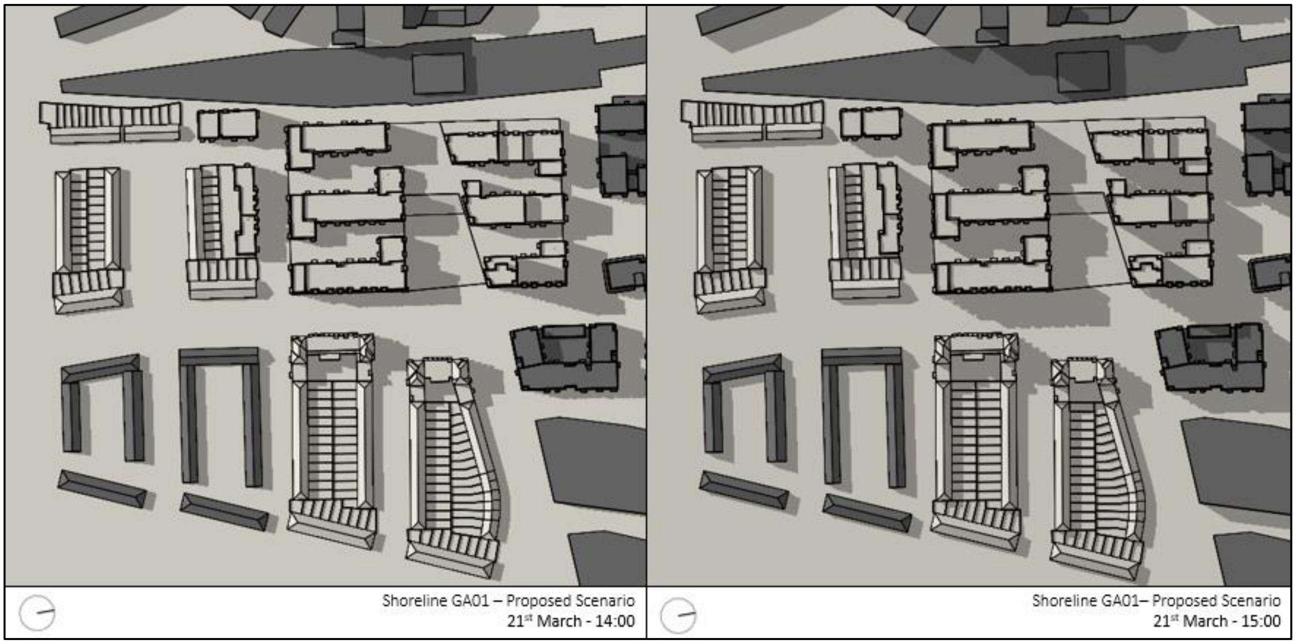


Figure 15.71: Overshadowing Image on March 21st at 4 p.m. and 5 p.m.

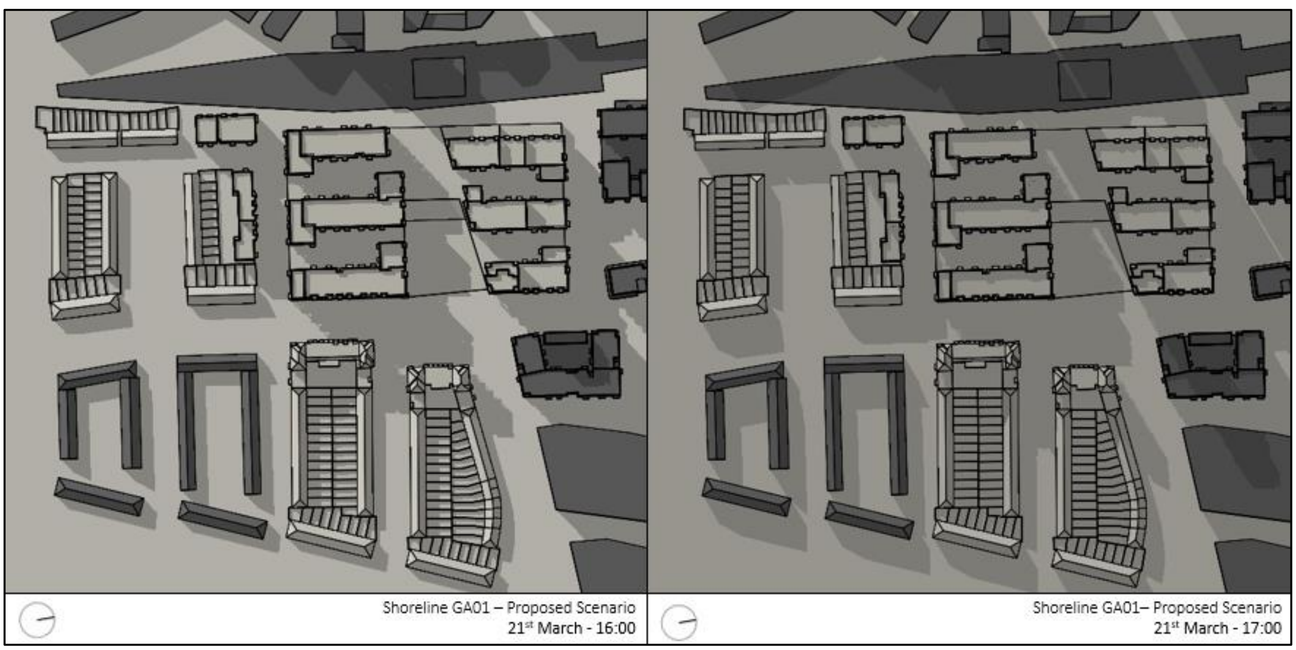


Figure 15.72: Overshadowing Image on June 21st at 8 a.m. and 9 a.m.

Figure 15.73: Overshadowing Image on June 21st at 10 a.m. and 11 a.m.

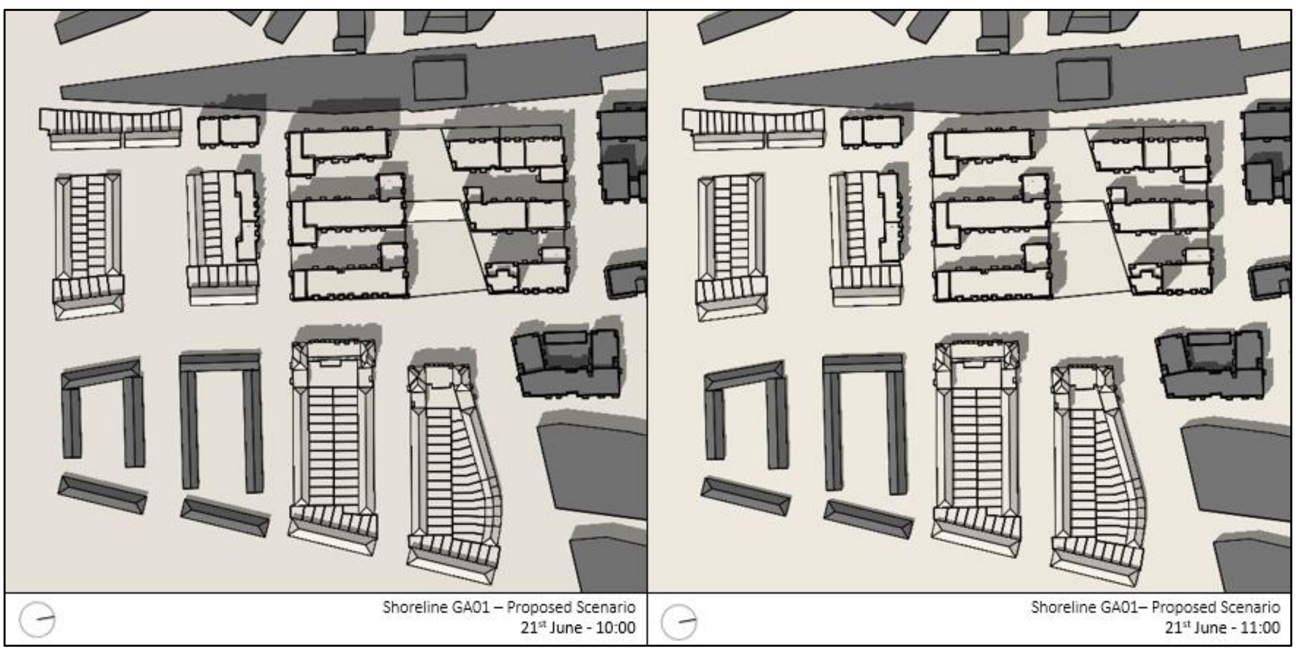


Figure 15.74: Overshadowing Image on June 21st at 12 p.m. and 1 p.m.

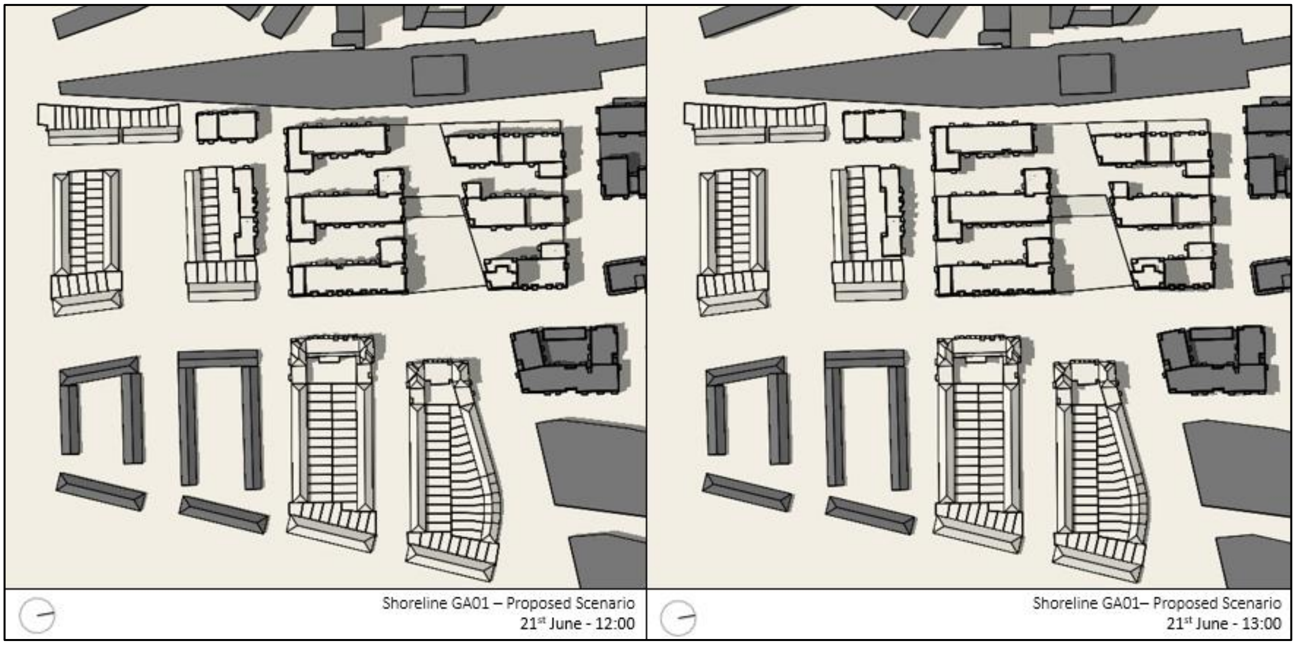


Figure 15.75: Overshadowing Image on June 21st at 2 p.m. and 3 p.m.

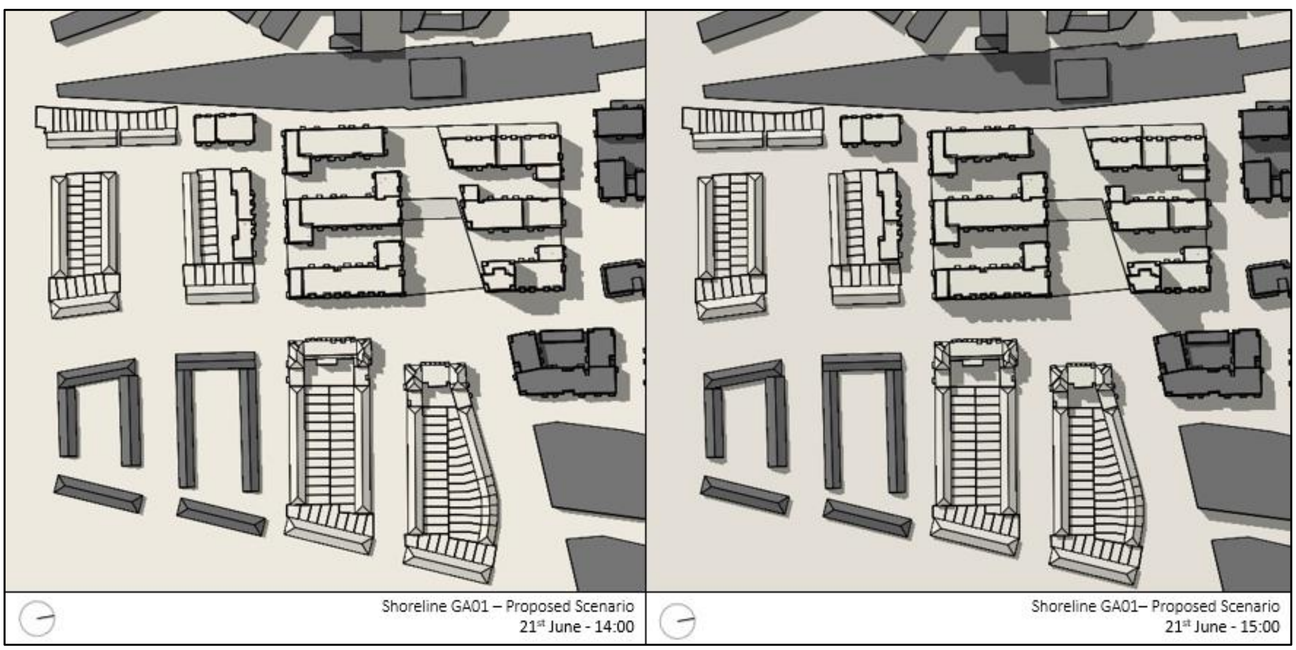


Figure 15.76: Overshadowing Image on June 21st at 4 p.m. and 5 p.m.

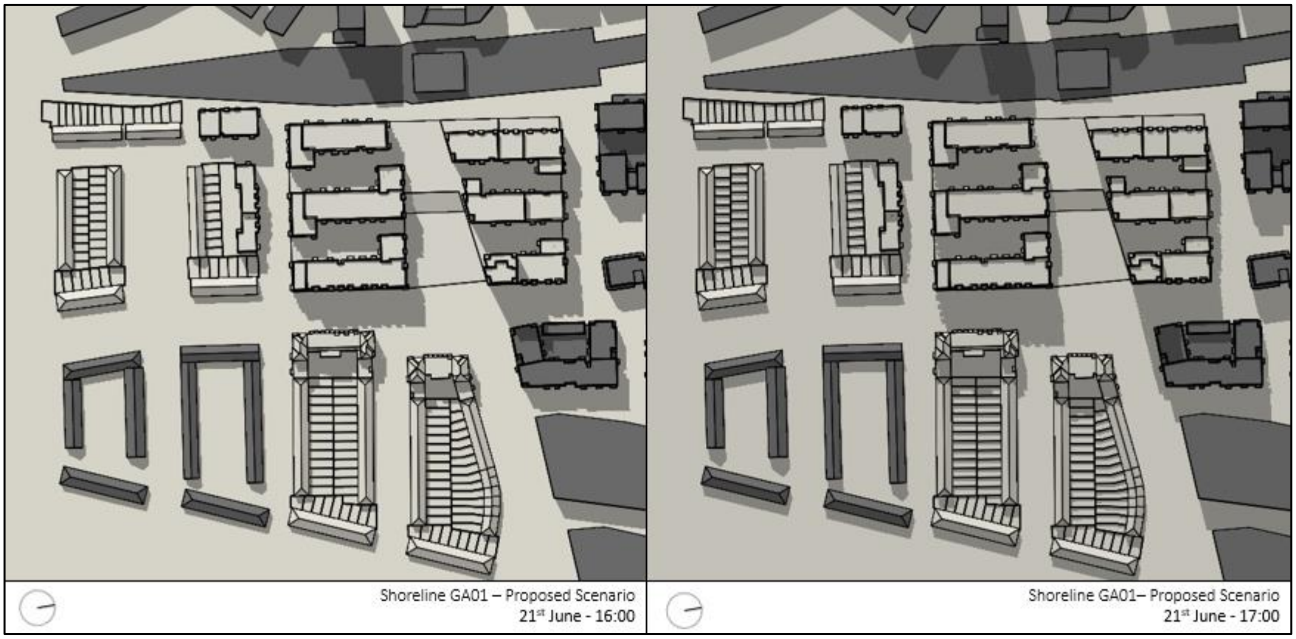


Figure 15.77: Overshadowing Image on June 21st at 6 p.m. and 7 p.m.

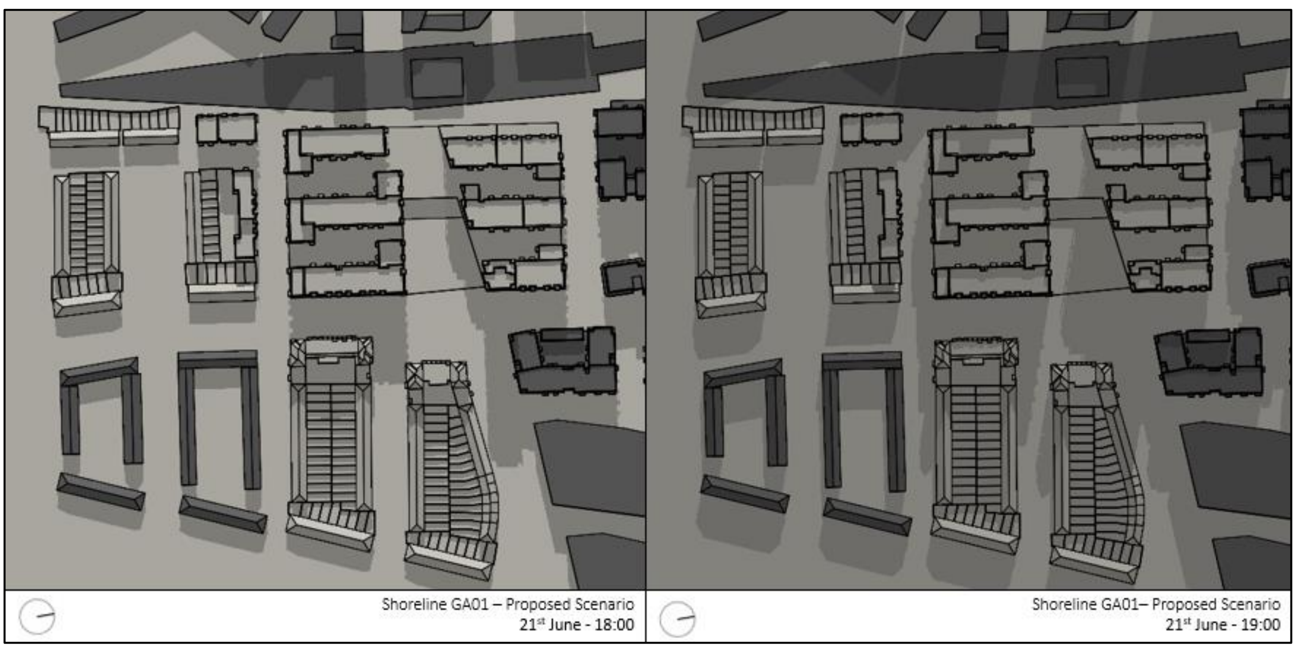


Figure 15.78: Overshadowing Image on December 21st at 10 a.m. and 11 a.m.

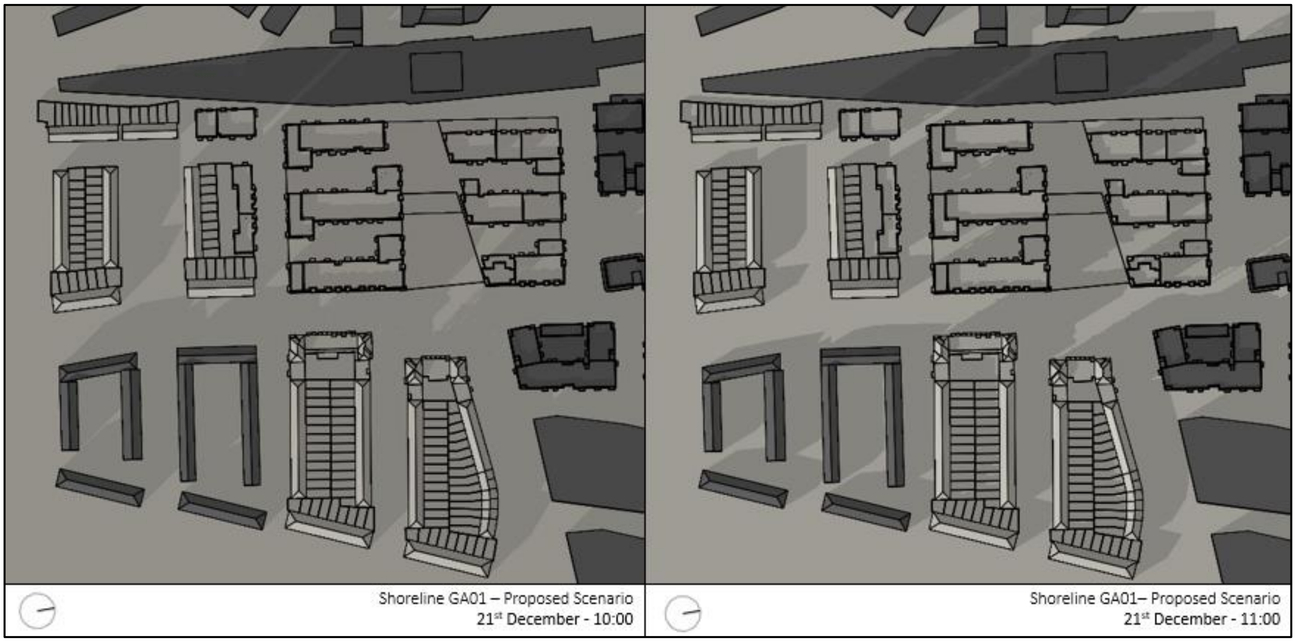


Figure 15.79: Overshadowing Image on December 21st at 12 p.m. and 1 p.m.

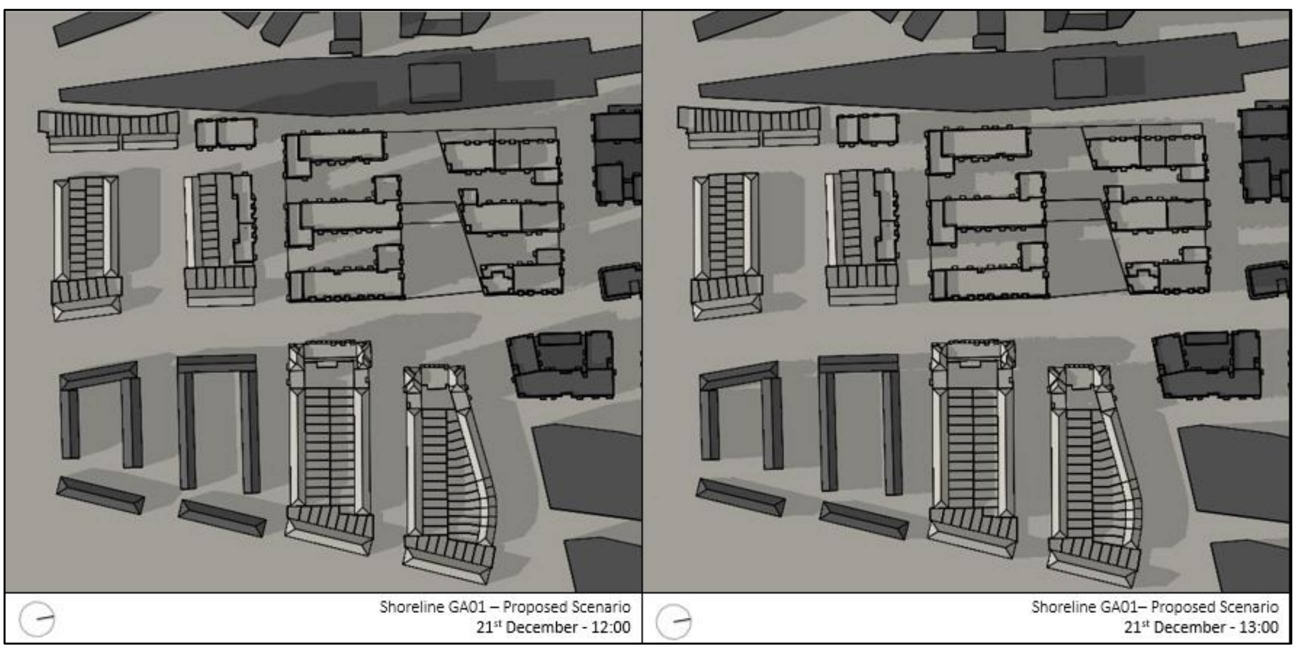
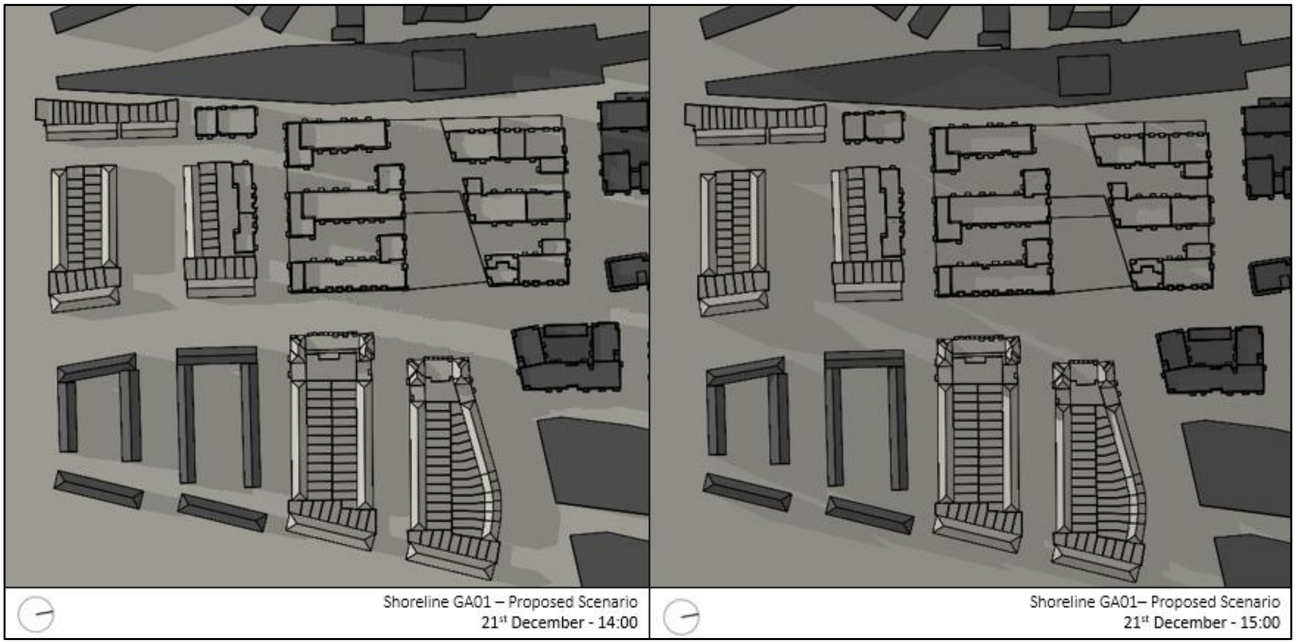
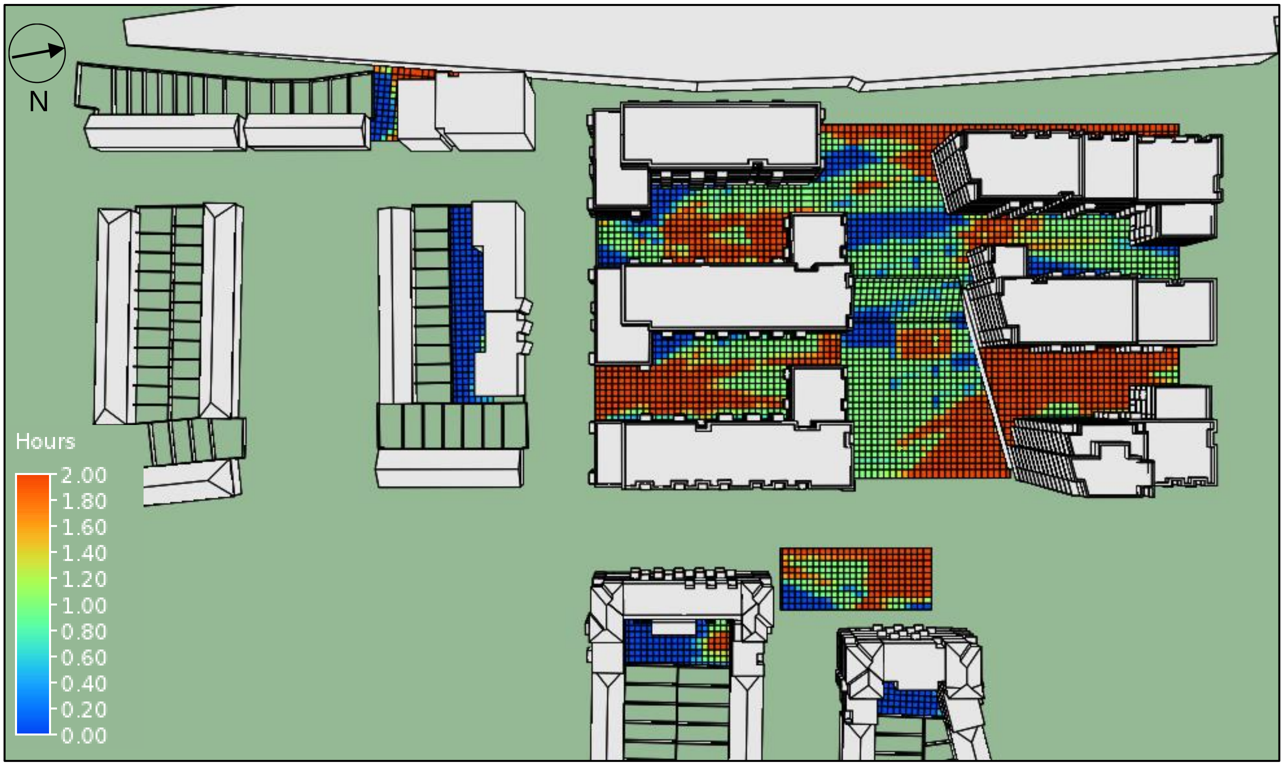


Figure 15.80: Overshadowing Image on December 21st at 2 p.m. and 3 p.m.



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 *"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. Only January, 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 must 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 must be used only for additional information.

Figure 15.81: Sunlight analysis January 21st

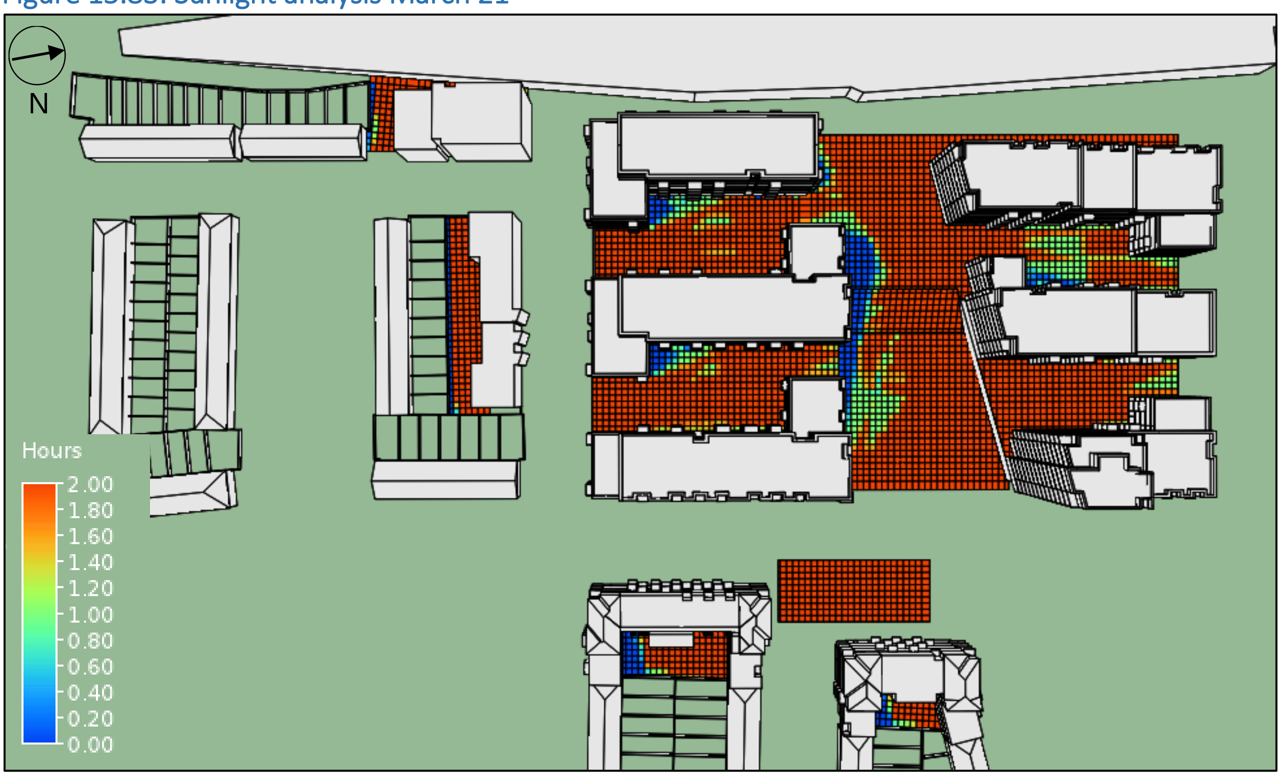


*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.82: Sunlight analysis February 21st

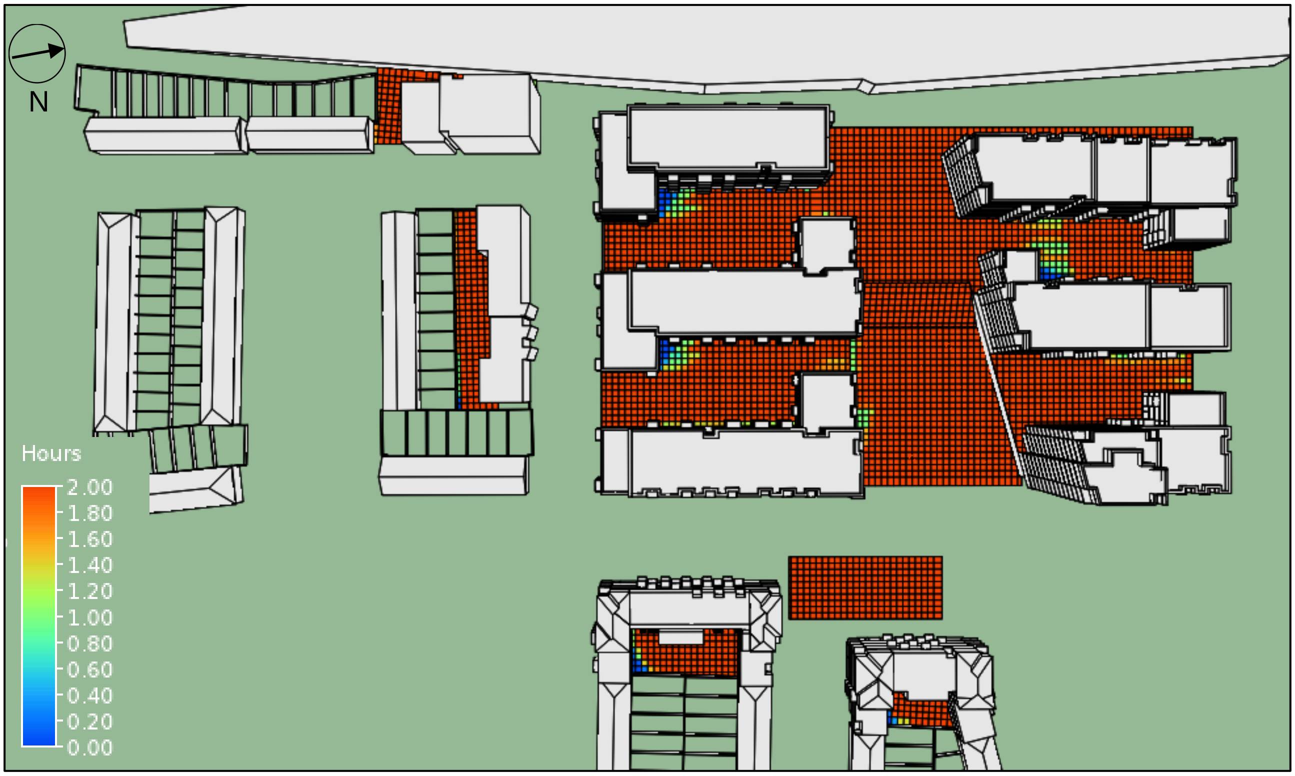
*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.83: Sunlight analysis March 21st



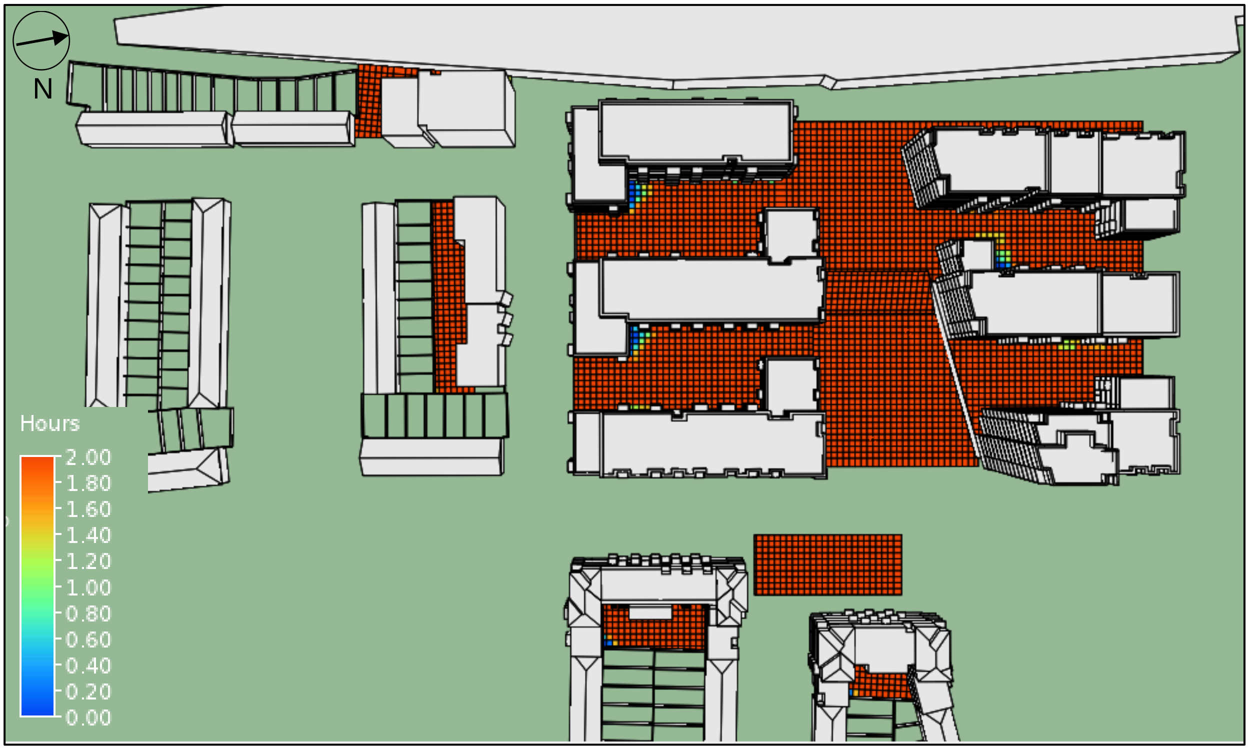
*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.84: Sunlight analysis April 21st



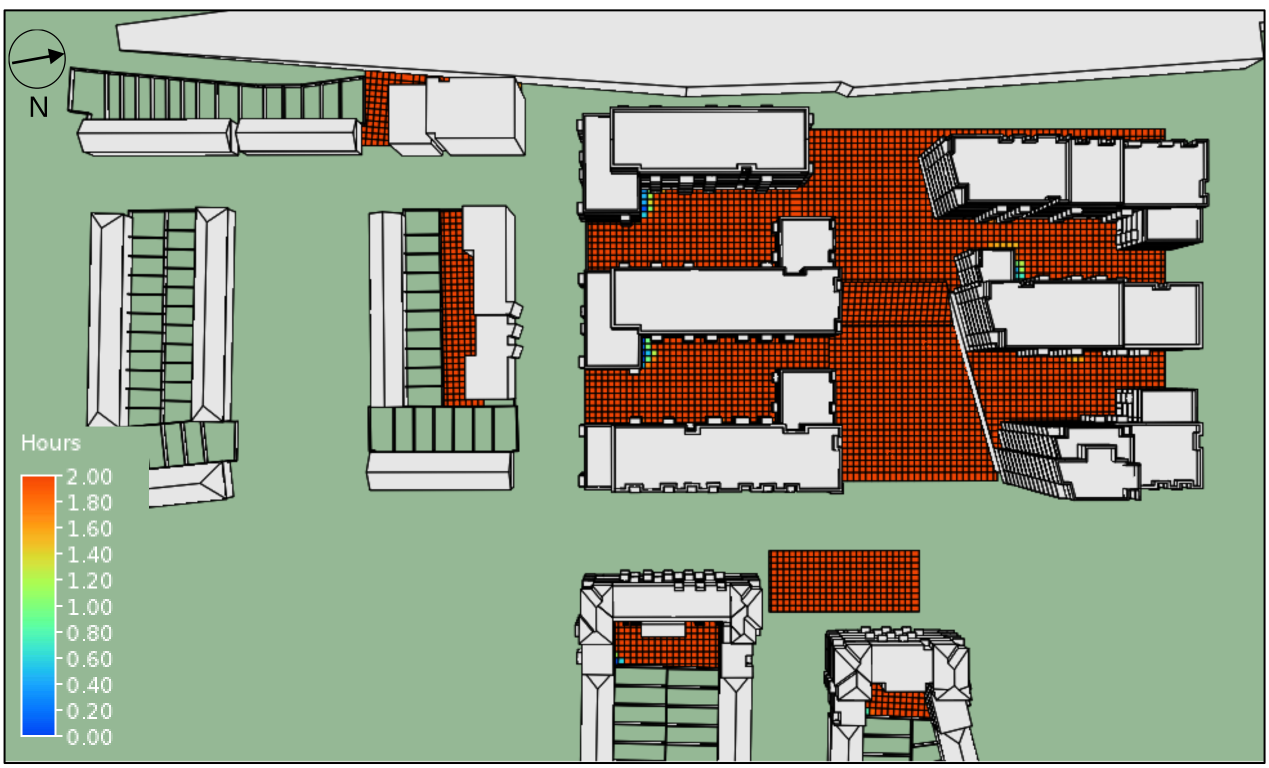
*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.85: Sunlight analysis May 21st



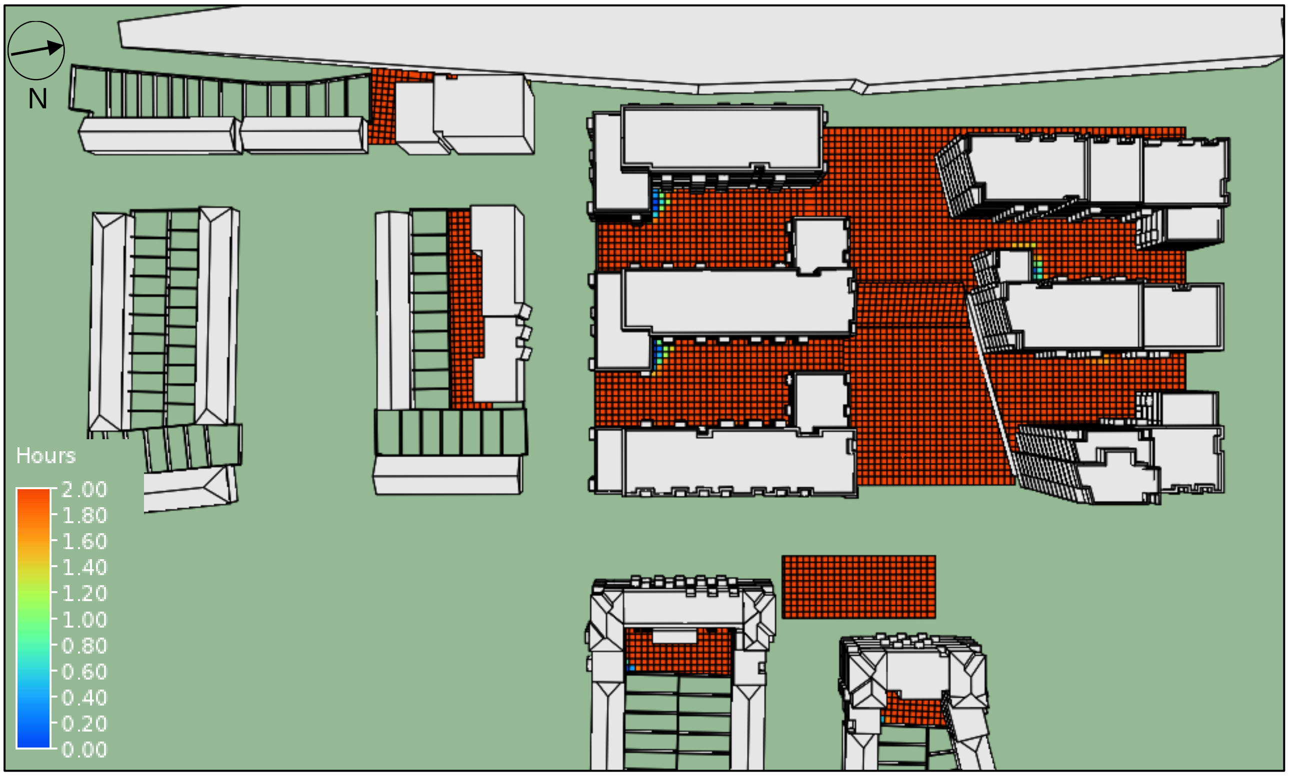
*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.86: Sunlight analysis June 21st



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.87: Sunlight analysis July 21st



*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.88: Sunlight analysis August 21st

*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.89: Sunlight analysis September 21st

*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.90: Sunlight analysis October 21st

*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.91: Sunlight analysis November 21st

*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

Figure 15.92: Sunlight analysis December 21st

*Adjacent properties were included as part of the analysis. However, they have been removed for the purpose of the image.

15.3.4.3 Impact to Adjacent Properties from the Proposed Project

As outlined within Section 15.3.2.2, the majority of adjacent properties are outside the 25° line criteria except for the north-west corner of sensitive receptor Ref. 3 and sensitive receptor Ref. 6. However, as the windows of sensitive receptor Ref. 3 are north facing with Block B1 of the proposed Project located to the north, no further analysis is required in line with *BRE Guidelines*. Thus, *imperceptible* impact will be perceived by these receptors. Also, as previously stated, sensitive receptor Ref. 6 is subject to a separate SHD application. The daylight / sunlight analysis that is being carried out for this application includes the impact of GA1. Therefore, sensitive receptor Ref. 6 was not selected for further analysis as the impact of GA1 will be accounted for within the daylight/sunlight results included within this application.

15.3.4.4 Potential 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. Open spaces provided as part of the development and open spaces to adjacent properties comply with the *BRE Guidelines* for sunlight.

15.3.4.5 "Do-Nothing" Impact

In a "Do-Nothing" scenario, the existing level of sunlight access to the buildings will remain unchanged.

15.3.5 Mitigation Measures

15.3.5.1 Construction Phase

Remedial measures during the Construction Phase in relation to sunlight are not considered to be required.

15.3.5.2 Operational Phase

Imperceptible impacts are expected in relation to the sunlight levels experienced by the future inhabitants of the proposed Project and to the existing inhabitants of the adjoining sites, therefore no remedial or reductive measures are required.

15.3.5.3 'Worst Case' Scenario

All windows within the apartments and the sample of houses (which represents all houses within the development) have been assessed in respect to sunlight and therefore all 'worst case' scenarios have been presented.

In relation to sunlight to open spaces, all common open spaces have been analysed, therefore all 'worst case' scenarios have been presented. The private gardens to houses considered 'worst case' have been selected for analysis and deemed representative of the private gardens to houses across the development. 'Worst case' gardens are those located in closest proximity to higher blocks with an orientation where an obstruction could create a risk of overshadowing. If those gardens that have a higher risk of overshadowing are compliant with the sunlight recommendations, the rest of garden plots are expected to receive a greater access to sunlight.

15.3.6 Residual Impact

Imperceptible impacts with *neutral long-term* effects, if any, are expected in relation to the sunlight levels experienced by the future inhabitants of the proposed Project and to the existing inhabitants of the adjoining sites. No remedial or reductive measures are considered to be required, therefore, there will be no residual impacts during the Operational Phase in respect of sunlight.

15.3.7 Monitoring

No on-going monitoring is required in relation to sunlight during the Construction Phase or the Operational Phase.

15.3.8 Reinstatement

Reinstatement is not pertinent to the assessment of impacts on sunlight in the case of the proposed Project.

15.3.9 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

16 Microclimate - Wind

16.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Dr. Cristina Paduano, Dr. Eleonora Neri and Dr. Arman Safdari of B-Fluid (Buildings Fluid-Dynamics) Ltd.

Dr. Cristina Paduano is a Chartered Engineer (CEng) 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. Eleonora Neri is a Chartered Engineer (CEng). She holds a PhD in Aeroacoustics from Trinity College Dublin, a M.Sc. and B.Sc. in Aeronautical Engineering. Dr. Arman Safdari is a CFD Modelling Engineer. 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 Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), on the wind conditions and microclimate affecting activities in areas within and surrounding the development, located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

Figure 16.1: Proposed Site Masterplan showing Red Line Boundary[244]

Wind and Microclimate study identifies the possible wind patterns around the existing environment and proposed Project, under mean and peak wind conditions typically occurring in Dublin. For this project, the wind assessment has considered the proposed Project in the existing environment including the GA2

244 Henry J Lyons (2021). Site Masterplan. Drawing No. STP0011 GA1

(which has been permitted the Clongriffin developments existing and permitted but not built and furthermore, the proposed Project in a cumulative scenario where a potential GA3 phase is included.

Figure 16.2: Proposed Project Site - Existing Scenario (with GA2 permitted and Clongriffin developments (existing and permitted but not built))

Figure 16.3: Proposed Project Site - Cumulative Scenario (with GA2 permitted, and Clongriffin developments (existing and permitted but not built) and GA3 potential phase)

Figure 16.4: Proposed Project Site Modelled

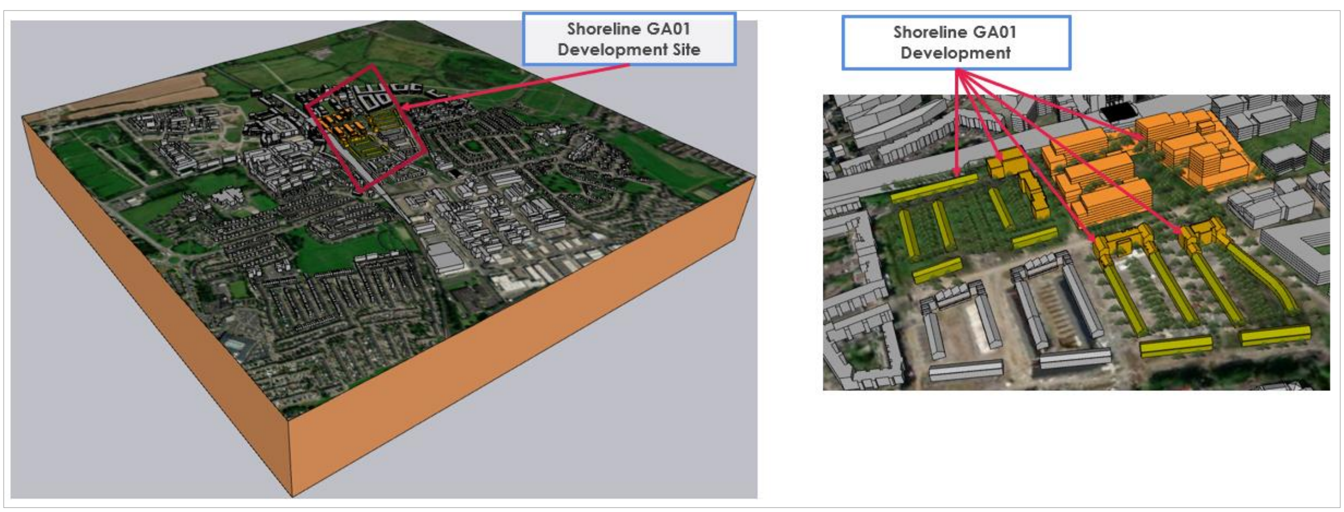


Figure 16.5: Shoreline GA1 Development Blocks - Modelled

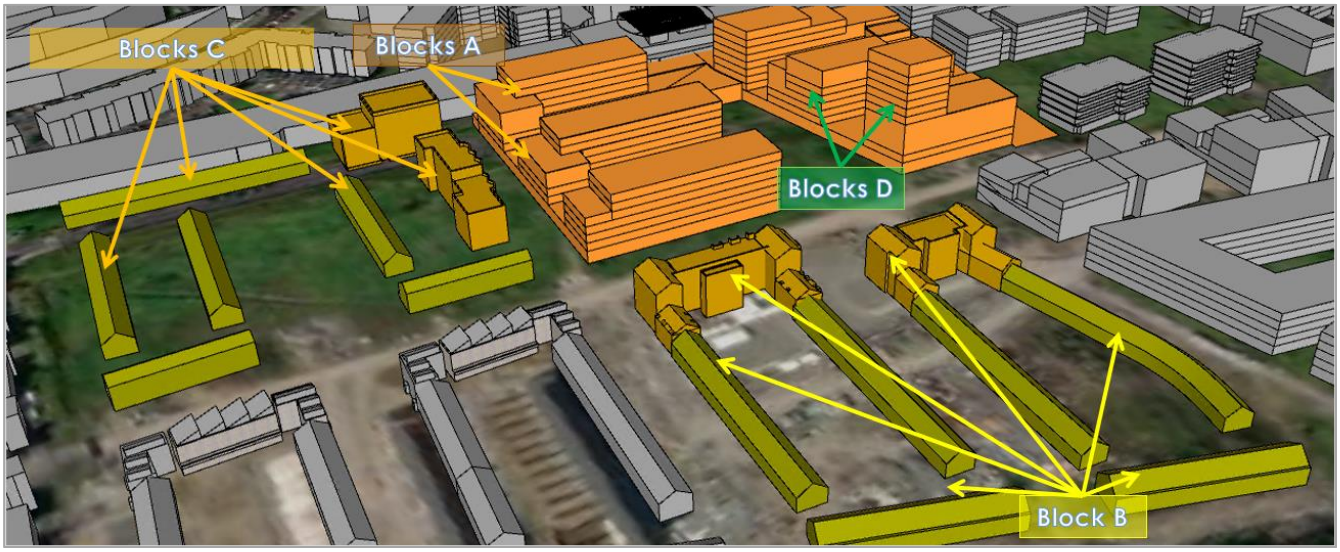
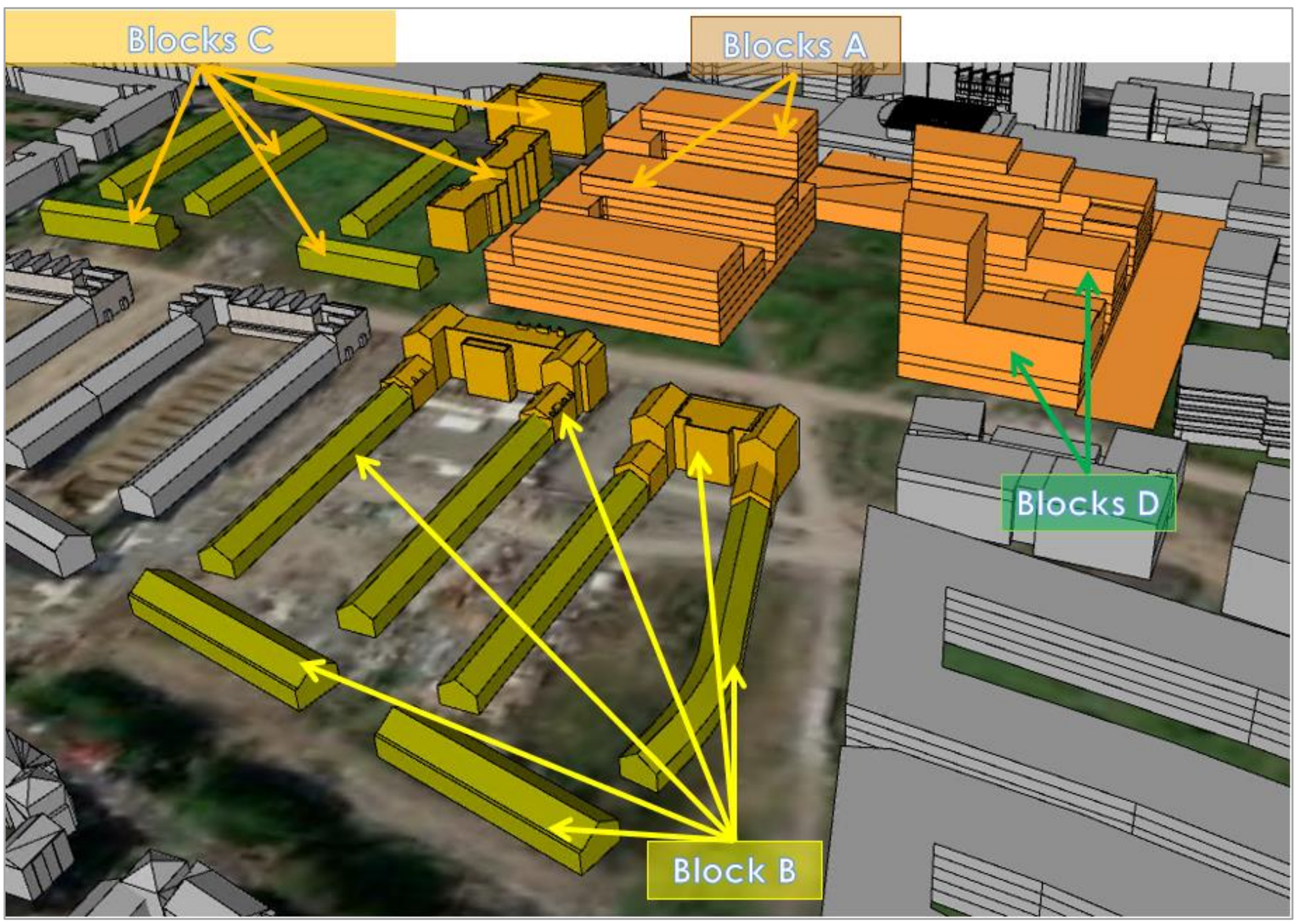


Figure 16.6: Shoreline GA1 Development Blocks - Modelled



This assessment is performed through Advanced Computational Fluid Dynamics (CFD) Modelling which is a numerical method used to simulate wind conditions and its 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 are utilized by Shoreline Partnership Design Team to configure the optimal layout for the proposed Project for the aim of achieving a high-quality environment for the scope of use intended of each areas / building (*i.e.* comfortable and pleasant for potential pedestrian) and not to introduce any critical wind impact on the surrounding areas and on the existing buildings.

The next sections describe in details the wind and microclimate modelling performed, its methodology and assumptions which B-Fluid Ltd has adopted for this study, together with impacts of the proposed Project on the existing environment.

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 the 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 sitting areas, and accessible roof top areas among others.

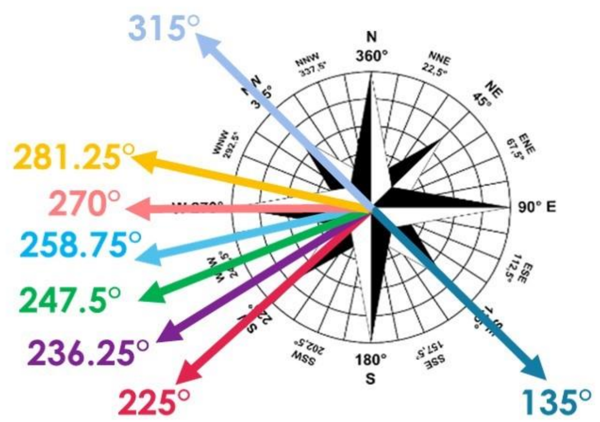
For this purpose, 18 no. different wind scenarios and directions have been modelled as shown in Table 16.1 in order to take into consideration all the different relevant wind directions. In particular, a total of 18 no. compass directions on the wind rose are selected. For each direction, the reference wind speed is 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.

Table 16.1: Summary of the 18 No. Wind Scenarios Modelled for the Proposed Project

DUBLIN WIND SCENARIOS AND DIRECTIONS		
Velocity (m/s)	Direction (degree)	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

This modelling study focuses on reporting 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 16.7.

Figure 16.7: Summary of Eight Wind Scenarios Reported



Velocity (m/s)	Direction (°)	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

16.1.2 National Policy

According to the *Urban Development and Building Heights, Guidelines for Planning Authorities*[245] document, specific impact assessment of the micro-climatic effects should be performed for 'buildings taller than prevailing building heights in urban areas'. (In the same guidance, standard buildings height is considered 6-8 storeys. Above this height, buildings are considered 'taller' for Dublin standards.) Usually, the recommended approach to wind microclimate studies is based on the building height, as presented in Figure 16.8 and prescribed by the *Wind Microclimate Guidelines for Developments in the City of London (*August 2019).

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.

Usually, the recommended approach to wind microclimate studies is based on the building height, as presented in Figure 16.8.

[245] DHPLG (2018c).

Figure 16.8: Recommended Approach to Wind Microclimate Studies based on Building Height, as prescribed by the Wind Microclimate Guidelines for Developments in the City of London

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

Computational fluid dynamics (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 near critical locations (*e.g.* entrances, corners, etc.) must be 0.3m 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 400m 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 1.5m 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.

16.2 Methodology

16.2.1 Study Methodology

16.2.1.1 Acceptance Criteria

Pedestrian Comfort - Pedestrian Wind Comfort is measured in 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 and these *"gust equivalent mean"* (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

The following criteria are widely accepted by 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 15m/s and a gust speed of 28m/s (62mph) to be exceeded less often than once a year. This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

  - '*General Public*': A mean speed of 20m/s and a gust speed of 37m/s (83mph) 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 notes that calm activity requires calm wind conditions, which are summarised by the Lawson scale, shown in Figure 16.9. The Lawson scale assesses pedestrian wind comfort in absolute terms and defines the reaction of an average person to the wind. Each wind type is associated to a number, corresponding to the Beaufort scale, which is represented in Figure 16.10. 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.

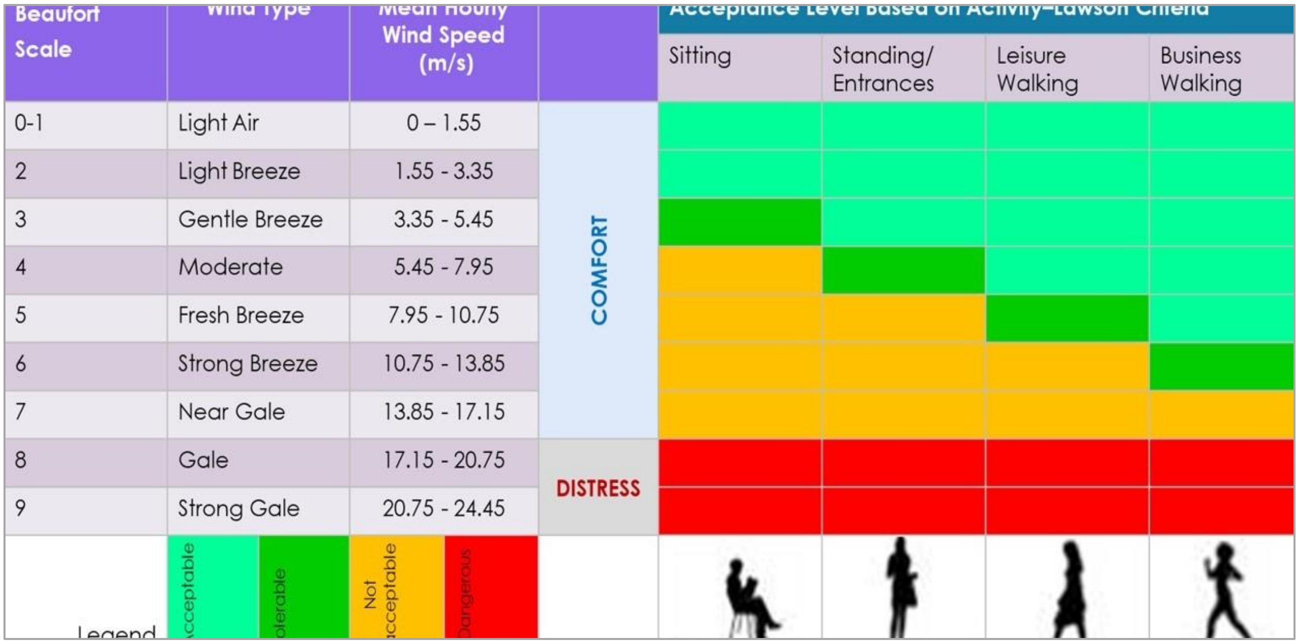
These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, *etc*. which can all affect a person's perception of a local microclimate. Moreover, pedestrian activity alters between winter and summer months. 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 1.5m above ground level. Unless in extremely unusual circumstances, velocities at pedestrian level increase as you go higher from ground level.

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.

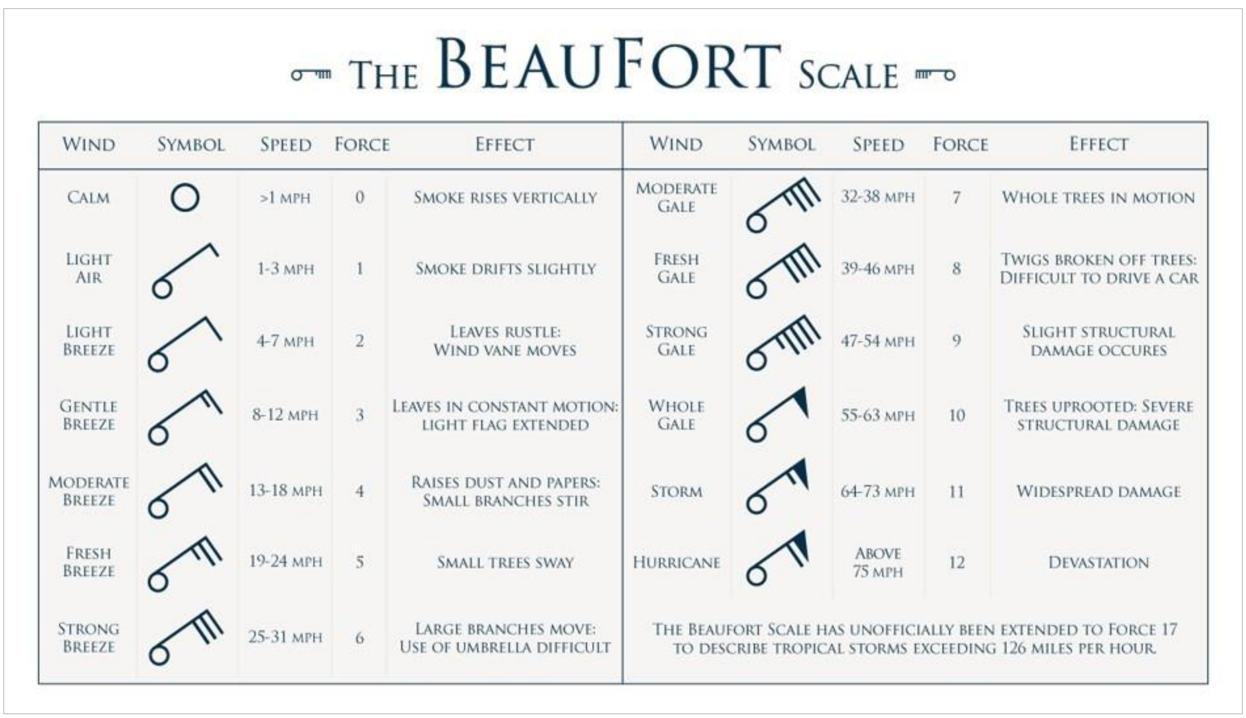
If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity and mitigation measure should be implemented into the design.

Figure 16.9: 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 16.10: Beaufort Scale



THE BEAUFORT SCALE

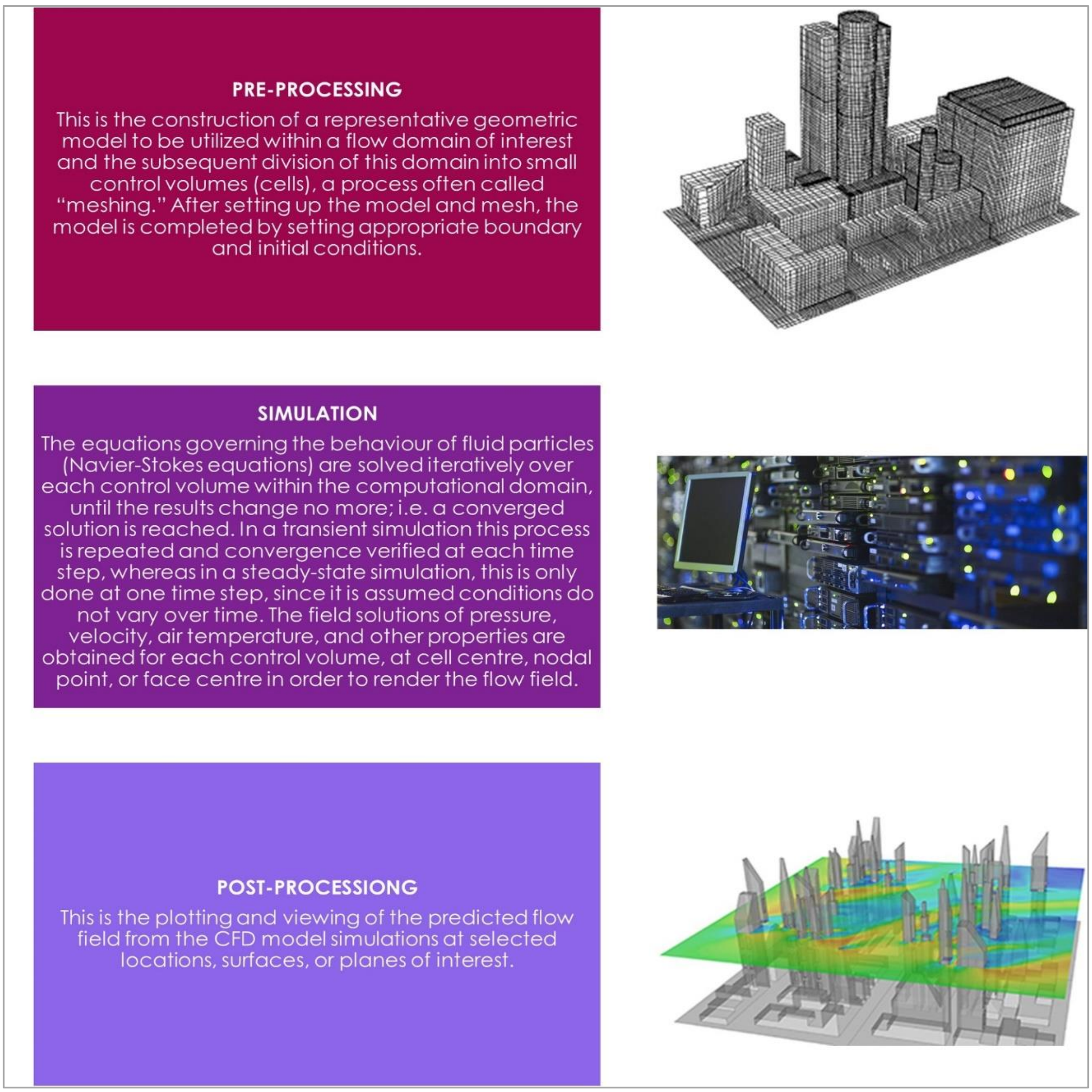
Wind	Speed	Force	Effect
Calm	>1 mph	0	Smoke rises vertically
Light Air	1-3 mph	1	Smoke drifts slightly
Light Breeze	4-7 mph	2	Leaves rustle: Wind vane moves
Gentle Breeze	8-12 mph	3	Leaves in constant motion: Light flag extended
Moderate Breeze	13-18 mph	4	Raises dust and papers: Small branches stir
Fresh Breeze	19-24 mph	5	Small trees sway
Strong Breeze	25-31 mph	6	Large branches move: Use of umbrella difficult
Moderate Gale	32-38 mph	7	Whole trees in motion
Fresh Gale	39-46 mph	8	Twigs broken off trees: Difficult to drive a car
Strong Gale	47-54 mph	9	Slight structural damage occures
Whole Gale	55-63 mph	10	Trees uprooted: Severe structural damage
Storm	64-73 mph	11	Widespread damage
Hurricane	Above 75 mph	12	Devastation

The Beaufort scale has unofficially been extended to force 17 to describe tropical storms exceeding 126 miles per hour.

16.2.2 CFD Modelling Method

Computational Fluid Dynamics (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 stage: pre-processing, simulation and post-processing as described in Figure 16.11. 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.

Figure 16.11: CFD Modelling Process Explanation



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 fluids energy therefore the errors introduced through the modelling of this component are minimal.

The error introduced by modelling the small eddies can be considered of an acceptable level. Computational time will be reduced by modelling the small eddies (compared to directly solving).

16.3 Baseline Environment

16.3.1 Baseline Environment Assessment

In this chapter, wind impact has been assessed on the existing receiving environment considered as the existing buildings and the topography of the site prior to construction of the proposed Project. A statistical analysis of 30 years historical weather wind data has been carried out to assess the most critical wind speeds, directions and frequency of occurrence of the same. The aim of this assessment has been to identify the wind microclimate of the area that may cause critical conditions for pedestrians comfort criteria. The baseline environment is shown in Figure 16.12.

Figure 16.12: Baseline Environment - Site on Recent Aerial Imagery [246]

[246] Google Earth (2020).

16.3.2 Site Location and Surrounding Area

The Site is located in Baldoyle-Stapolin Growth Area 1 (GA1), Baldoyle, Dublin 13, c. 10km 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 and Fingal Council areas. The proposed Project is framed within the context of national, regional and local planning policy.

The existing Site is shown in Figure 16.13. The area considered for the existing environment and proposed Project assessment comprises a 3km² area around the proposed Project as represented in Figure 16.14.

Figure 16.13: The Site and Baseline Environment

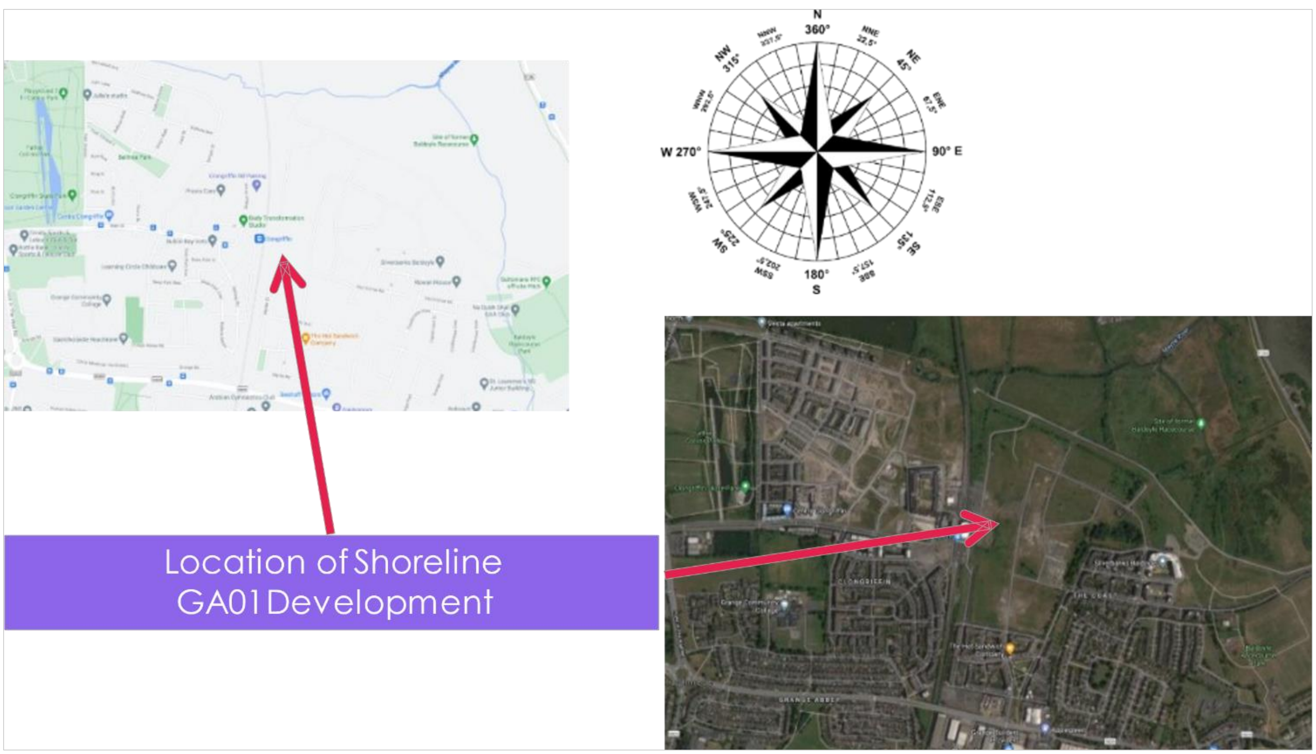
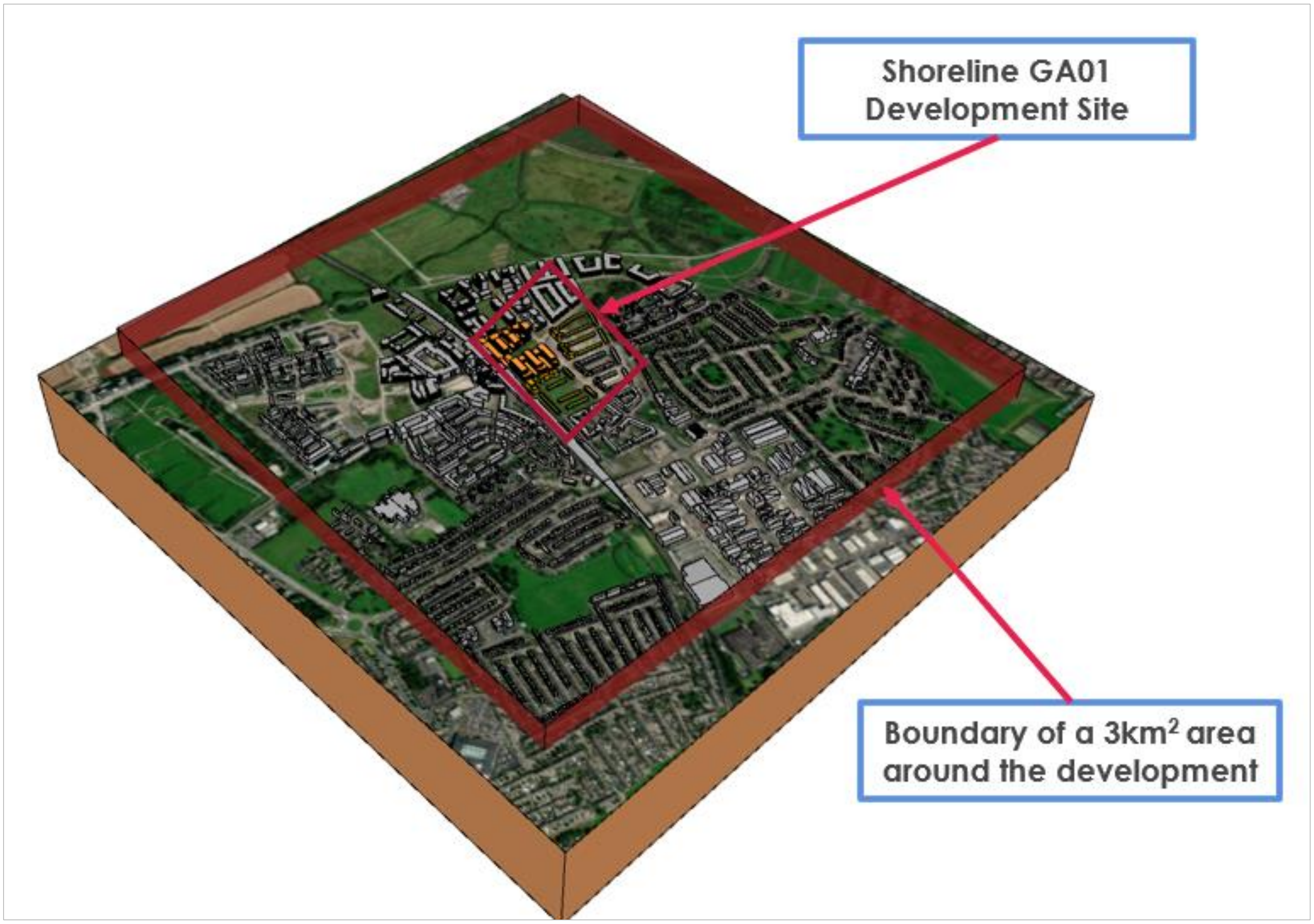


Figure 16.14: Extents of Analysed Baseline Environment around the Site

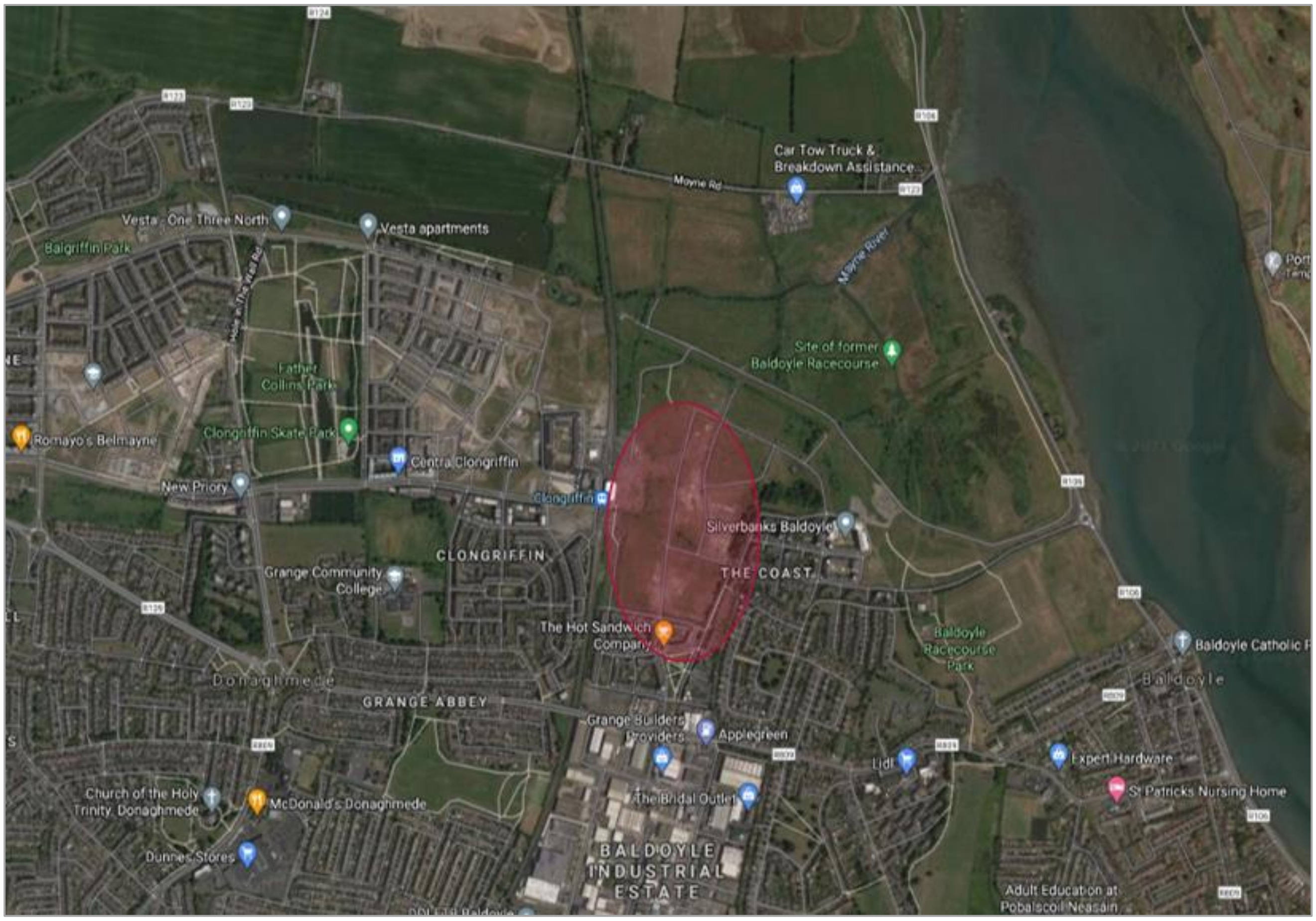


16.3.3 Topography and Built In Environment

Figure 16.15 shows an aerial photograph of the terrain surrounding the construction Site. The Site is located in Baldoyle, Dublin 13, c. 10km, north-east from Dublin City centre and it is 6km east of Dublin Airport and c. 1.5km from Baldoyle village.

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 in this connection “urban winds” and no distinction will be made between them.

Figure 16.15: Built-in Environment around Construction Site[247] (Site Location in Red)



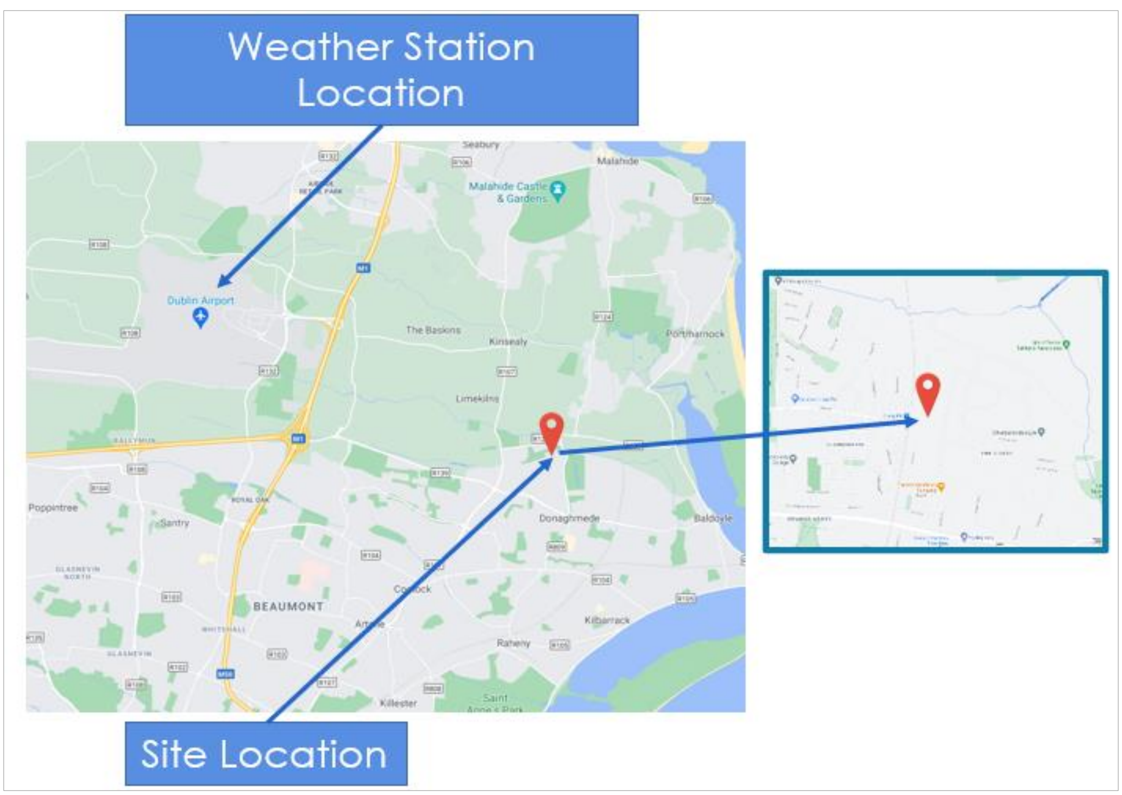
16.3.4 Wind and Microclimate Conditions

This analysis considers the existing environment being exposed to typical wind conditions of the Site. The buildings are oriented as shown in the previous sections. The wind profile is built using the annual average of meteorology data collected at Dublin Airport Weather Station. Figure 16.16 and 16.17 shows on the map the position of the proposed Project and the position of Dublin Airport.

[247] Google Earth (2020).

Figure 16.16: Map Showing the Position of the Proposed Project and Dublin Airport

Figure 16.17: Map Showing the Position of the Proposed Project and 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 urban area with dense built-in structure with buildings of at least 15m height in average.
- **Mean Wind Speeds:** Due to the different terrain environment, the ground-near wind speeds (at pedestrian level) will be lower at the construction site compared to the meteorological station at the airport.
- **Wind Directions:** The landscape around the Site can in principle be characterized as flat terrain. Isolated elevations in the near area of the development should have no influence on the wind speed and wind directions. 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 the wind comfort at the Site.

16.3.5 Wind Conditions

The assessment of the wind comfort conditions at the proposed Project 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 analysed 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 data is recorded at a weather station at the airport, which is located 10m above ground or 71mOD.

Figure 16.18: Local Wind Speed (10m) - 1985-2020

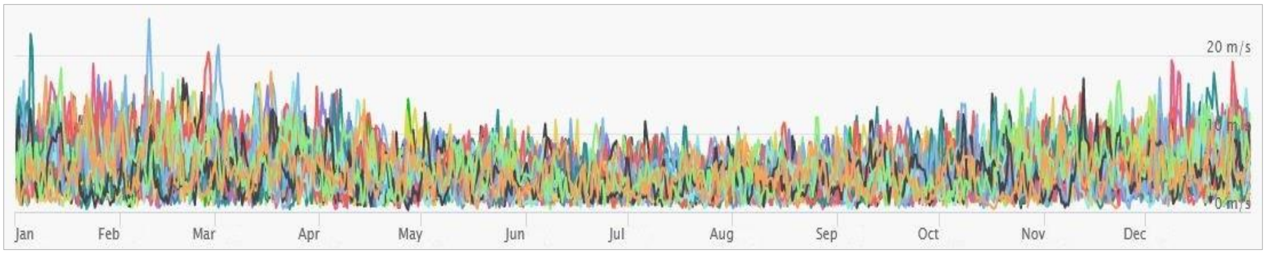


Figure 16.19: Local Wind Gust (10m) - 1985-2020

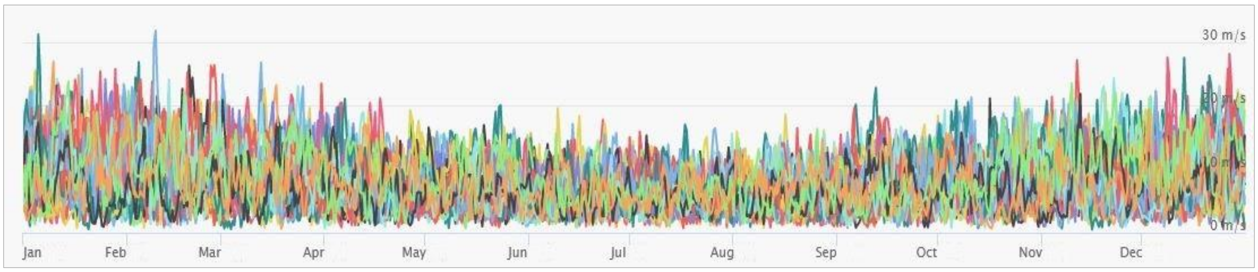


Figure 16.20, presenting the wind speed diagram for Dublin, shows the days per month, during which the wind reaches a certain speed. In Figure 16.21 the wind rose for Dublin shows how many hours per year the wind blows from the indicated direction, confirming how the predominant directions are WSW, W, and SW.

Figure 16.20: Dublin Wind Speed Diagram

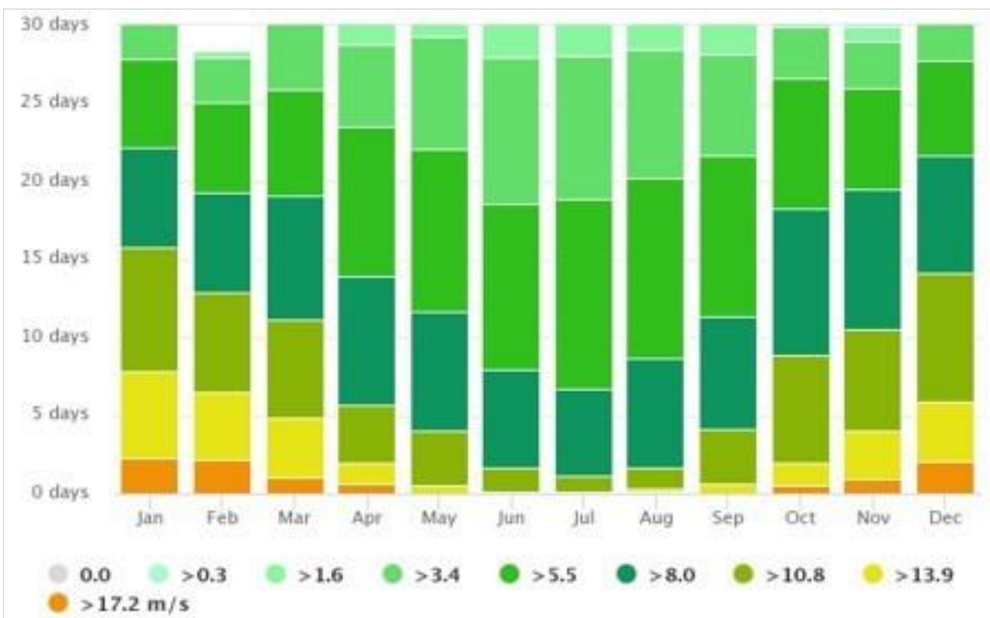
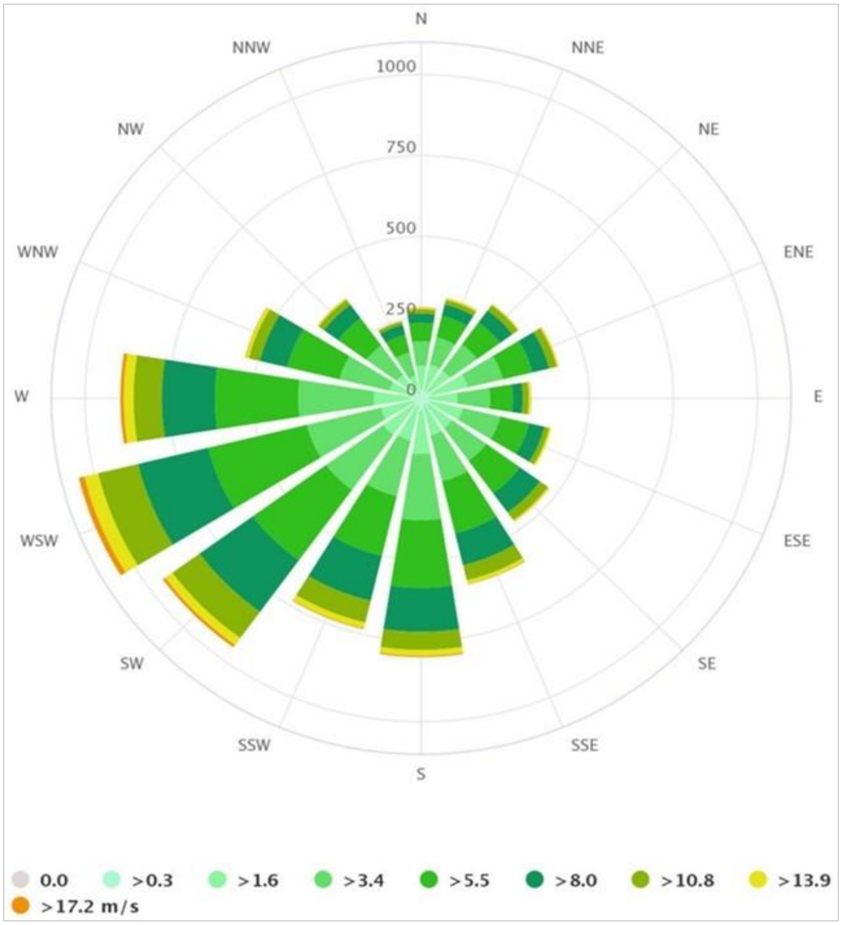


Figure 16.21: Dublin Wind Rose



Based on the criterion of occurrence frequency the main wind directions are presented in Figure 16.22 and listed below in descending order of dominance:

1. South-west with most frequent wind speeds around 6m/s (all year).
2. South-east.
3. West-south-west.

The analysis will mainly focus on the large sector of prevailing wind directions of winds from above. Other wind directions will be discussed if deemed necessary for the study.

Figure 16.22: Main Wind Directions Occurrence Frequency

Velocity (m/s)	Direction (°)	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
4.801	202.5	2.021
3.689	78.75	1.963
3.627	168.75	1.495
4.285	67.5	1.370
4.863	56.25	1.279
4.042	191.25	1.199
4.630	326.25	1.164
3.844	11.25	1.142
4.418	337.5	1.062
4.787	348.75	0.982
4.006	22.5	0.959
3.555	180	0.879
4.059	33.75	0.845
0.700	0	0.011
Selected Conditions : 32	Total Coverage : 95.35 %	

16.3.5.1 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 Southeast. It is apparent that winds from other directions are rare. Maximum daily wind speeds of nearly 30m/s were recorded in the past 30 years, however, the maximum daily winds are commonly found between 6m/s and 15m/s. the strongest winds arise from the west and south-west.

Figure 16.23: Maximum Wind Conditions

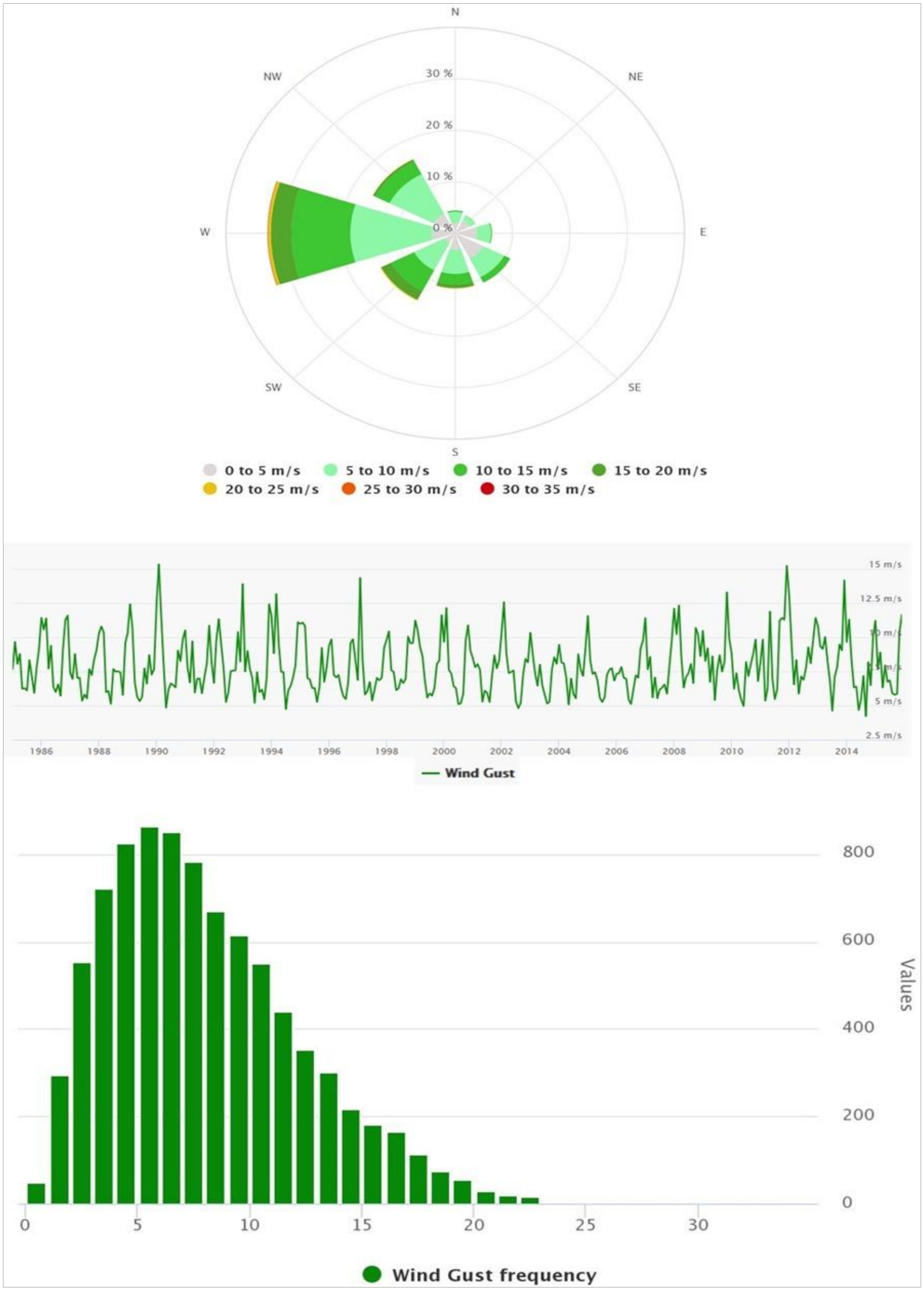
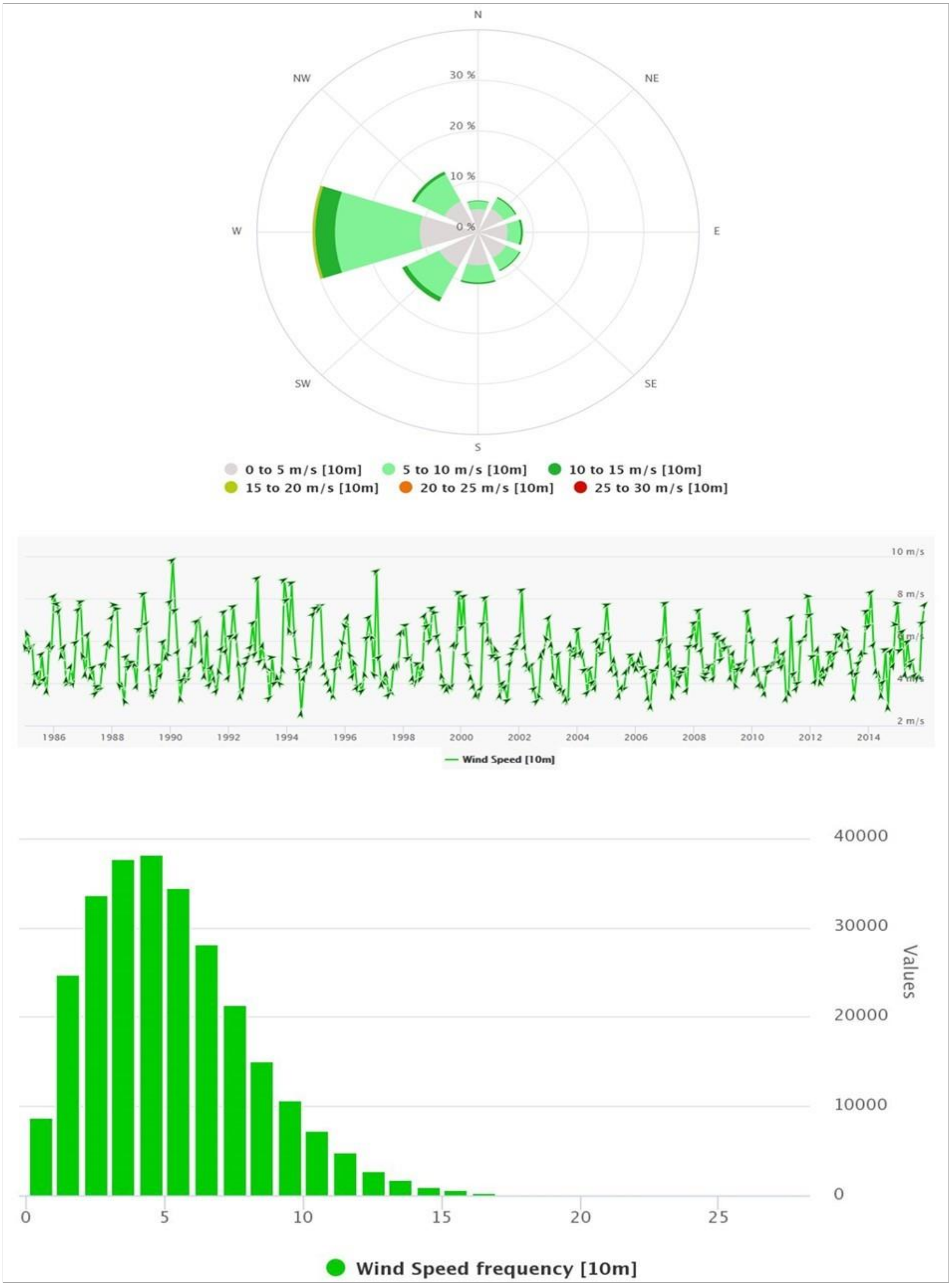


Figure 16.24: Mean Wind Conditions



16.3.5.2 Comparison with the on-site Weather Station

The wind profile built using the data from Dublin Airport, is also compared with the one obtained using the data collected on-site in the period 14 Dec 2018 - 10 Jan 2019 (28 days).

Figure 16.25: B-Fluid on-site Weather Station

Figures 16.26 and 16.27 respectively show wind speed and gust and wind direction recorded by the on-site weather station during the 28 days.

Figure 16.26: Wind speed and Wind Gust recorded by B-Fluid on-site Weather Station

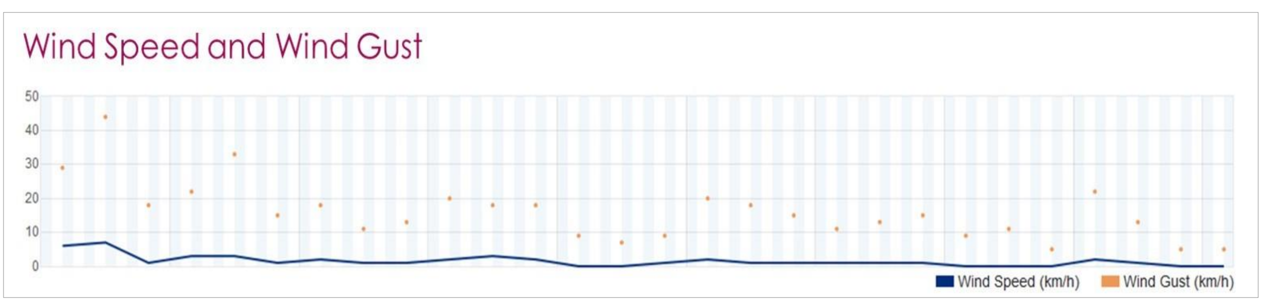
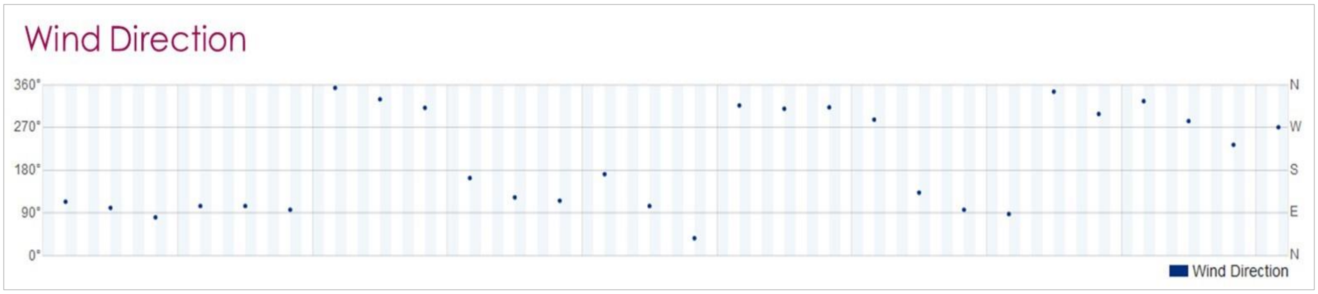


Figure 16.27: Wind direction recorded by B-Fluid on-site Weather Station



As it is possible to assess from the comparison between on-site and airport measurements, presented in Figures 16.28 and 16.29, the wind speed daily mean and the wind gust daily mean recorded on-site follow the same pattern as the one recorded at Dublin Airport. However, the wind speed levels, and the gust wind speed levels registered on-site are quite lower. This is due to the fact that the Site is located in the urban environment thus much more shielded if 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.

Figure 16.28: Wind Speed Daily Mean Comparison

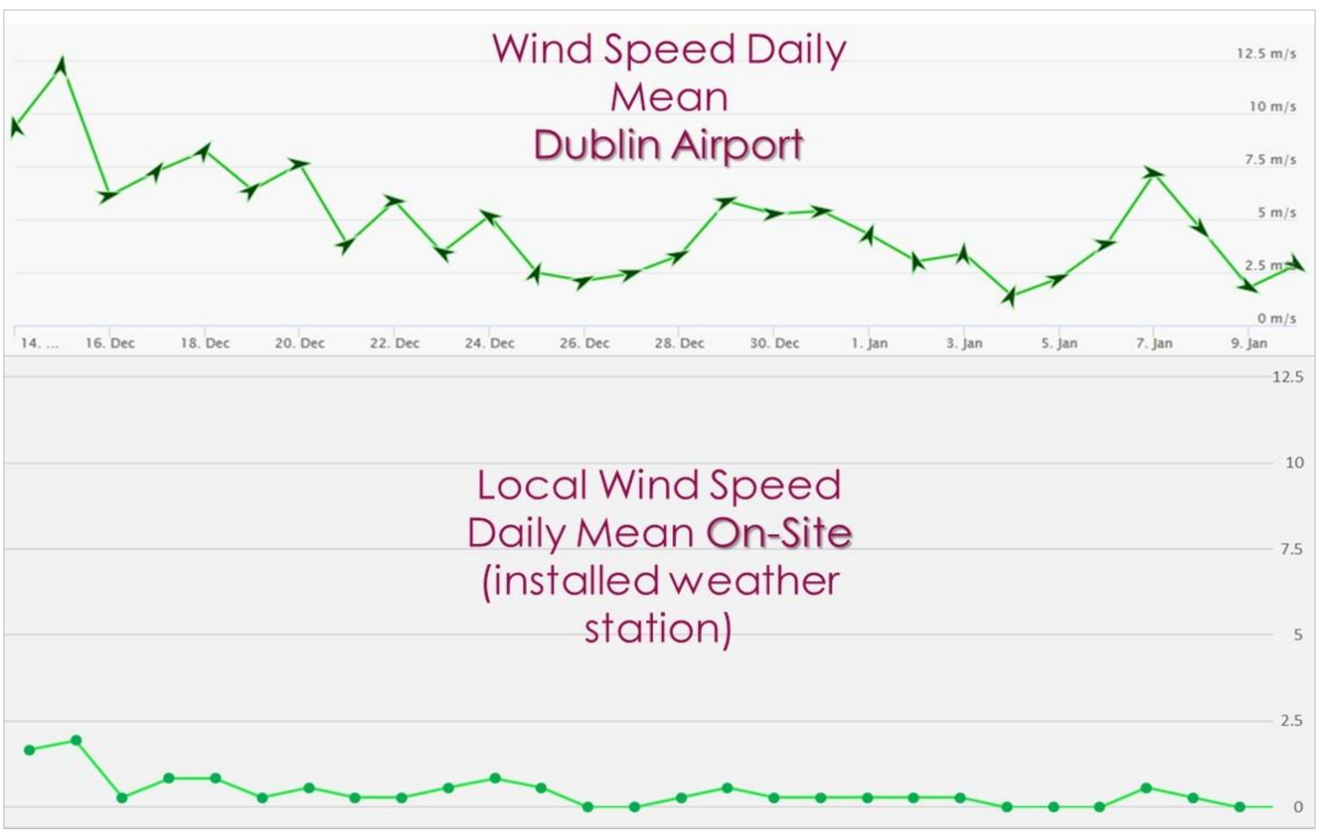
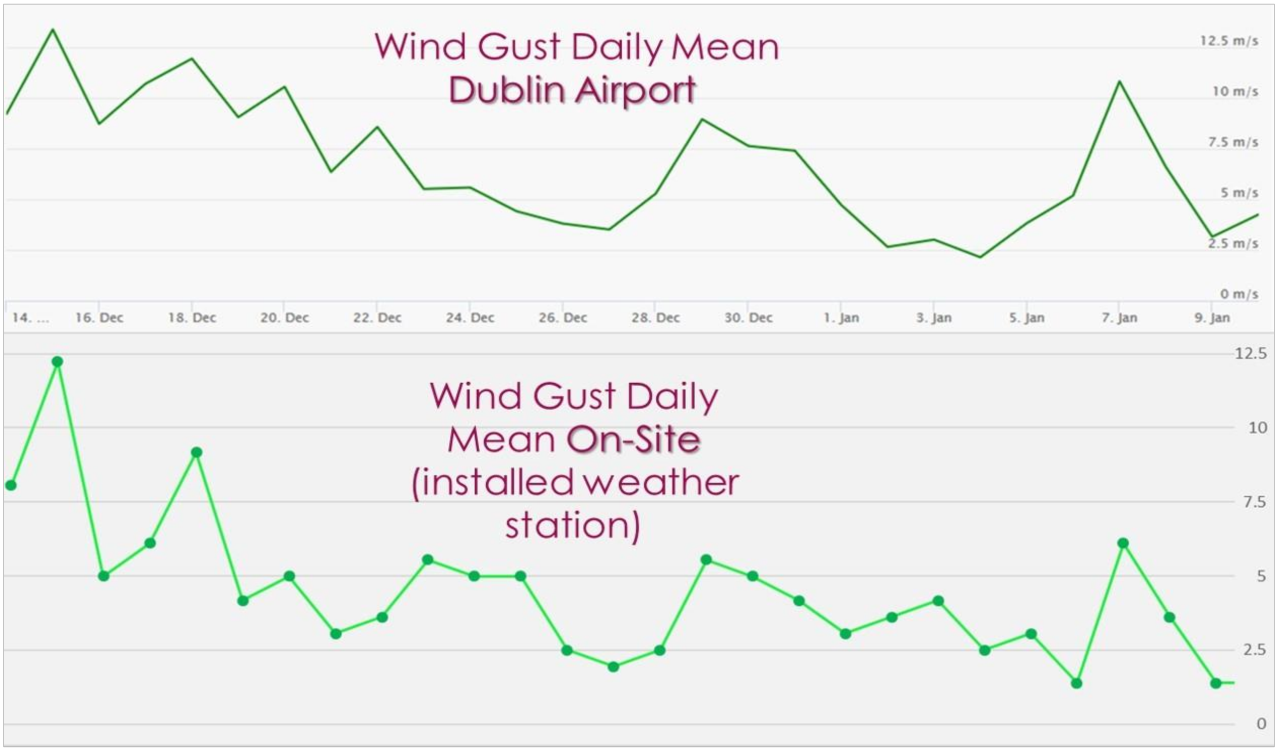


Figure 16.29: Wind Gust Daily Mean Comparison



16.3.5.3 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 sitting 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:

Figure 16.30: Main Categories for Pedestrian Activities

A	Sitting for a long period of time; laying steady position; pedestrian sitting; *Terrace; street 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*

16.3.5.4 Baseline Environment Summary

The wind desktop study of the existing receiving environment showed that:

- The wind profile was built using the annual average of meteorology data collected at Dublin Airport Weather Station. In particular, the local wind climate was determined from historical meteorological data recorded 10m 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 are selected. For each direction, the reference wind speed is 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, is also compared with the one obtained using the data collected on-site. Except few differences, both the wind speed daily mean and the wind gust daily mean recorded on-site follow the same patterns as the ones recorded at Dublin Airport. The speed levels registered on-site are in 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 thus much more shielded if compared with Dublin Airport. This confirms the fact that using wind data from Dublin Airport still ensures a conservative analysis of the wind impact on the proposed Project.
- The prevailing wind directions for the site are identified in the west, west south-west and south-east with magnitude of approximately 6m/s.

16.4 Characteristics of the Proposed Project

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

The images in Figures 16.31 to 16.35 show the development masterplan, development blocks, scale, massing and elevations.

Figure 16.31: Proposed Site Masterplan showing Red Line Boundary[248]

[248] Henry J Lyons (2021). Site Masterplan. Drawing No. STP0011 GA1

Figure 16.32: Project Shoreline GA1 Development Site (CFD modelled)

Figure 16.33: Project Shoreline GA1 Development Blocks (CFD modelled)

Figure 16.34: Project Shoreline GA1 - Elevation Layout Block D

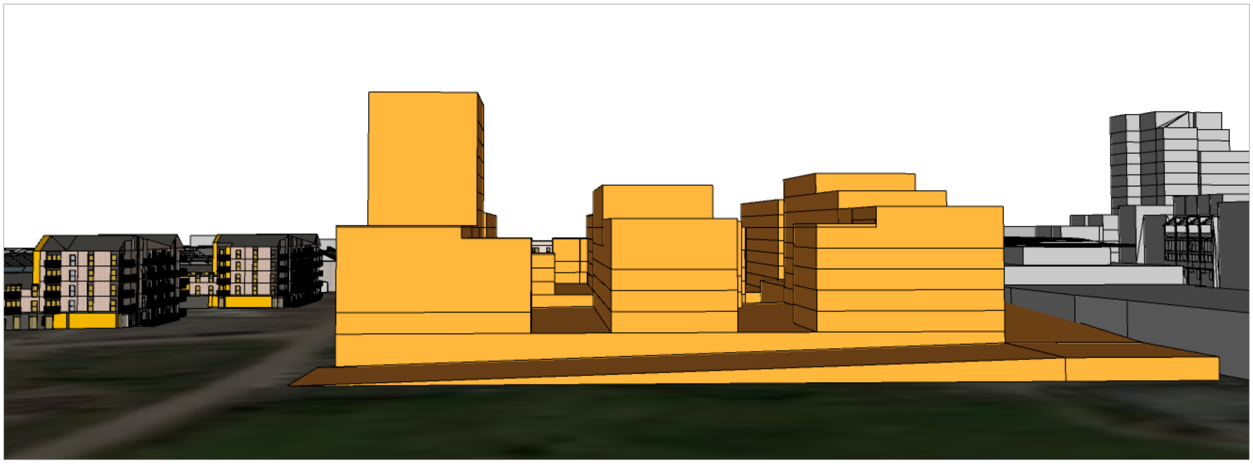
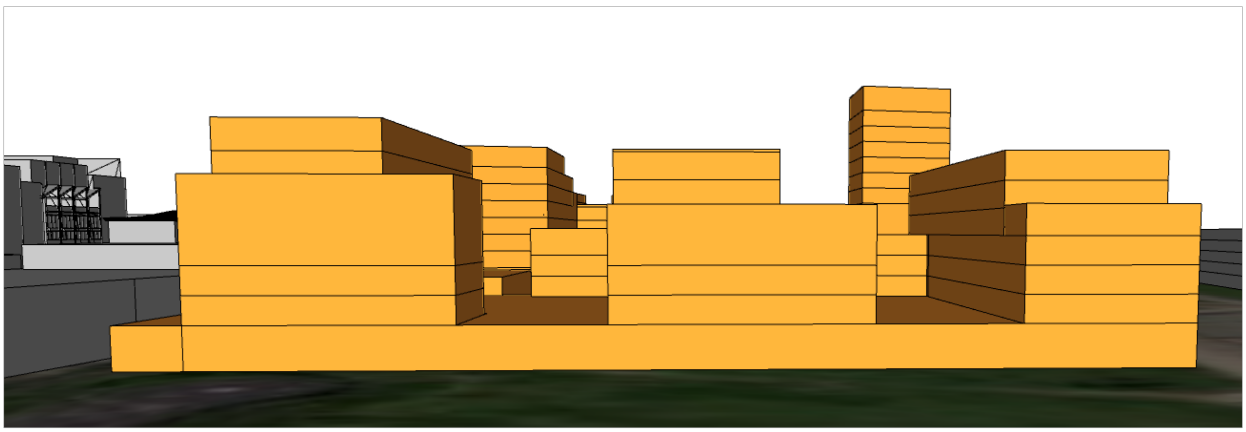


Figure 16.35: Project Shoreline GA1 Section - Elevation Layout Block A



16.5 Potential Impact 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 adjust to those of the completed development, and mitigation measures would need to be implemented 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 development, in principle, offer more drag to the incoming wind profile as detailed in the session that follow (see "Planetary boundary layer and terrain roughness"). Consequently, the wind at lower level can reduce and modify its flow path directions. However, zones of re-circulations caused by the re-direction of the wind can also been 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

In order to conduct the wind comfort assessment, Figures 16.36 to 16.39 show the orientation of the development. It should be kept in mind that this analysis is only 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.

As presented in previous Sections, the Site is receiving a predominant wind from south-west, which correspond to the dominant wind direction in Dublin. For this reason, the qualitative assessment is performed for this condition.

Figure 16.36: Orientation of the Proposed Project within the Red Line

Figure 16.37: Shoreline GA1 (Proposed Project in Colour with Existing and Cumulative Environment in grey)

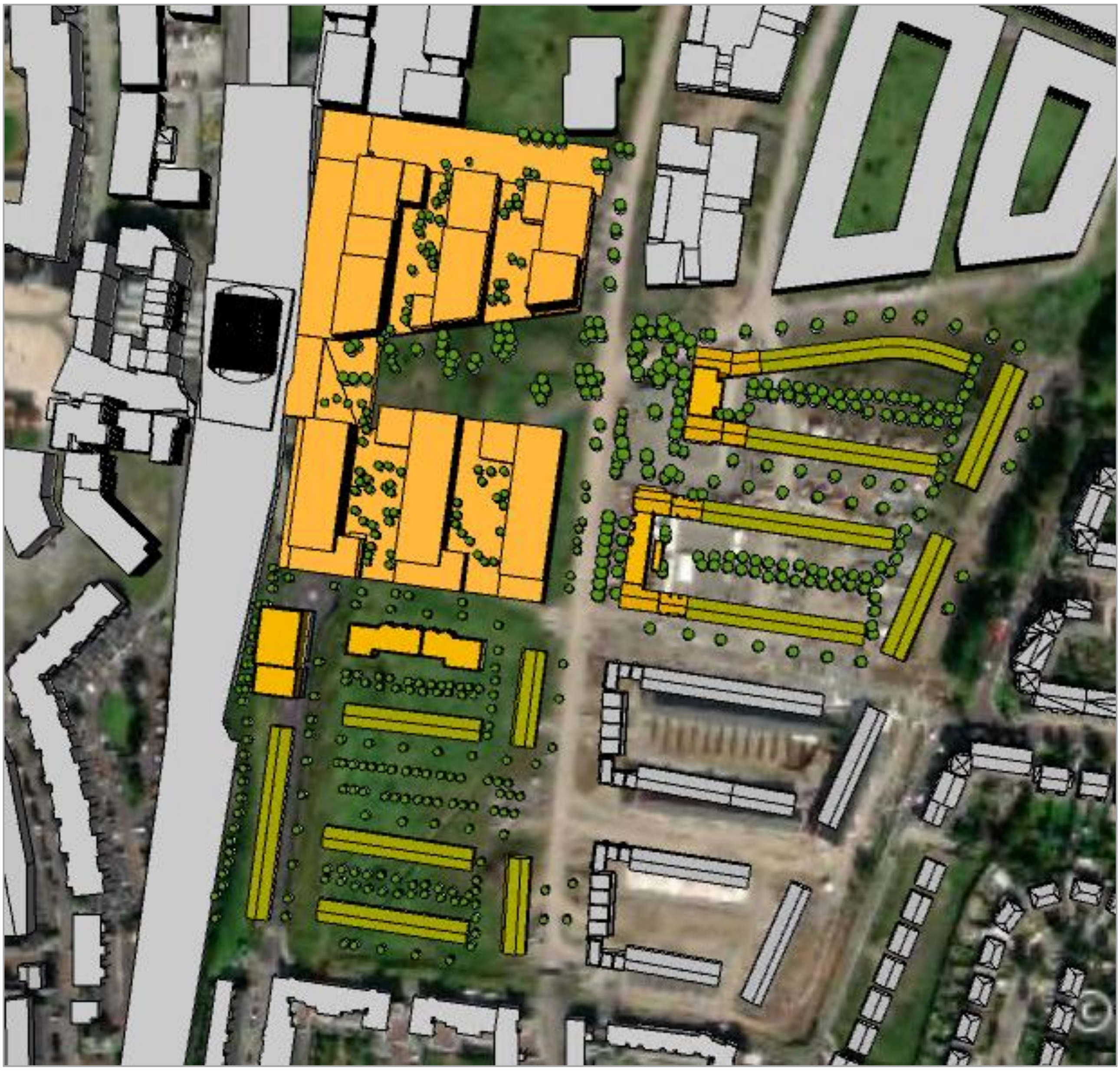


Figure 16.38: Orientation of the Proposed Project - in colour, existing (or proposed LAP development) in grey

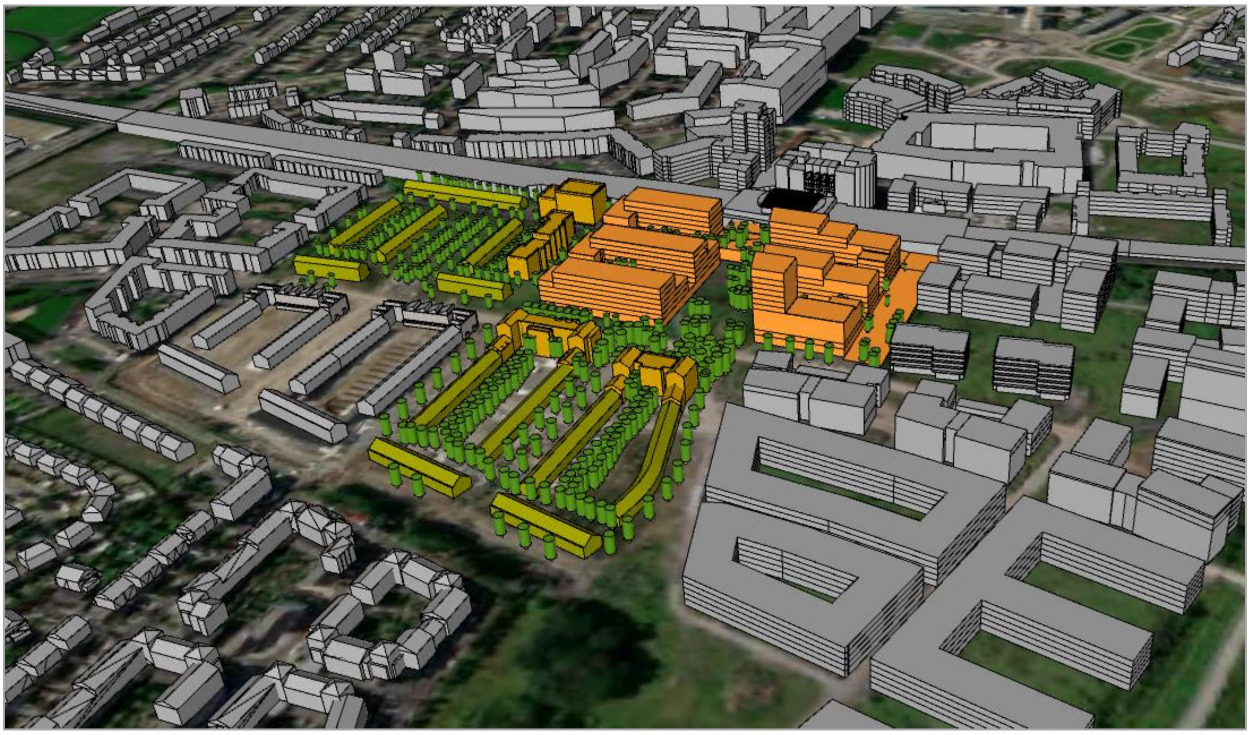


Figure 16.39: Orientation of the Proposed Project - in colour, existing (or proposed LAP development) in grey

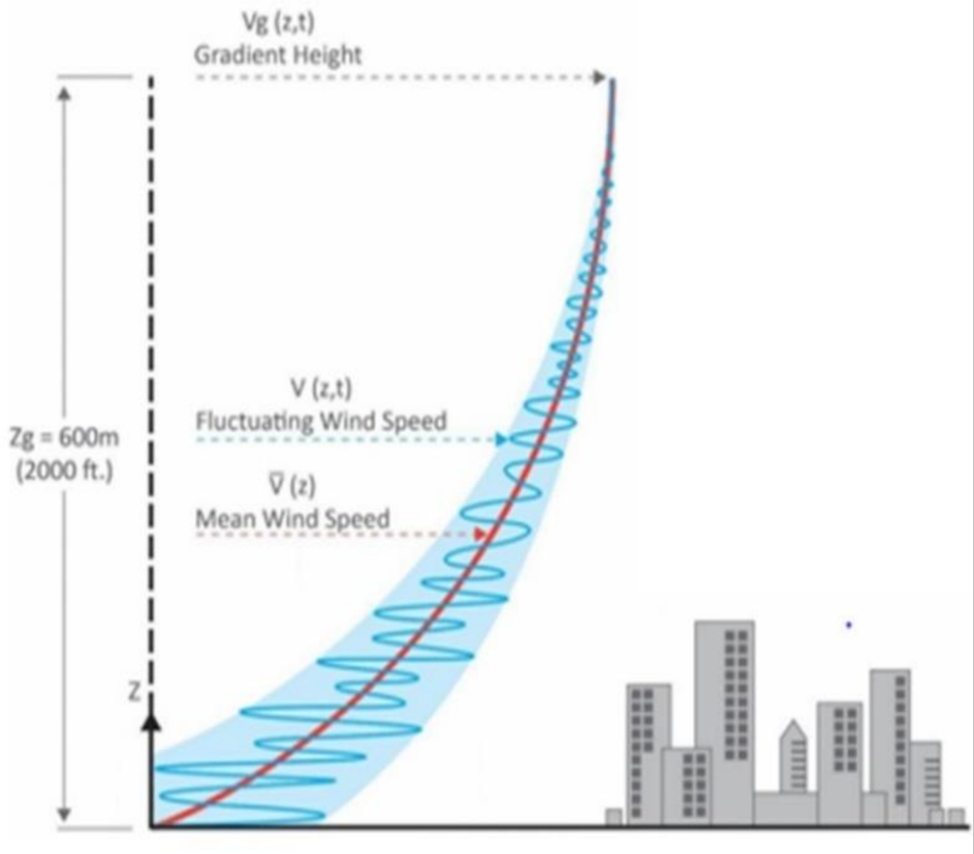
- **Potential Downdraft Effect -** The building heights varies across the site, this can create phenomena of downdraft in some areas. This can be seen when the leeward face of a low building faces the windward face of a tall building, it causes an increase in the downward flow of wind on the windward face of the tall building.
- **Potential Funnelling Effect -** The buildings location appears to converge on the central area of "Ireland 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 facades, building separation distance and building orientation.
- **Potential Downwash Effect -** There is an intention of constructing tall buildings within the development. In this case, if the height ratio between the proposed tall buildings and their surrounding is increased significantly, a Downwash effect will be likely to occur. The tall buildings tend to deflect the wind downwards, causing accelerated wind speeds at pedestrian level and around the windward corners of the 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 - "the surface layer of the planetary boundary layer".

Wind speed increases with increasing height above the ground, starting from zero, due to the no-slip condition. In particular, the wind velocity profile 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 16.40 shows the wind velocity profile, as described above.

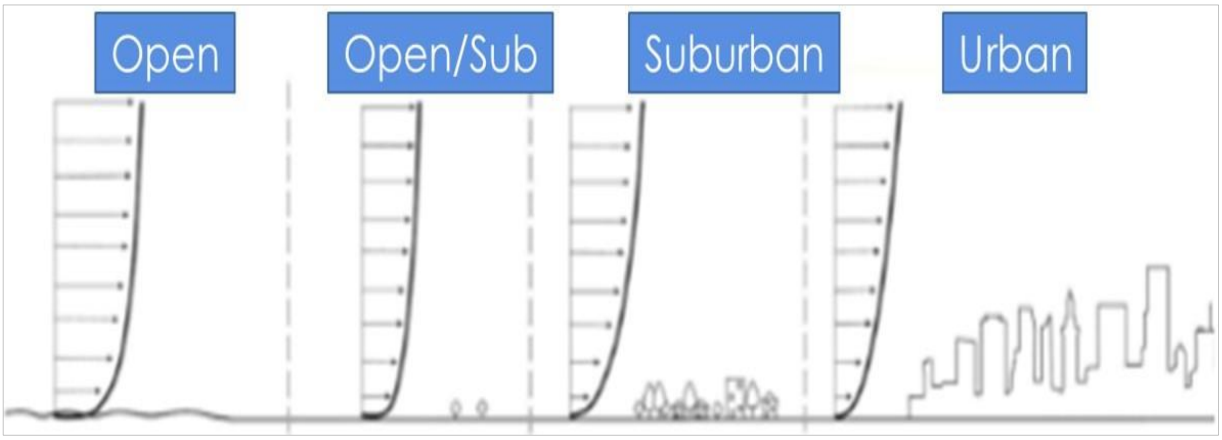
Figure 16.40: Wind Velocity Profile



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.

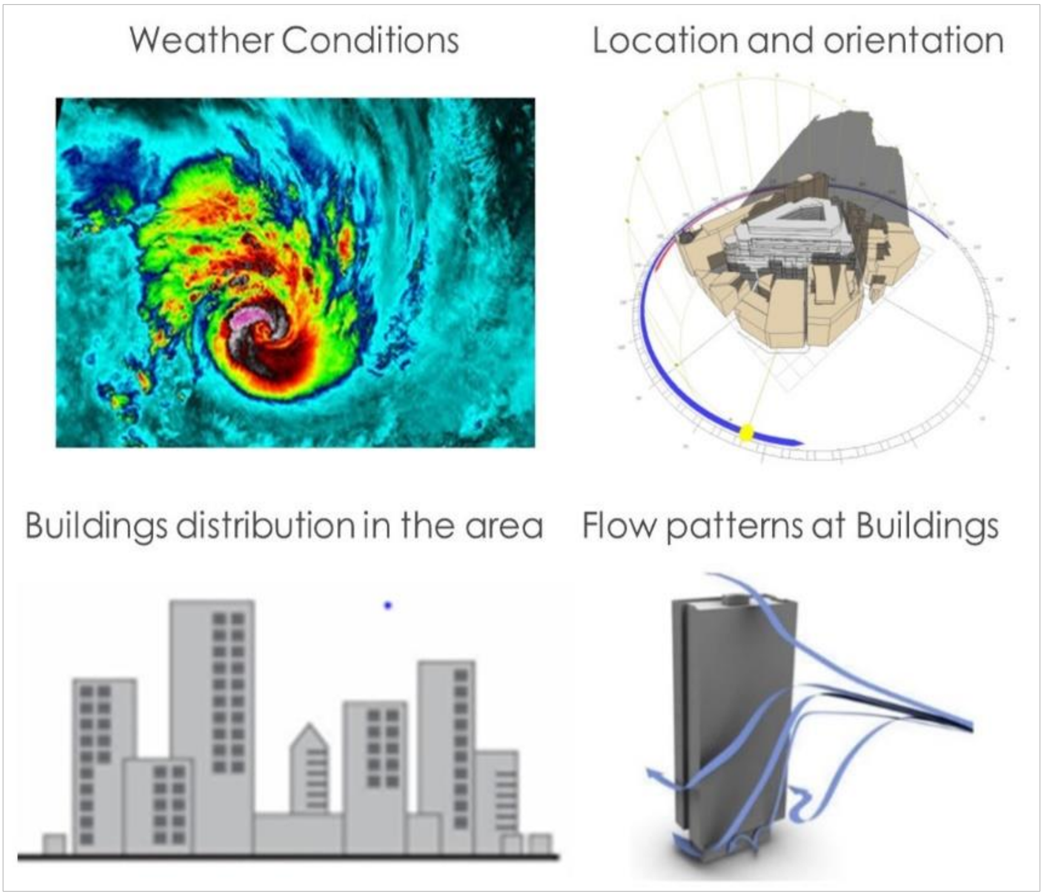
Figure 16.41: Wind Velocity Profile for different terrains



In order to assess the wind conditions in a particular area, it is important to know (refer to Figure 16.42):

- Weather conditions in the area
- Location and orientation of the site
- Buildings distribution in the area
- Flow patterns at the building

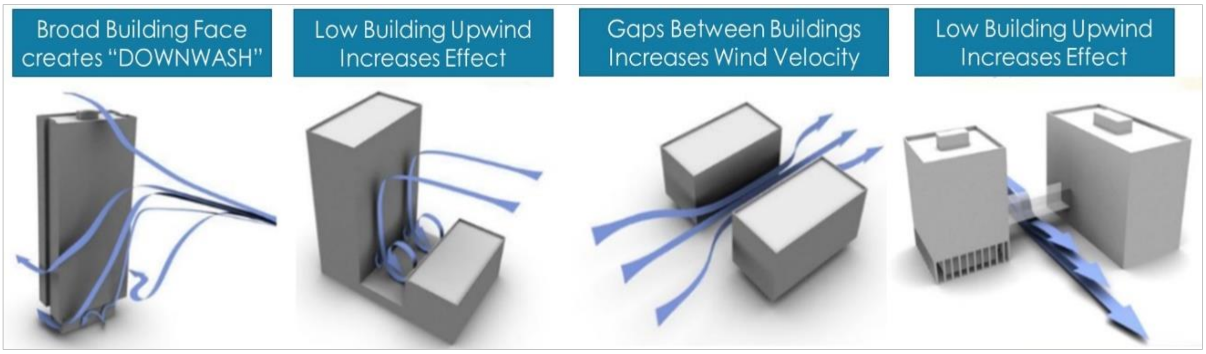
Figure 16.42: Parameters to know for Wind Conditions Assessment



Moreover, it is important to understand key flow features (refer to Figure 16.43):

- Broad Building Face creates "DOWNWASH".
- Low Building Upwind Increases Wind Effects.
- Gaps Between Buildings Increases Wind Velocity.
- Low Building Upwind Increases Wind Effects.

Figure 16.43: Parameters to know for Wind Conditions Assessment



16.6 Mitigation Measures

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 adjust to those of the completed development, and mitigation measures would need to be implemented before completion and operation.

16.6.2 Operational Phase

As stated above, if the wind conditions exceed the threshold, these conditions become unacceptable for favourable pedestrian activities and mitigation measure should be accounted for.

Mitigation measures include:

- **Landscaping:** the use vegetation to protect buildings from wind.
- **Sculptural screening (solid or porous):** to either deflect the wind or bleed the wind by removing its energy.
- **Canopies and Wind gutters:** horizontal canopies are used to deflect the wind and redirect the wind around the building and above the canopy**.**

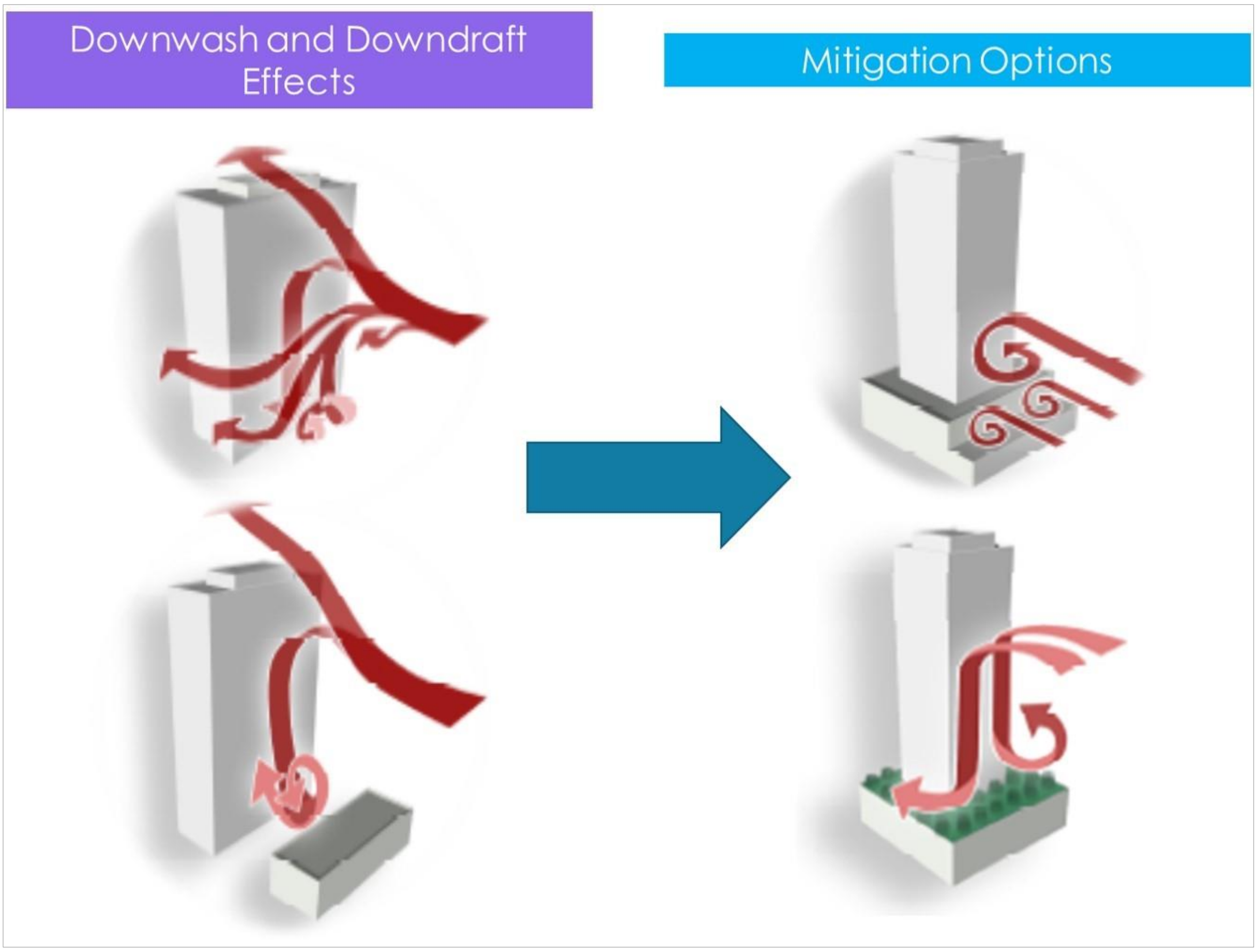
In particular, it is possible to summarise the different flow features and the corresponding mitigation option as follows (Figures 16.44 and 16.45):

- **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 facades 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.

Example of Typical Mitigation Options:

- 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 16.44: Mitigation Measures for Downwash and Downdraft Effects

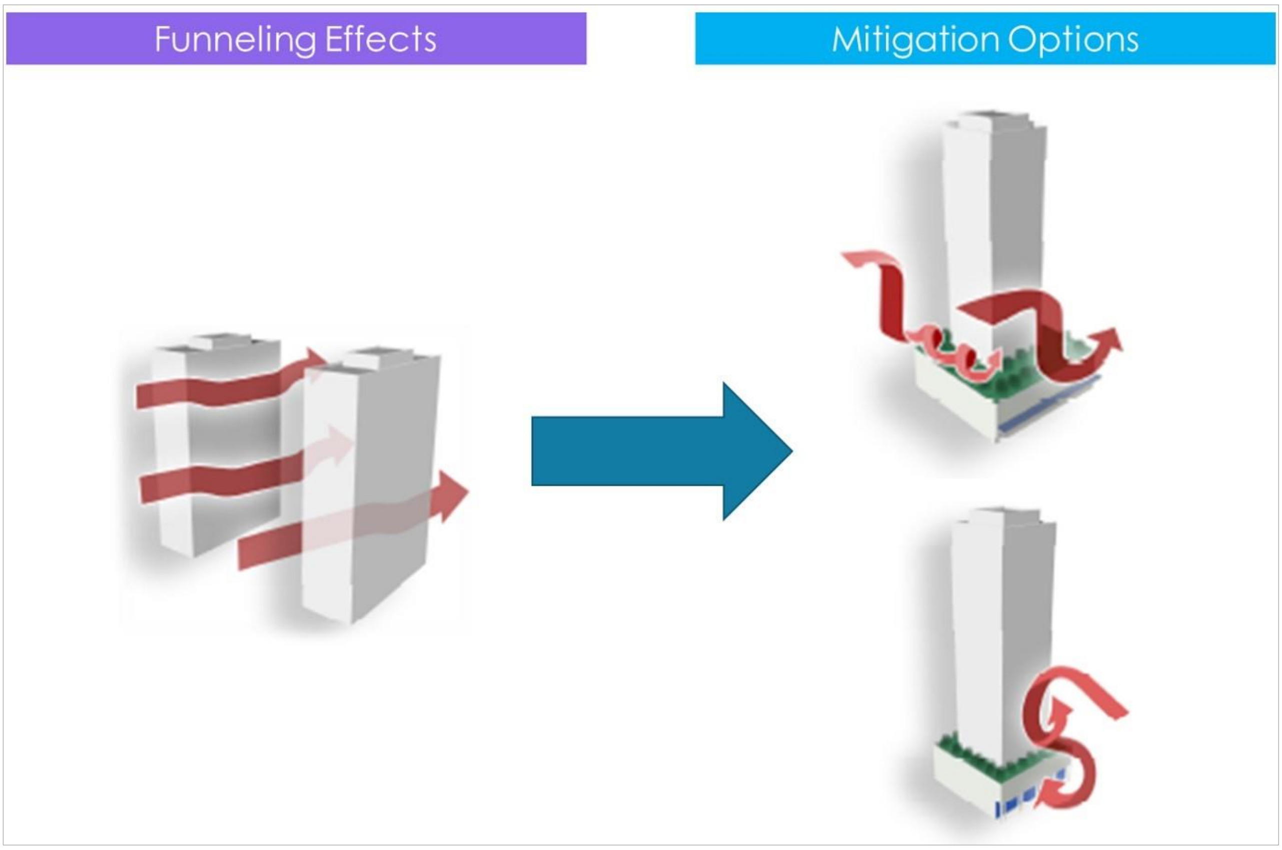


- **Funnelling Effects**: Wind speed is accelerated when wind is funnelled between two buildings. This is referred to as the "wind canyon effect". The intensity of the acceleration is influenced by the building heights, size of the facades, building separation distance and building orientation. Similar effect can be noticed when a bridge is connecting two buildings, the wind passing below the bridge is accelerated, therefore pedestrians can experience high uncomfortable velocities of wind.

Examples of Typical Mitigation Options:

- 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 where to walk while being protected or a breeze walking space outside the colonnade zone.

Figure 16.45: Mitigation Measures for Funnelling Effects



The mitigation measures utilized for 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 Figure 16.46 and 16.47. These introduce a pressure drop in the model and therefore causes the wind to reduce its speed when passing through the trees, as expected in reality. The CFD plot shown in Figure 16.46 demonstrates this effect. Trees are introduced into the model as porous mediums, this to reproduce the velocity modifications and pressure drop that vegetation will create on the incoming air flows. These porous mediums are illustrated in geometry as shown in Figure 16.46.

Figure 16.49 shows a plan view of the mitigation measures that will be implemented as agreed with BSLArch (Project's Landscape Architects) around the proposed Project. Figures 16.50 and 16.51 show the CFD modelling of the trees. Figures 16.52 shows in detail the mitigation measures implemented around Block A1, A2 and A3. Figures 16.53 and 16.54 respectively show in detail the mitigation measures implemented as linear parks in the proposed Project.

Landscape Trees Modelling (Using Porous Media)

Through CFD Modelling, it is possible to implement the effects of landscaping trees on the wind flowing through an urban environment. Urban landscape managers, local councils and architects can now observe and assess the effects of landscaping trees in their urban landscape models. The landscape trees are simulated as comprising effects of porous zones within the urban environments. This is an essential tool for accurately assessing the actual wind speed and pattern at a pedestrian level when landscape is available. Figures 16.46 and Figure 16.47 show the modelling approach of utilizing porous media within the CFD numeric code to implement the effect of landscape within Shoreline GA1, Baldoyle, Dublin 13.

Figure 16.46: CFD Modelling of a Tree

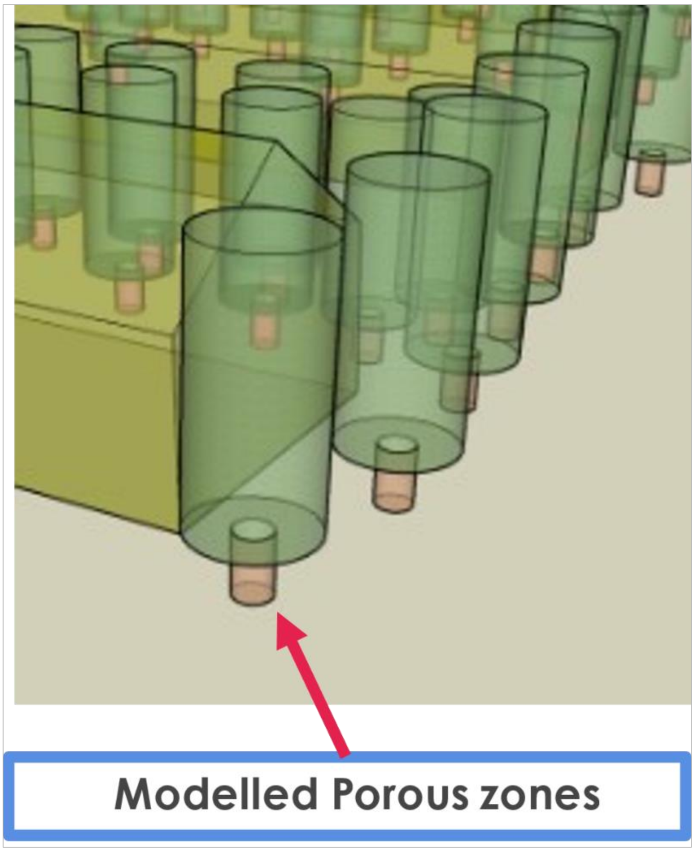


Figure 16.47: CFD Modelling of the Trees

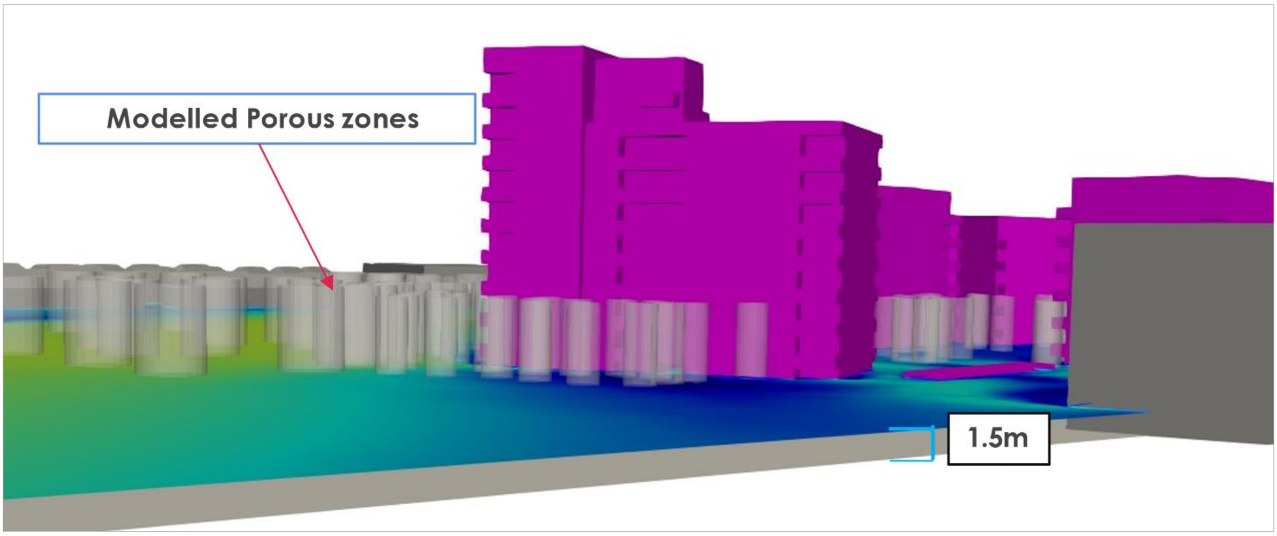


Figure 16.48: Generic Result of Wind Impacting on a Tree

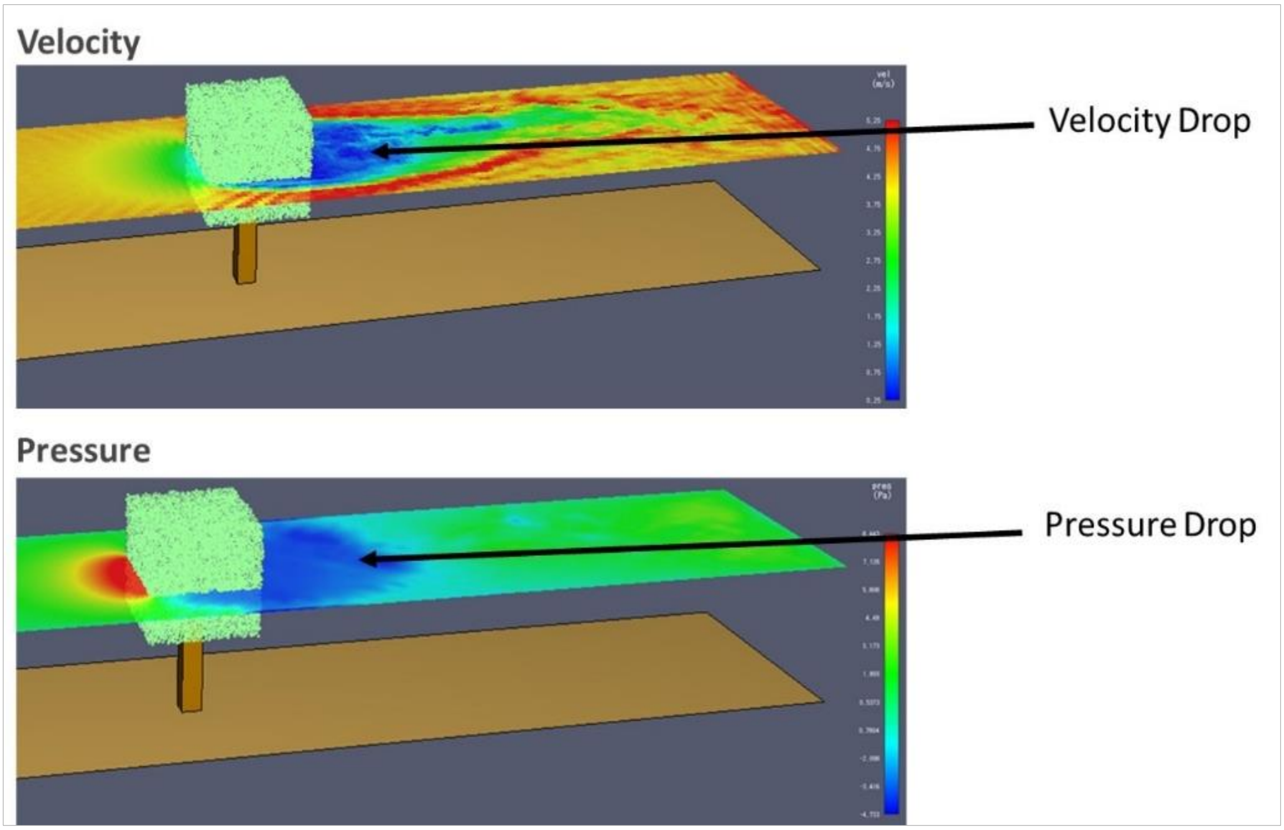


Figure 16.49: Plan View of the Mitigation Measures that will be implemented around the Proposed Project

Figure 16.50: CFD Modelling of the Trees

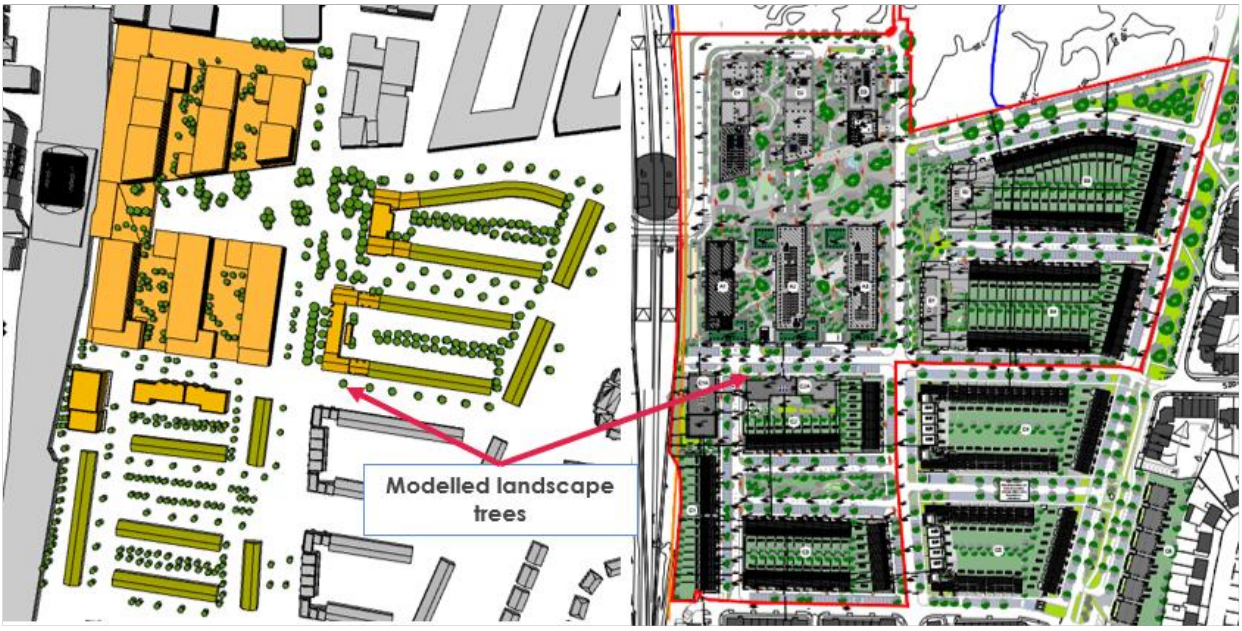


Figure 16.51: CFD Modelling of the Trees

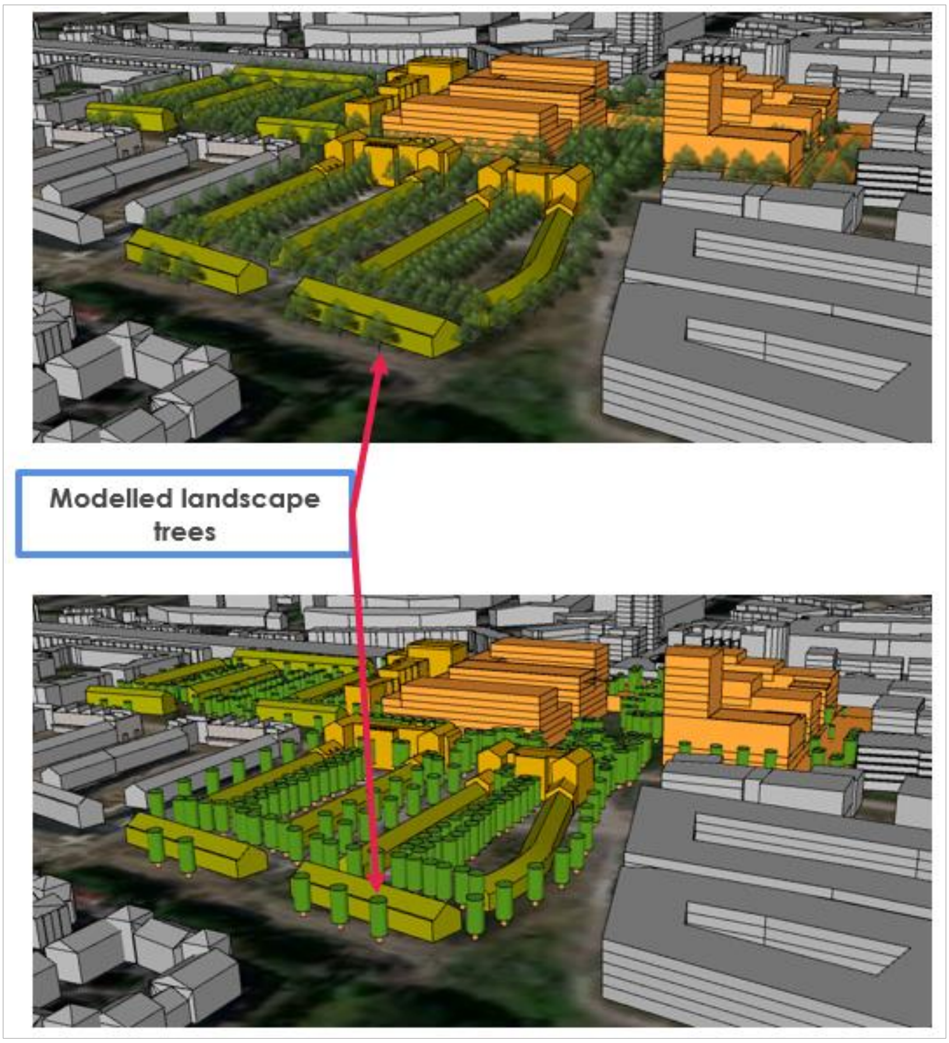


Figure 16.52: Mitigation Measures that will be implemented around Block A1, A2 and A3

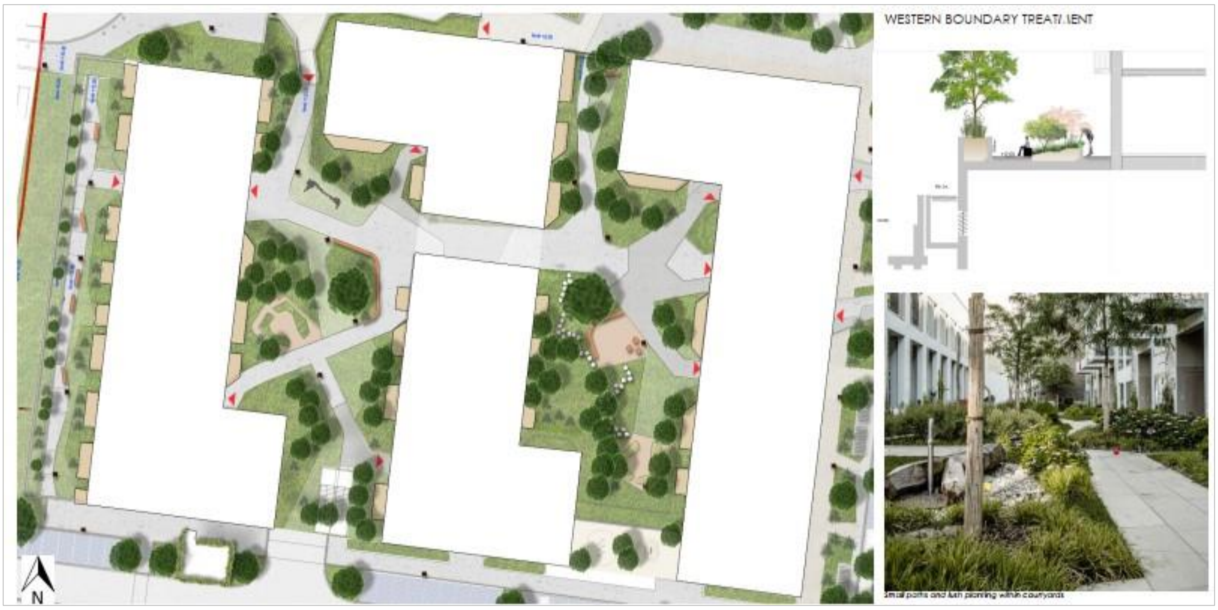


Figure 16.53: Mitigation Measures - Linear Park 1

Figure 16.54: Mitigation Measures - Linear Park 2

Figure 16.55: Mitigation Measures in CFD model

16.7 Predicted Impact of the Proposed Project

This section assessed the potential impact of the proposed Project on the already existing environment, and the suitability of the proposed Project to create and maintain a suitable and comfortable environment for different pedestrian activities.

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 CFD model. Any object which may have 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 16.56 and 16.57. The modelled layout and dimensions of the surrounding environment are outlined in the table below (refer to Table 16.2).

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 2km^2 around the proposed Project, as shown.

Table 16.2: Modelled Environment Dimensions

	Modelled CFD Environment Dimensions		
	Width	Length	Height
CFD Mesh Domain	1500m approx.	1500m approx.	200m approx.

Figure 16.56: Proposed Project - Extents of Modelled Area

Figure 16.57: Proposed Project 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 (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:

- v1 = wind speed measured at the reference height h1.
- h1 = reference height to measure v1.
- h2 = height of the wind speed v2 calculated for the wind profile.
- z0 = 0.4 [m] roughness length selected (see table in Figure 16.56 below).

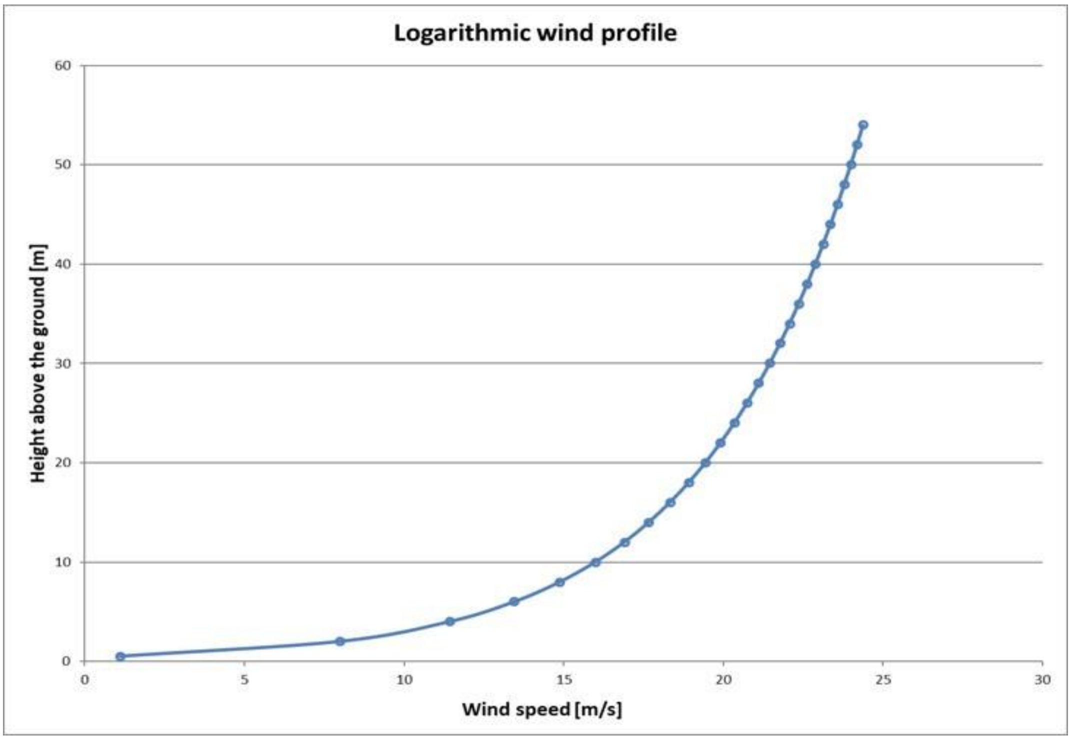
Figure 16.58: Roughness Length and Class to be used for the Logarithmic Wind Profile

Roughness Classes and Lengths

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 seperated by more than 1 km
2	0.1 m	Agricultural land with a few buildings and 8 m high hedges seperated by approx. 500 m
2.5	0.2 m	Agricultural land with many trees, bushes and plants, or 8 m high hedges seperated 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 16.59.

Figure 16.59: 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 16.3, while an example of the utilized computational mesh grid is as shown in Figures 16.60 - 16.62.

The grid follows the principles of the '*Finite Volume Method*', which implies that the solution of the model equations is calculated at discrete points (nodes) on a three-dimensional grid, which includes all the flow volume of interest. The mathematical solution for the flow is calculated at the centre of each of these cells and then an interpolation function is used by the software to provide the results in the entire domain.

Table 16.3: Air and Computational Mesh Parameters

AIR AND COMPUTATIONAL MESH PARAMETERS	
Air Density	$1.2kg/m^3$
Ambient Temperature (T)	$288K\ (approx. 15C^{\circ})$
Min mesh cell size	Approx. 0.1m - 0.5m At Development Building Approx. 0.5m - 1.5m At Environment Buildings Approx. 2m - 5m Elsewhere
Background cell size ratio	1:1:1 (dx:dy:dz)
Total mesh size	Approx. cells number = 15 million

Figure 16.60: Proposed Project Domain - Computational Mesh Utilized

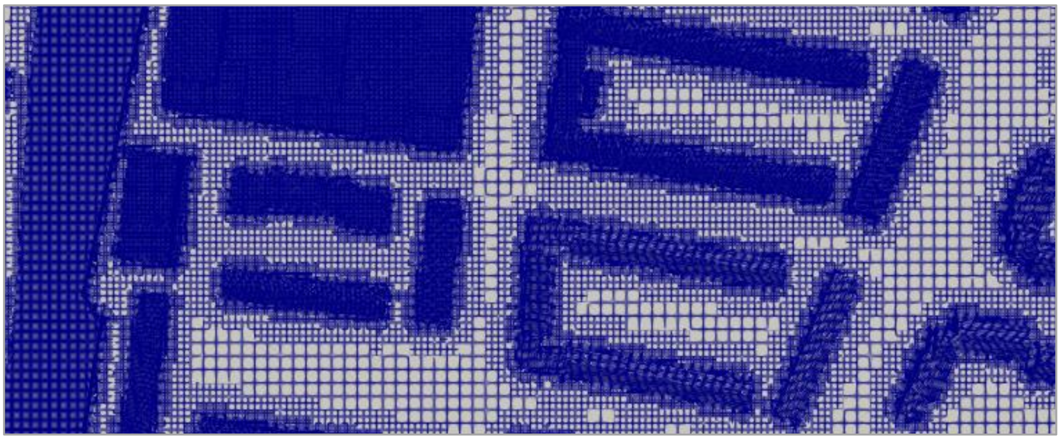


Figure 16.61: Proposed Project - Computational Mesh Utilized

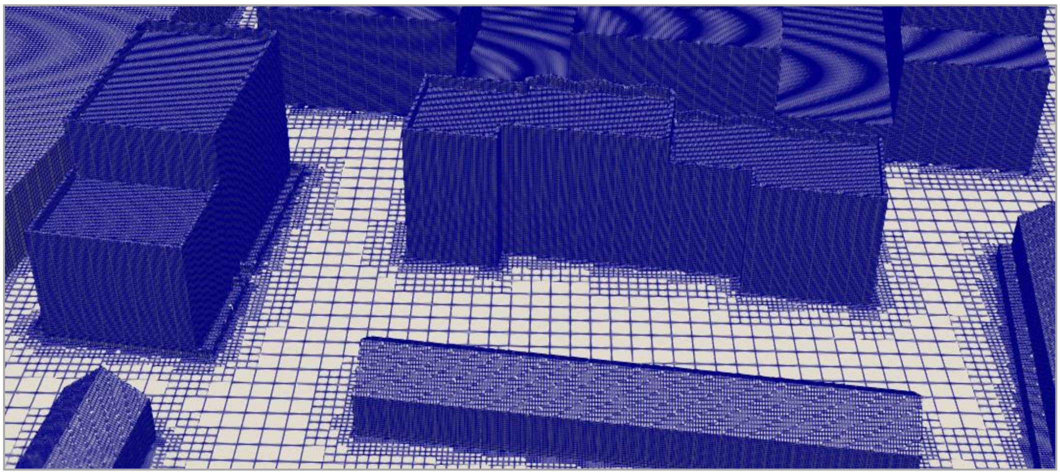
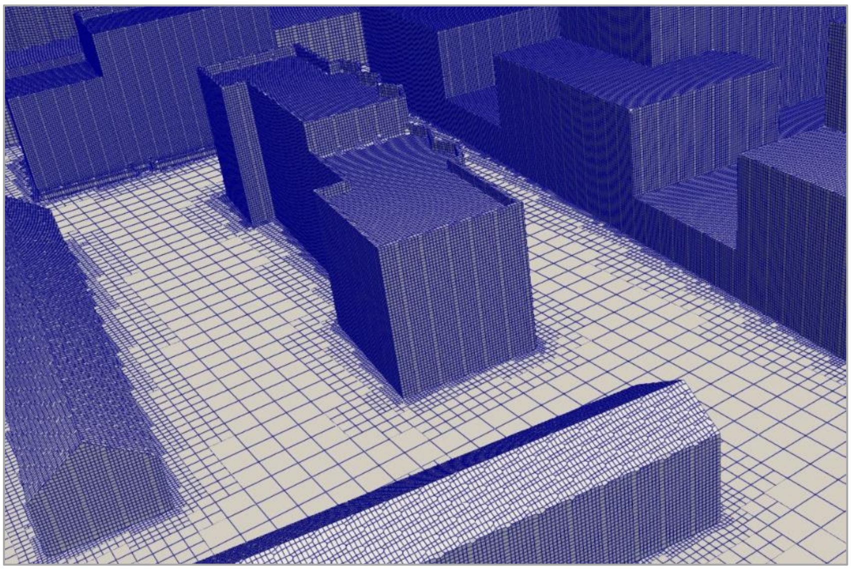


Figure 16.62: Proposed Project - Computational Mesh Utilized



16.7.5 Construction Phase

The possible effects on wind micro-climate at the Site during the Construction Phase of the proposed Project has not been directly assessed but was 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 development proceeds, the wind setting at the Site would progressively conform to those of the completed development. 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 should in case some areas of the Site are expected to be functional before the construction is finalized.

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 slightly calmer when the proposed Project is in-situ), the impacts evaluated on-site are considered to be *insignificant.* Thus, the predicted impacts during Construction Phase are identified *as not significant* or *imperceptible.*

In summary, as construction of the proposed Project progresses, the wind conditions at the Site would gradually adjust to those of the completed development. During the Construction Phase, predicted impacts are classified as *negligible.*

16.7.6 Operational Phase

This section shows CFD results of wind and microclimate assessment carried out considering the "Operational Phase" of the proposed Project. In this case the assessment has considered the impact of wind on the existing area including the proposed Project. For this scenario, the proposed Project has been simulated. Wind simulations have been carried out on all the various directions for which the development 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 areas 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 in this project is given in the table shown in Figure 16.63.

Figure 16.63: Summary of CFD Model Input Data

Parameter	CARMANHALL ROAD DEVELOPMENT MODEL
Environment Conditions	
Ambient pressure	101325 Pa
Wind profile	Logarithmic atmospheric profile
Ambient temperature	15 °C
Analysis type	Steady state (LES)
Computational Details	
Total cells used	> 20,000,000
Mesh size	< 0.2 m
Turbulence treatment	K-epsilon turbulence model
Convergence Criteria	$< 10^{-6}$
Boundary Conditions	
CFD Domain Inlet	Wind Velocity inlet
CFD Domain Outlet	Pressure Outlet condition (zero pressure)
Carmanhall Road Buildings	Zero velocity gradient (No-slip condition)

It is also of interest at this point to underline once more the objectives of simulations performed. In particular:

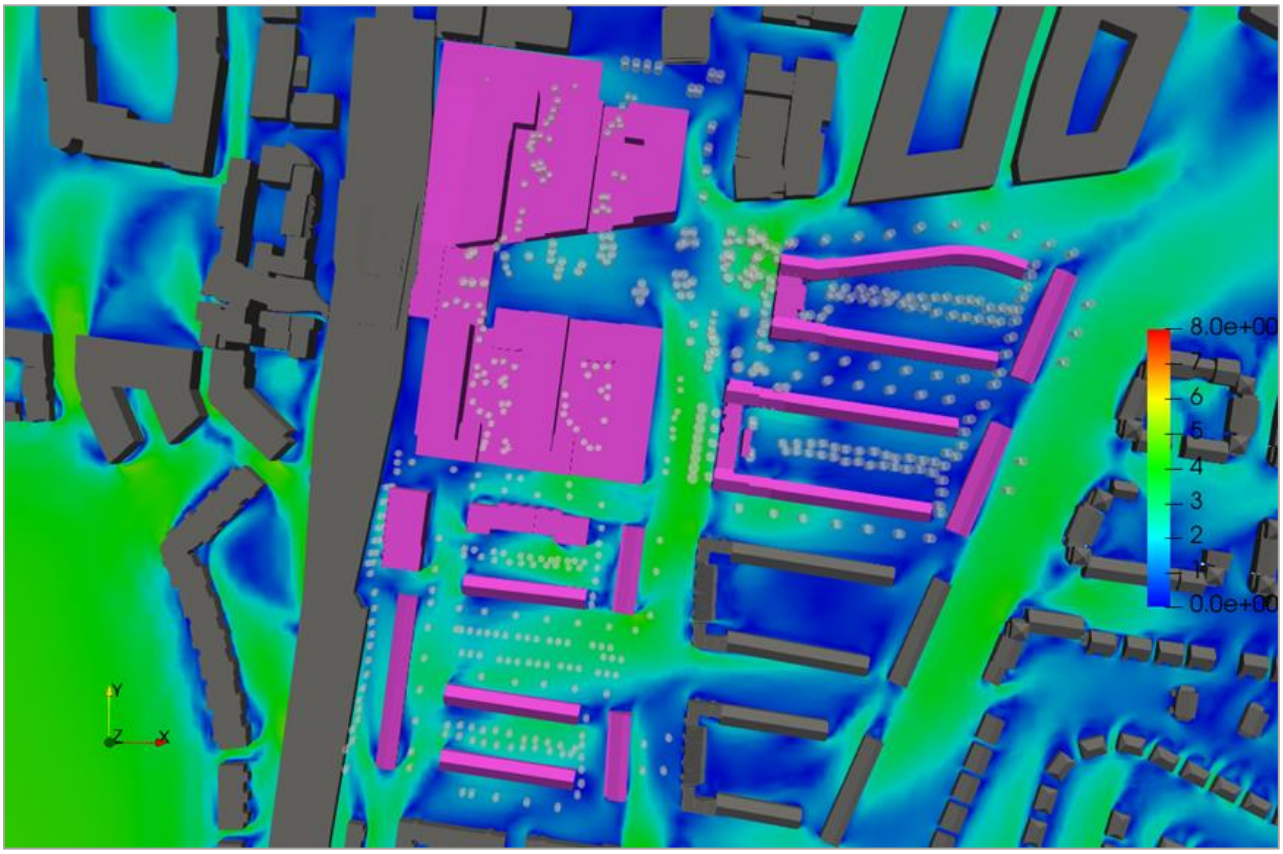
- Pedestrian Wind Comfort and Safety Studies are conducted to predict, assess and, where necessary, mitigate the impact of the development on pedestrian level wind conditions.

To assess comfortable and safe pedestrian level wind conditions that are appropriate for the intended use of pedestrian areas. Pedestrian areas include sidewalks and street frontages, pathways, building entrance areas, open spaces, public spaces, amenity areas, outdoor sitting areas, etc.

Results of 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 16.64 shows a 3D example of wind speed results collected at 1.5m height above ground floor level of the proposed Project. Red colours generally indicate critical values while blue colours indicate tenable conditions.

Figure 16.64: Wind Flow Results Collected At 1.5m Height above Ground Floor



Shoreline GA1 with permitted Shoreline GA2 and Clongriffin existing and permitted developments (Existing Scenario)

This section assessed the potential impact of the proposed Project on the already 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. Shoreline GA1 Development and adjacent buildings Model (including permitted GA2) and Clongriffin existing and permitted development which are not built yet, are shown in Figures 16.65 (top views).

Figure 16.65: Top View - Shoreline GA1 Development, Permitted Shoreline GA2 Development and Clongriffin developments (existing and permitted but not built) - Extents of Modelled

16.7.6.1 Flow Velocity Results - Ground Floor Level - Without Mitigation Measures

Results of wind speeds and their circulations around the proposed Project at pedestrian level of 1.5m above the development 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 east side of the proposed Project and on the main road across the development, as well as near the train station, especially when the wind is blowing from south-west and west-south-west. However, the implementation of tree landscaping on the main roads and all around the proposed Project, with particular attention to the corners, will mitigate these effects.

Depending on the wind direction, funnelling effects are experienced on the main roads around the development and on the roads in-between the different blocks. Possible solutions for this could be horizontal canopies, which 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. Finally, a colonnade on the windward face of the base building could provide the pedestrian with a calm area where to walk while being protected or a breeze walking space outside the colonnade zone. Also, the implementation of tree landscaping in these areas might mitigate these effects. Courtyards, parks and squares seem to be well shielded. However, some recirculation effect have been found for certain wind directions. The implementation of tree landscaping in these areas will mitigate these effects.

Figures 16.66 to 16.82 present views of the flow velocity results for the entire domain for the dominant wind direction (225°).

Figure 16.66: Wind Speed Results at 1.5m Above Ground - 3D View: 225°

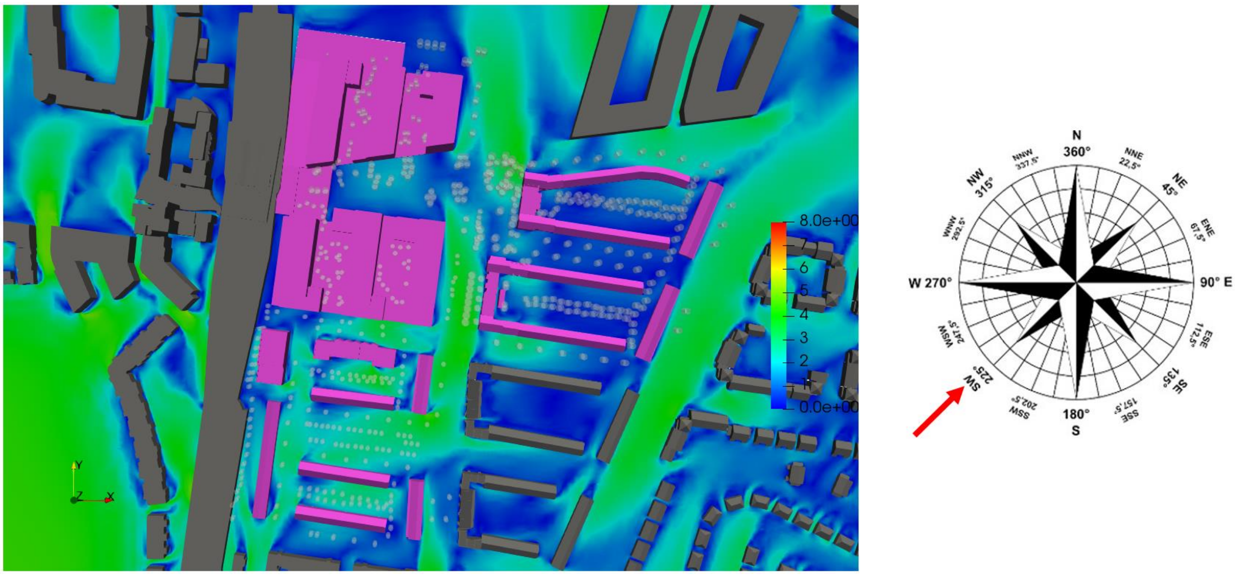


Figure 16.67: Wind Speed Results at 1.5m Above Ground - 3D View: 225°

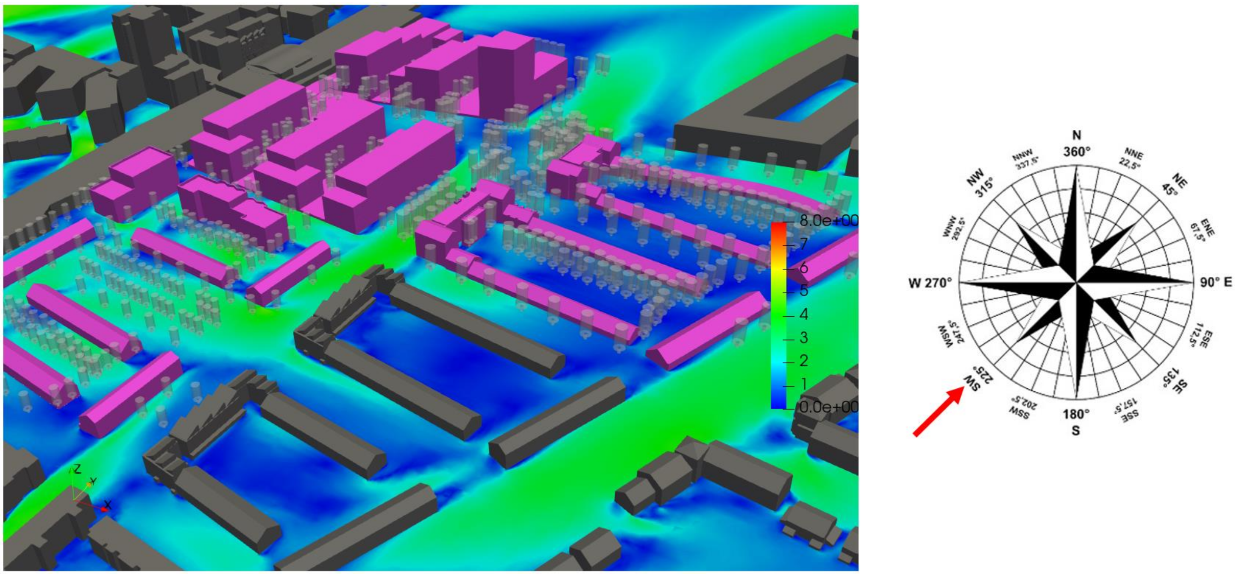
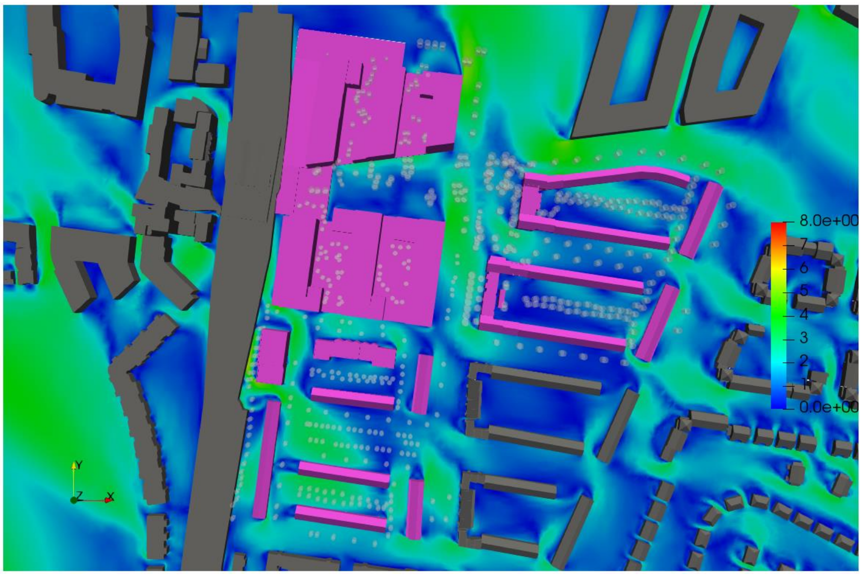


Figure 16.68: Wind Speed Results at 1.5m Above Ground - 3D View: 135°



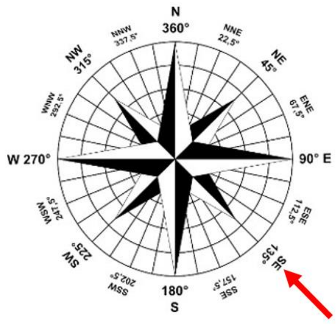
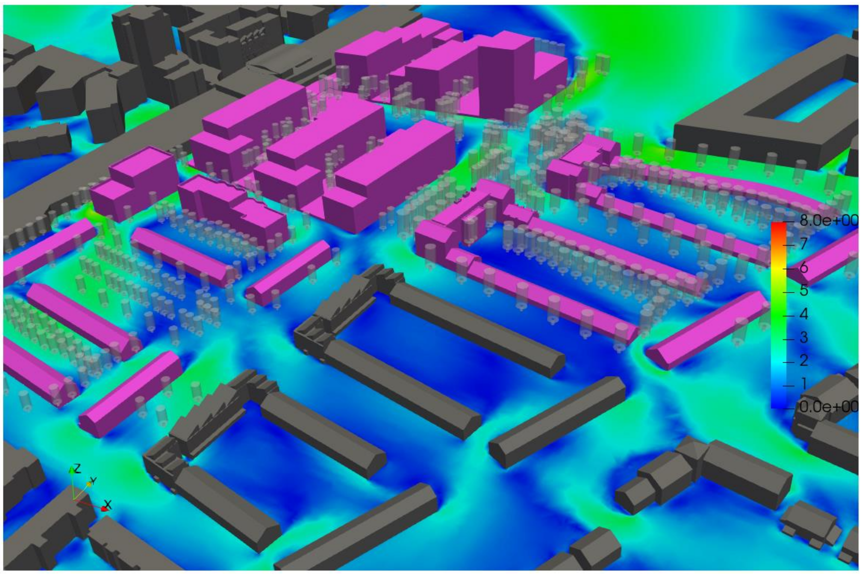


Figure 16.69: Wind Speed Results at 1.5m Above Ground - 3D View: 135°



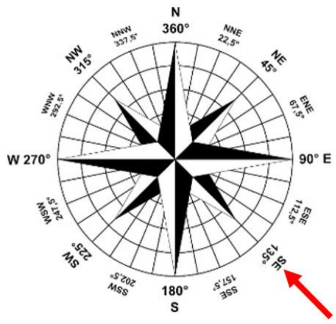


Figure 16.70: Wind Speed Results at 1.5m Above Ground - 3D View: 236°

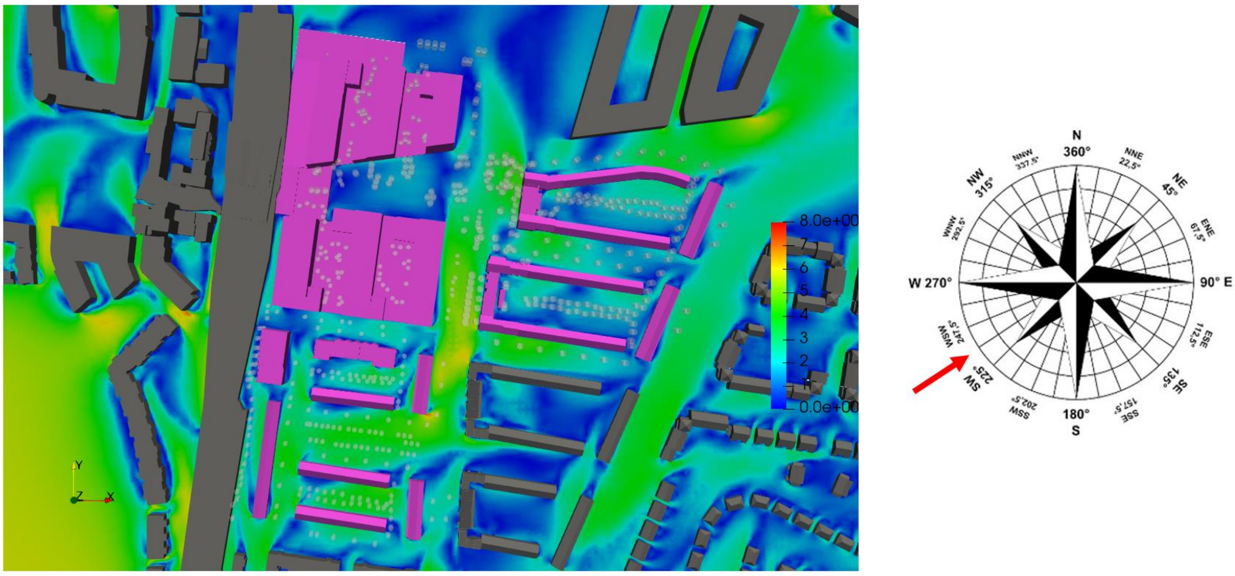


Figure 16.71: Wind Speed Results at 1.5m Above Ground - 3D View: 236°

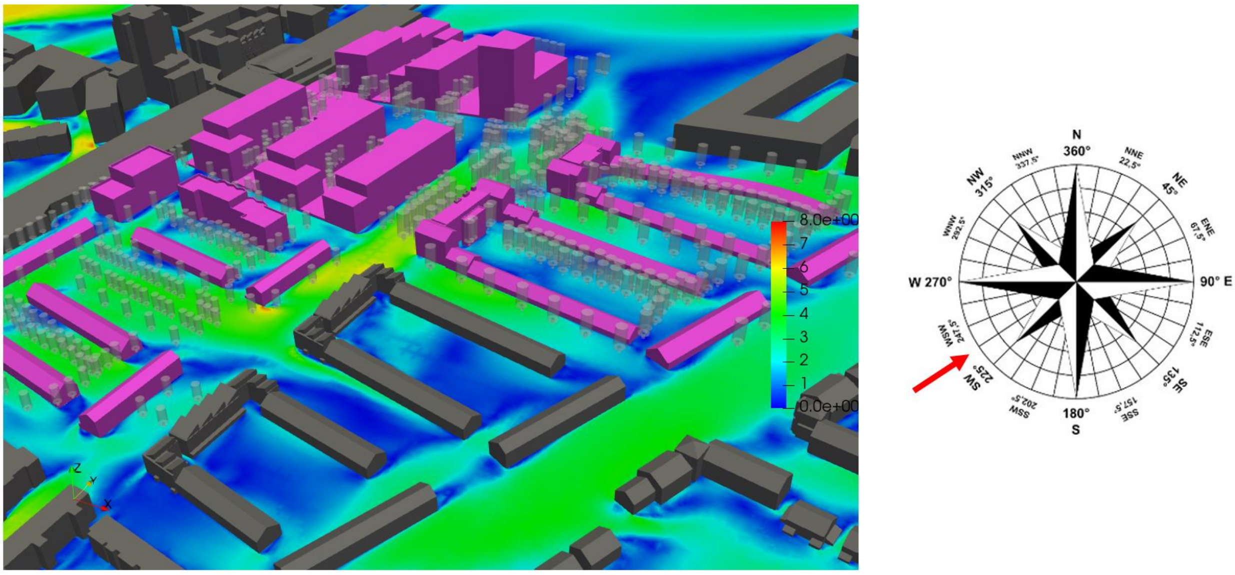


Figure 16.72: Wind Speed Results at 1.5m Above Ground - 3D View: 258°

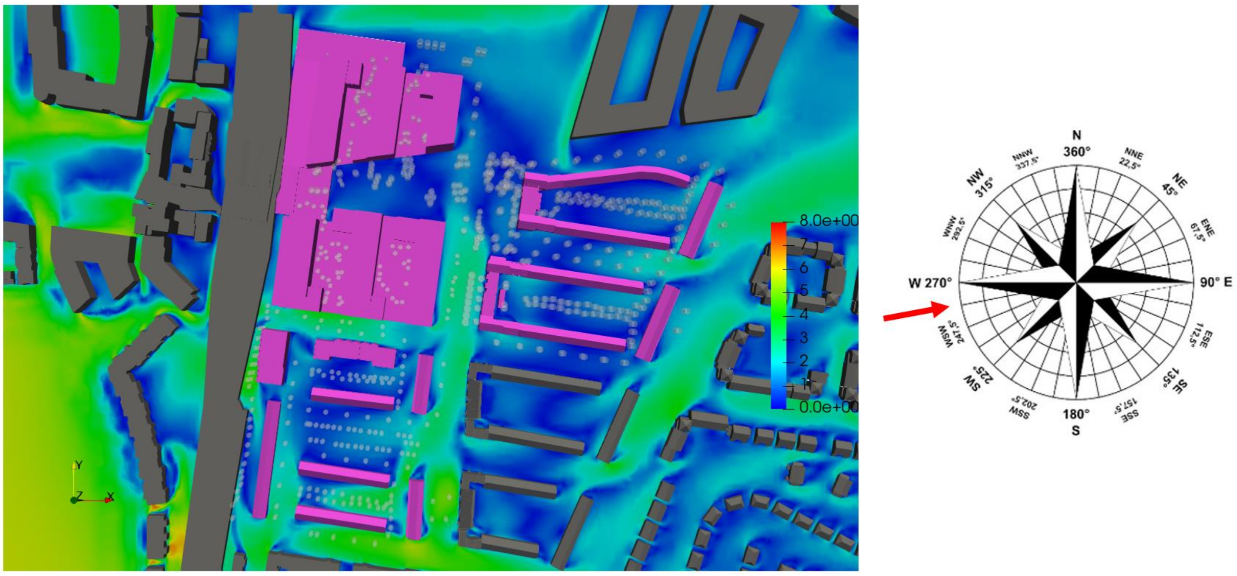


Figure 16.73: Wind Speed Results at 1.5m Above Ground - 3D View: 258°

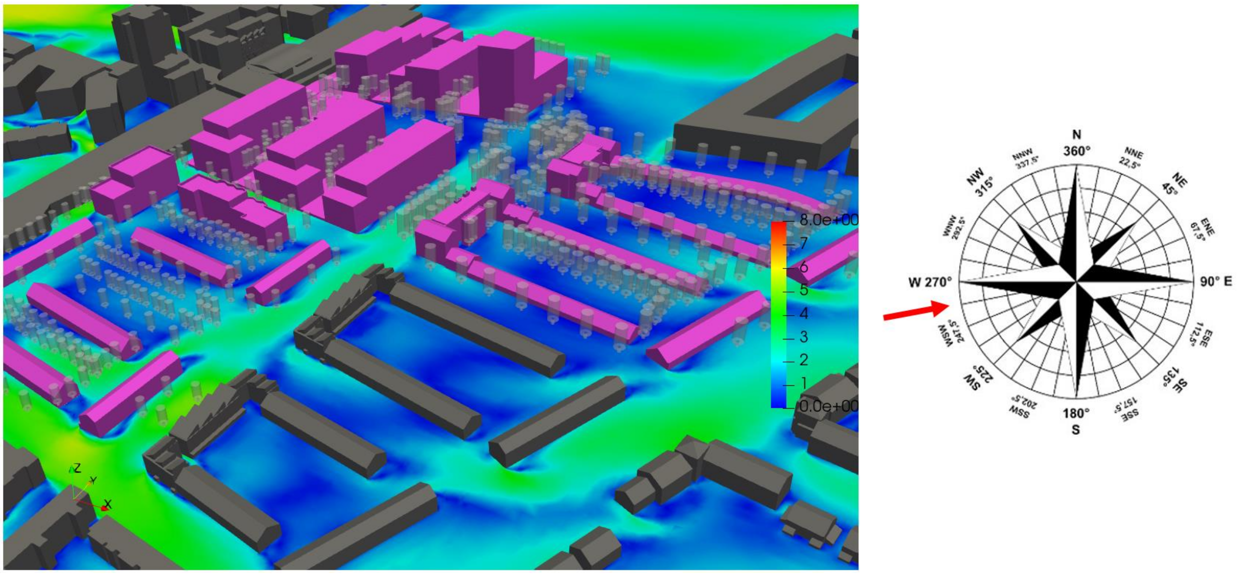


Figure 16.74: Wind Speed Results at 1.5m Above Ground - 3D View: 247°

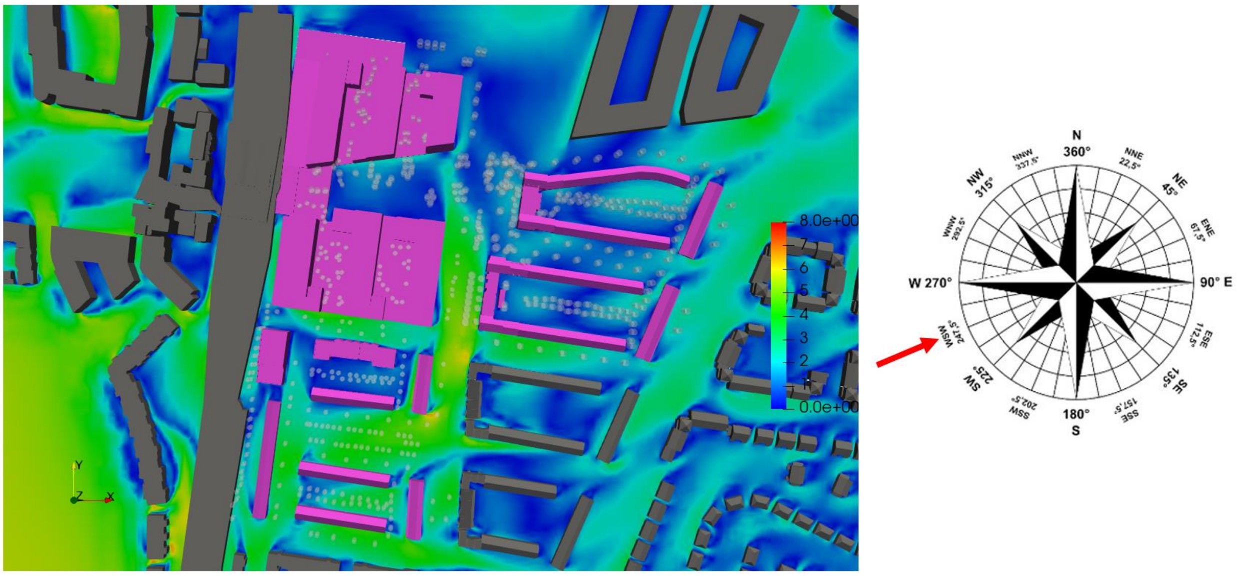


Figure 16.75: Wind Speed Results at 1.5m Above Ground - 3D View: 247°

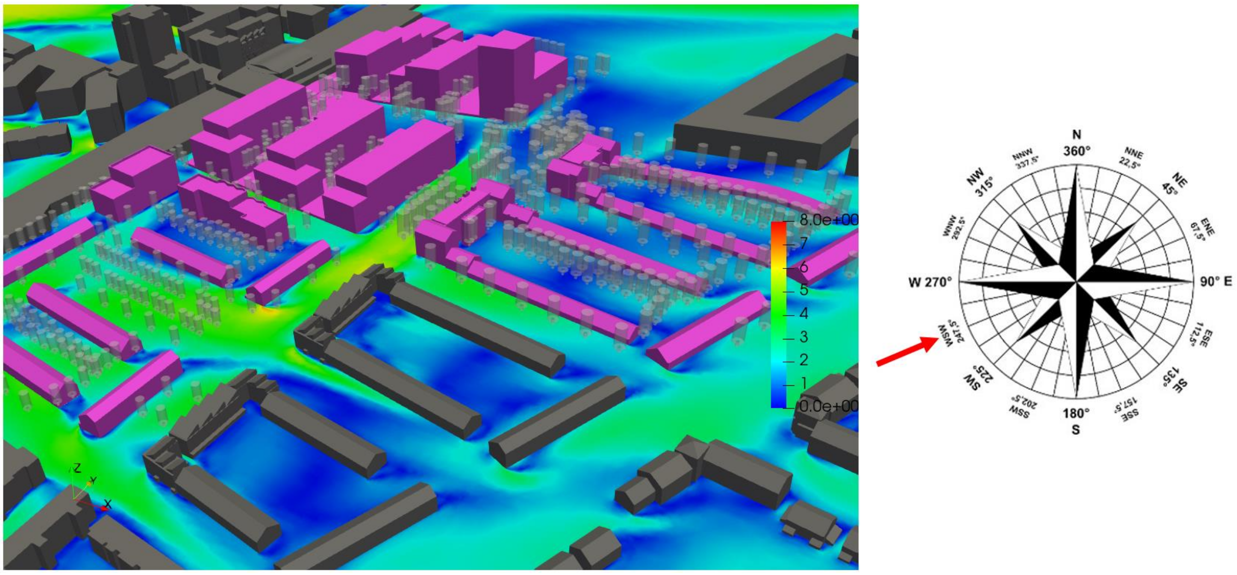


Figure 16.76: Wind Speed Results at 1.5m Above Ground - 3D View: 270°

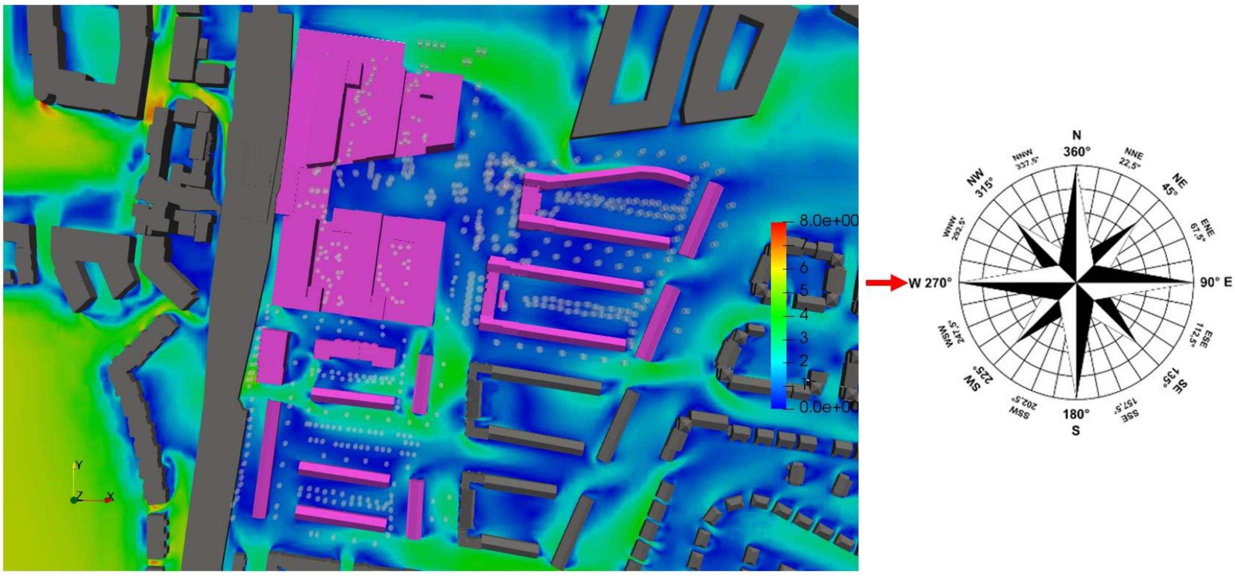


Figure 16.77: Wind Speed Results at 1.5m Above Ground - 3D View: 270°

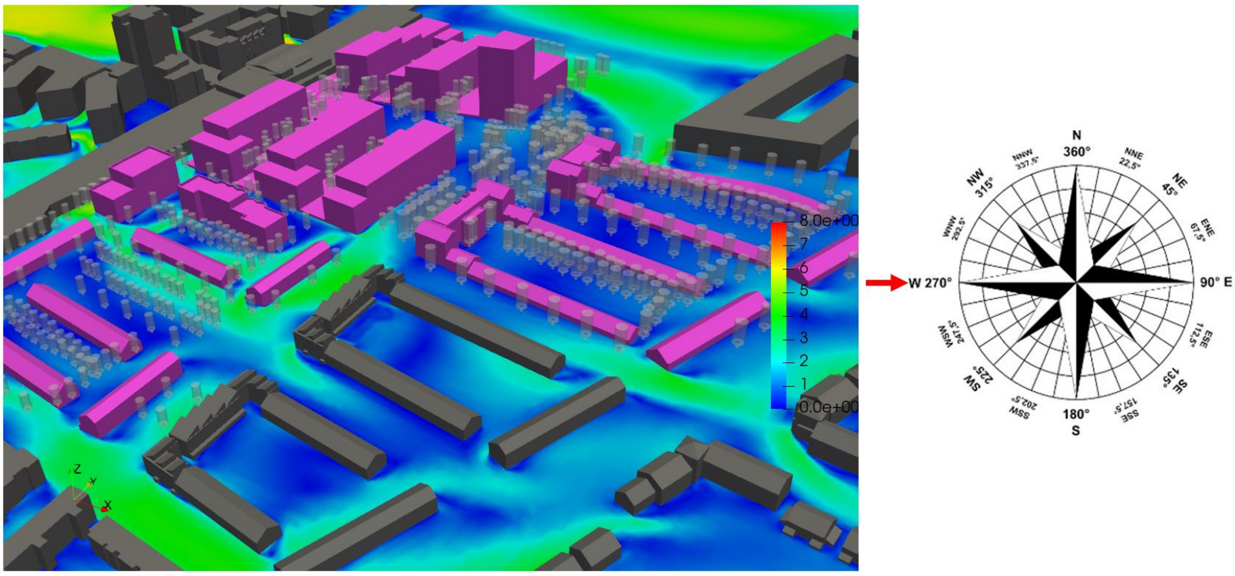
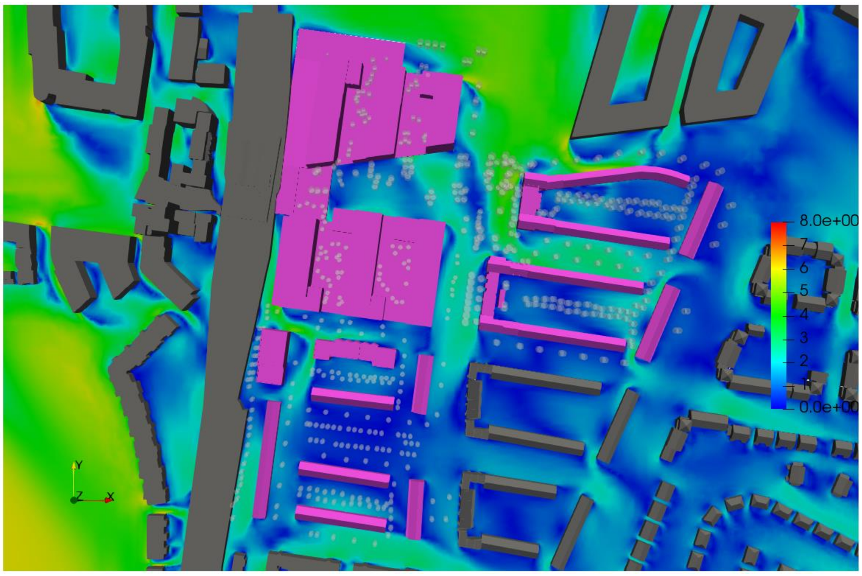


Figure 16.78: Wind Speed Results at 1.5m Above Ground - 3D View: 315°



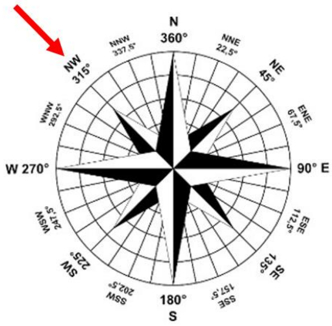
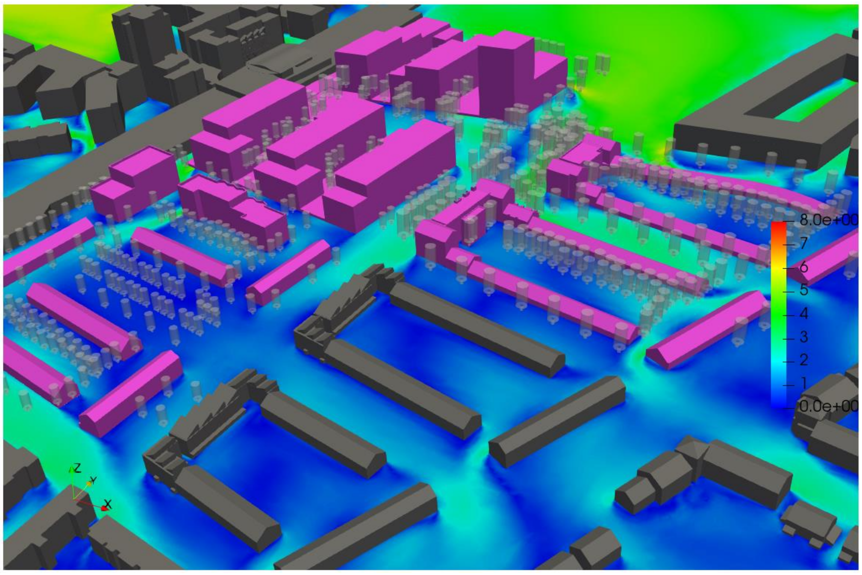


Figure 16.79: Wind Speed Results at 1.5m Above Ground - 3D View: 225°



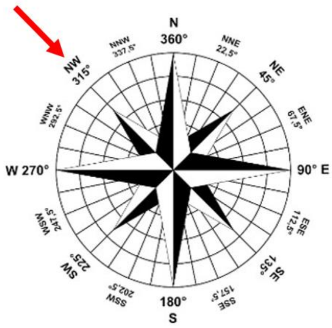
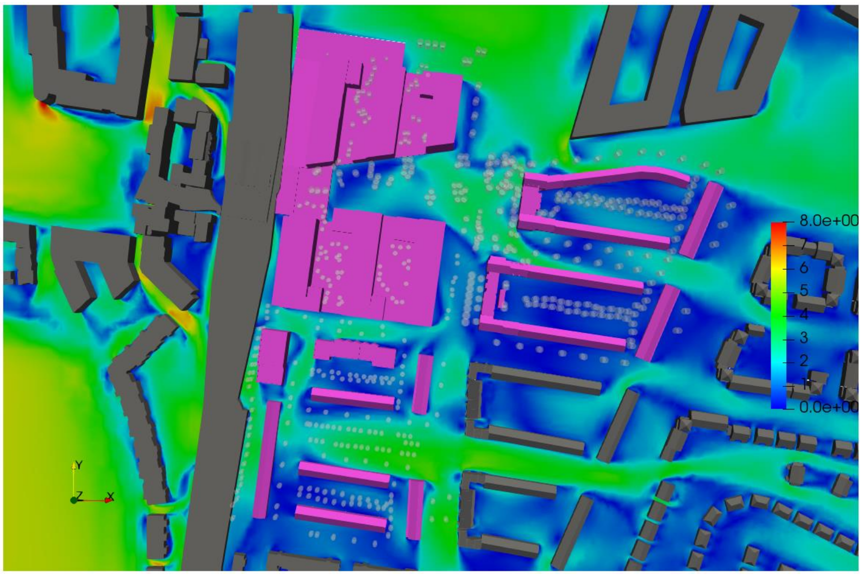


Figure 16.80: Wind Speed Results at 1.5m Above Ground - 3D View: 281°



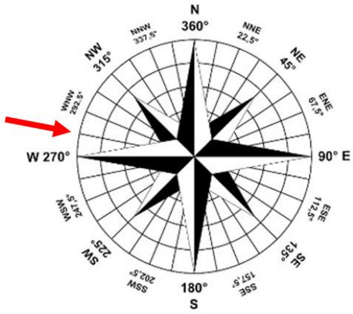
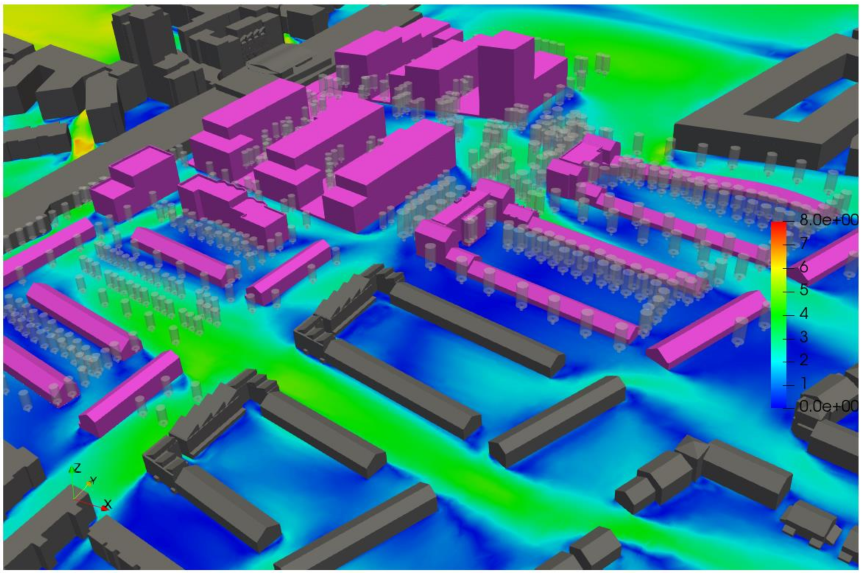
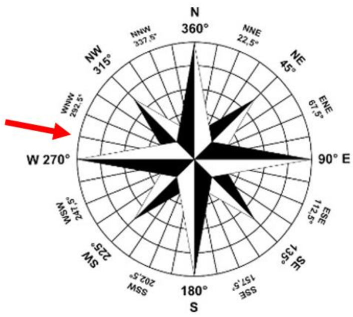


Figure 16.81: Wind Speed Results at 1.5m Above Ground - 3D View: 281°





Shoreline GA1 with permitted Shoreline GA2 and the Proposed Shoreline GA3 (Cumulative Scenario)

This section assessed the potential impact of the proposed Project on the already existing environment, also considering Shoreline GA2 buildings, that have been granted planning permission (but that are not built yet), and Shoreline GA3 Development (that will be potentially constructed in the future). Shoreline GA1 Development and adjacent buildings Model (including GA2 and GA3) are shown in Figures 16.82 (top views).

Figure 16.82: Top View - Shoreline GA1 Development, Permitted Shoreline GA2 Development, Clongriffin developments (existing and permitted but not built) and Proposed Shoreline GA3 Development - Extents of Modelled Area

As shown in the previous sections for the existing scenario, also for the cumulative one, results of wind speeds and their circulations around the proposed Project at pedestrian level of 1.5m above the development ground are presented for all the simulated wind directions. In general the introduction of the potential GA3 developments is improving the wind impact on the north east side, however some higher velocities are still experienced around the buildings of GA1 due to south-west 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 development, 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 still 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 but their impact is *negligible.*

Figures 16.83 to 16.85 present views of the flow velocity results for the entire domain for the dominant wind direction (225°).

Figure 16.83: Wind Speed Results at 1.5m above Ground - Cumulative Scenario - Top View: 225°

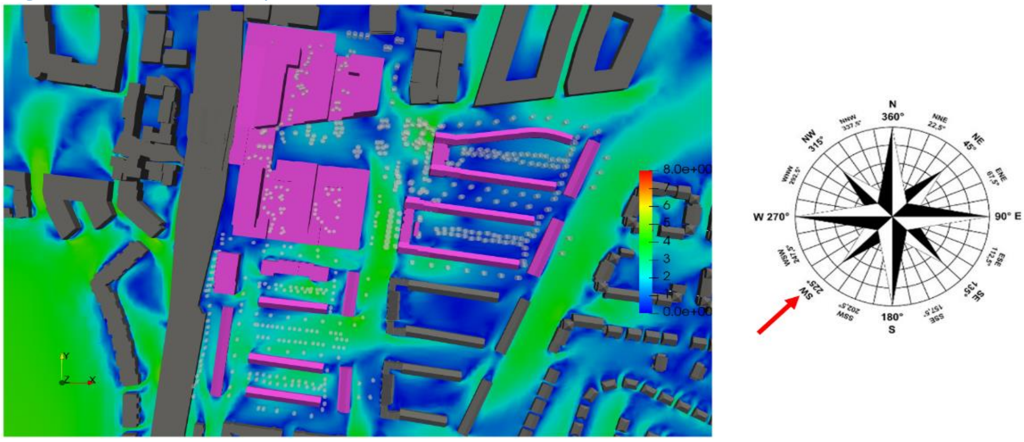


Figure 16.84: Wind Speed Results at 1.5m Above Ground - Cumulative Scenario - 3D View: 225°

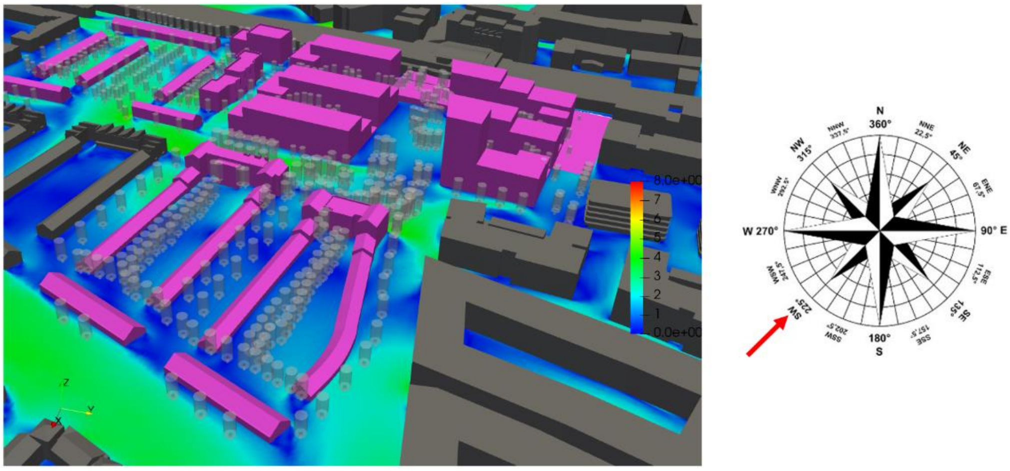
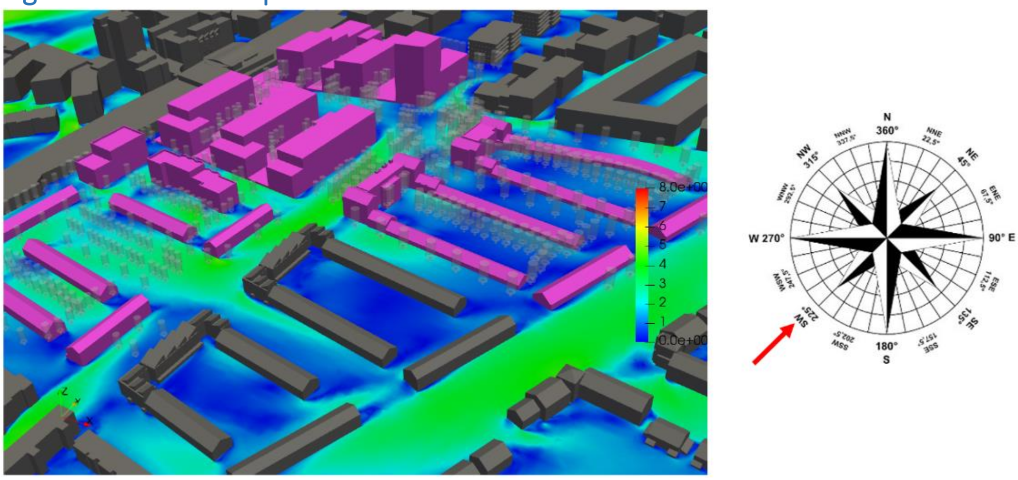


Figure 16.85: Wind Speed Results at 1.5m Above Ground - Cumulative Scenario - 3D View: 225°



Figures 16.86 to 16.88 present views of the flow velocity results for the entire domain for the dominant wind direction (135°).

Figure 16.86: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 135°

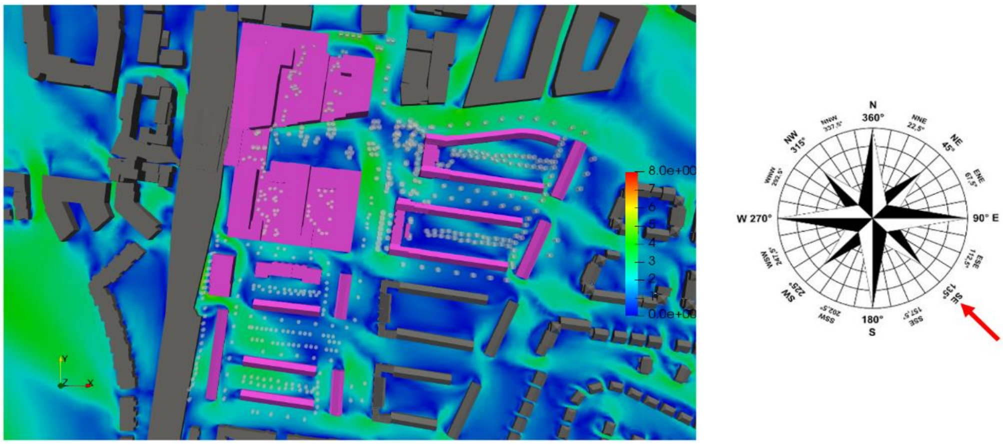


Figure 16.87: Wind Speed Results at 1.5m Above Development Ground - Cumulative Scenario - 3D View: 135°

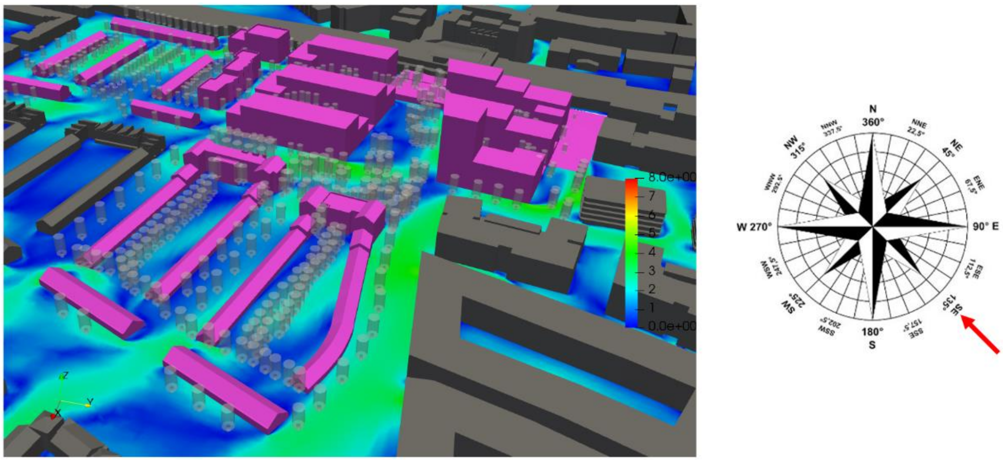
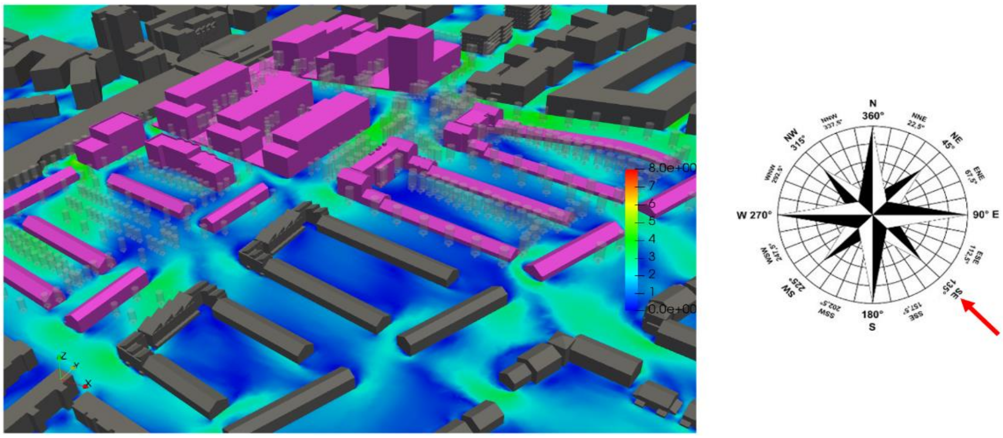


Figure 16.88: Wind Speed Results at 1.5m Above Development Ground - Cumulative Scenario - 3D View: 135°



Figures 16.89 to 16.91 present views of the flow velocity results for the entire domain for the dominant wind direction (236°).

Figure 16.89: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 236

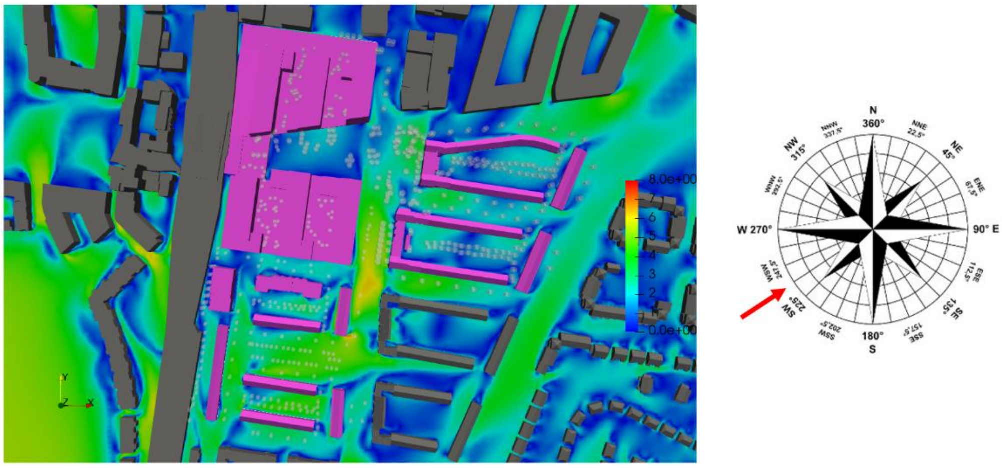


Figure 16.90: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View:

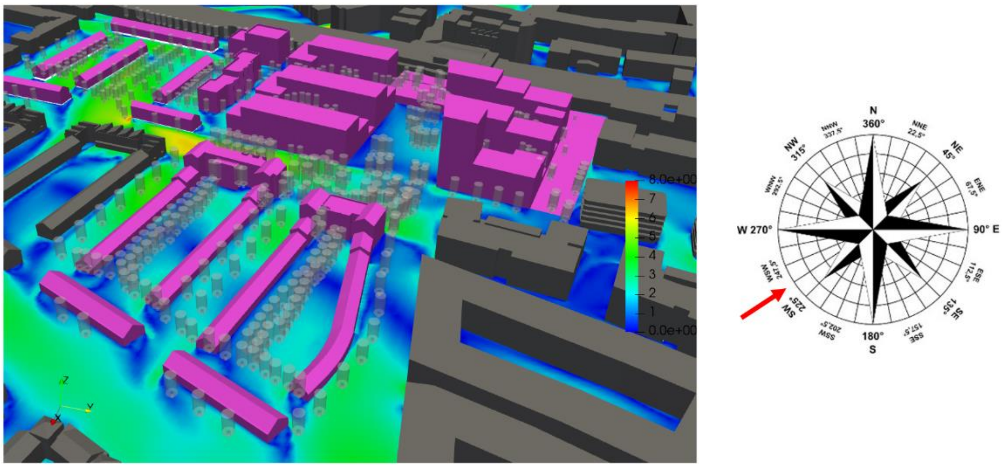
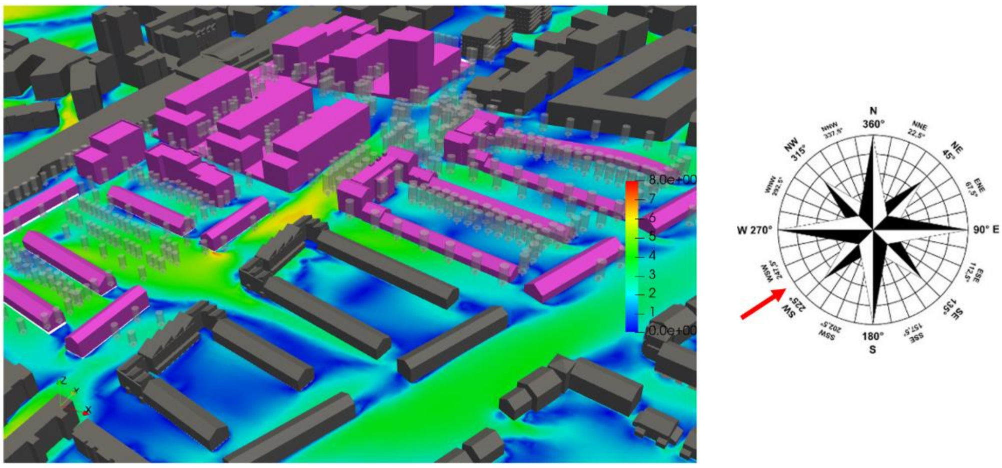


Figure 16.91: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 236°



Figures 16.92 to 16.94 present views of the flow velocity results for the entire domain for the dominant wind direction (247°).

Figure 16.92: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 247°

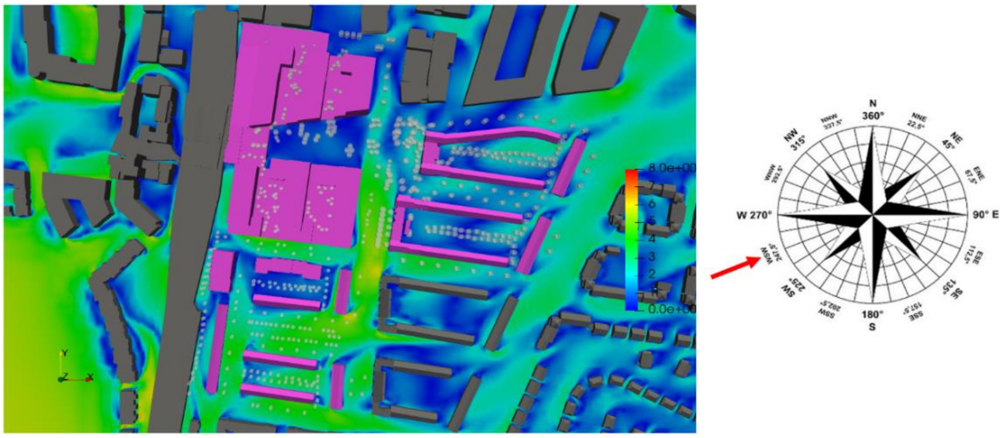


Figure 16.473: Wind Speed Results at 1.5m above Development Ground - 3D View: 247°

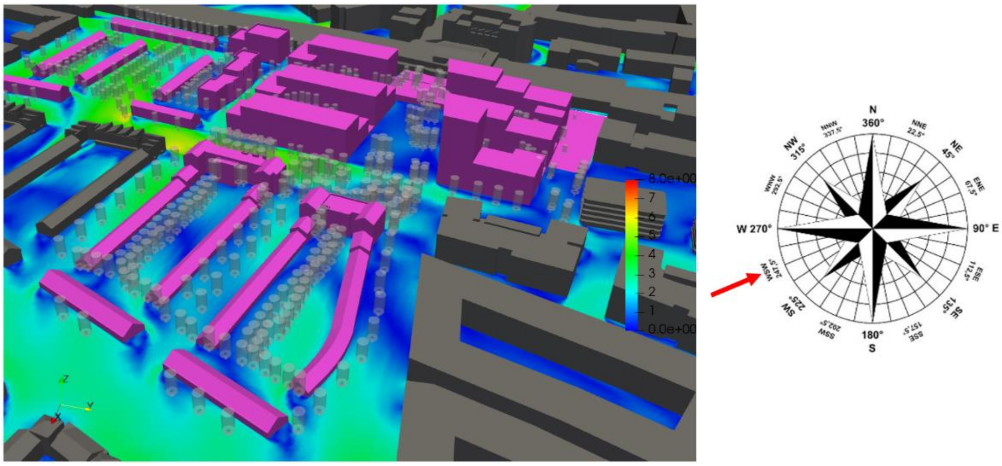
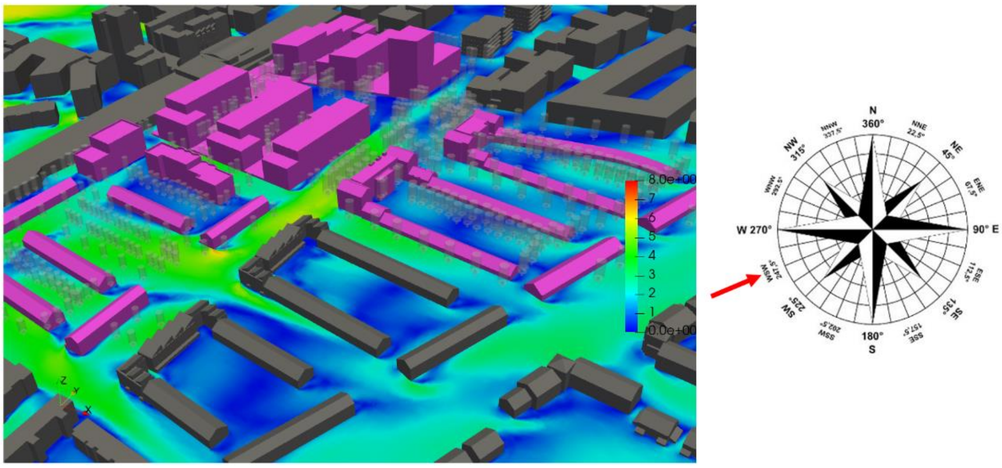


Figure 16.94: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 247°



Figures 16.95 to 16.112 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 in the next pages.

Figure 16.95: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 258°

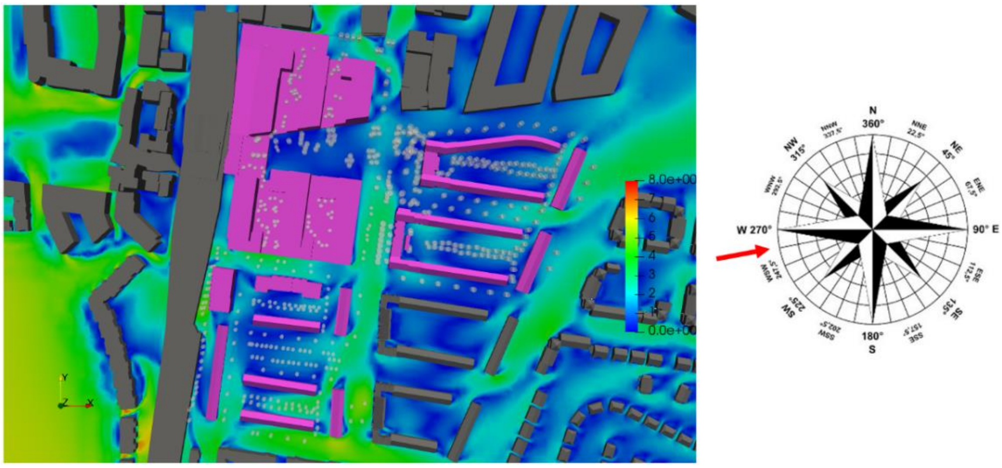


Figure 16.96: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 258°

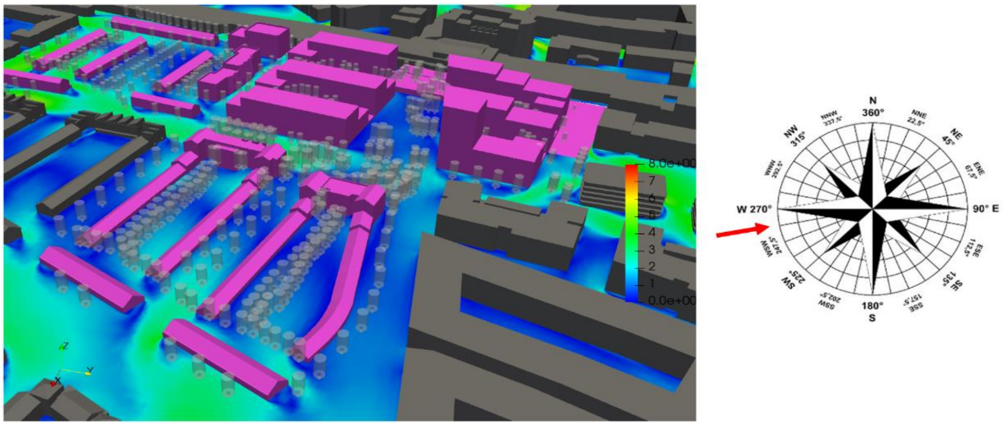


Figure 16.97: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 258°

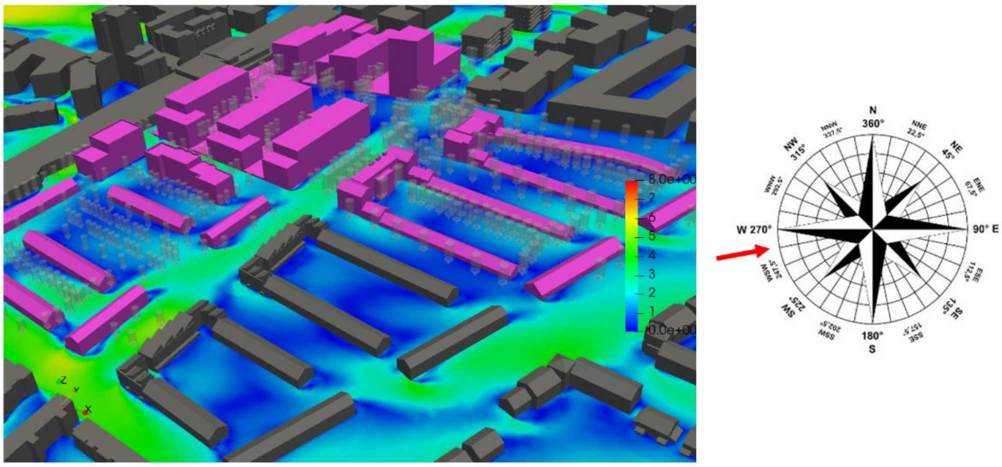


Figure 16.98: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 270°

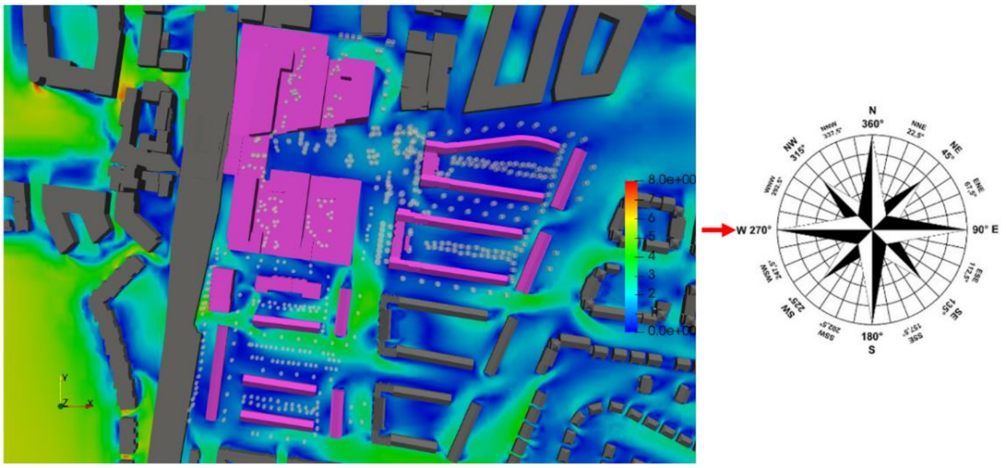


Figure 16.99: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 270°

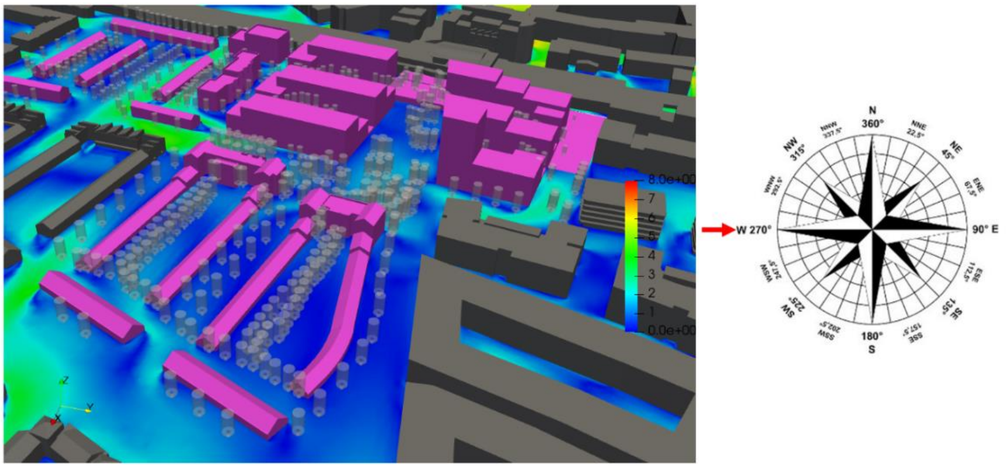


Figure 16.100: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 270°

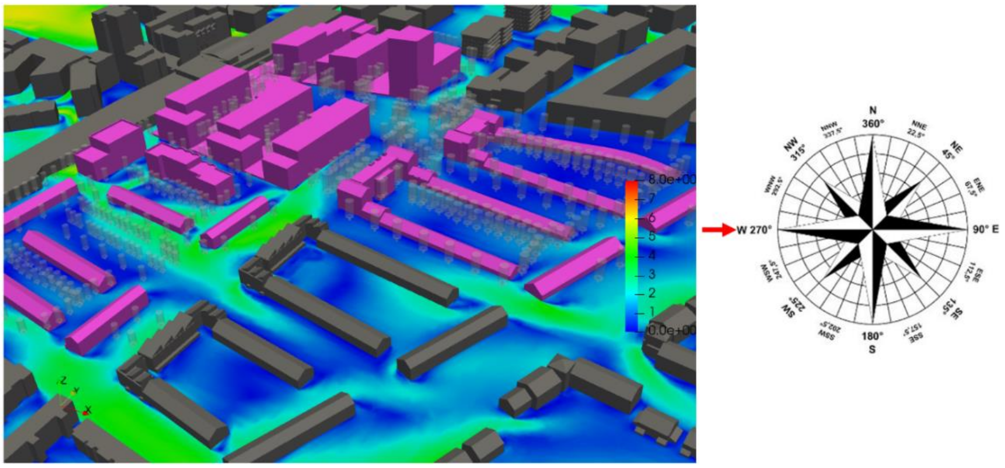


Figure 16.101: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 281°

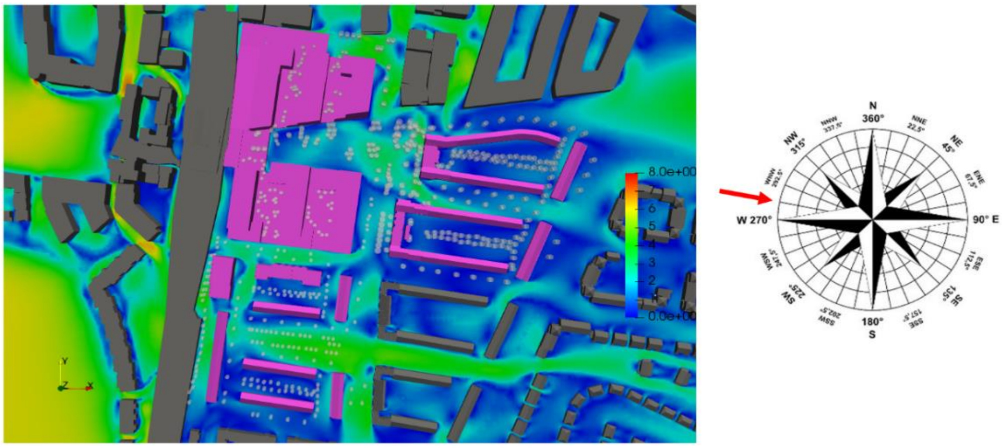


Figure 16.102: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 281°

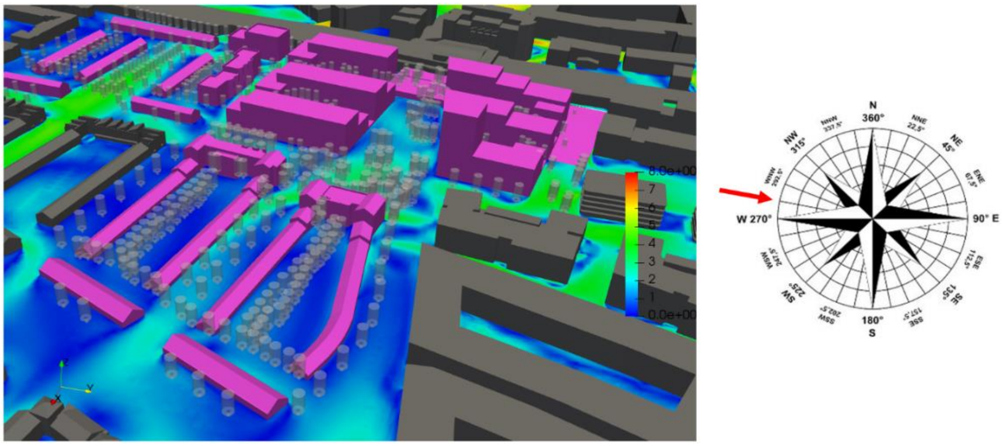


Figure 16.103: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 281°

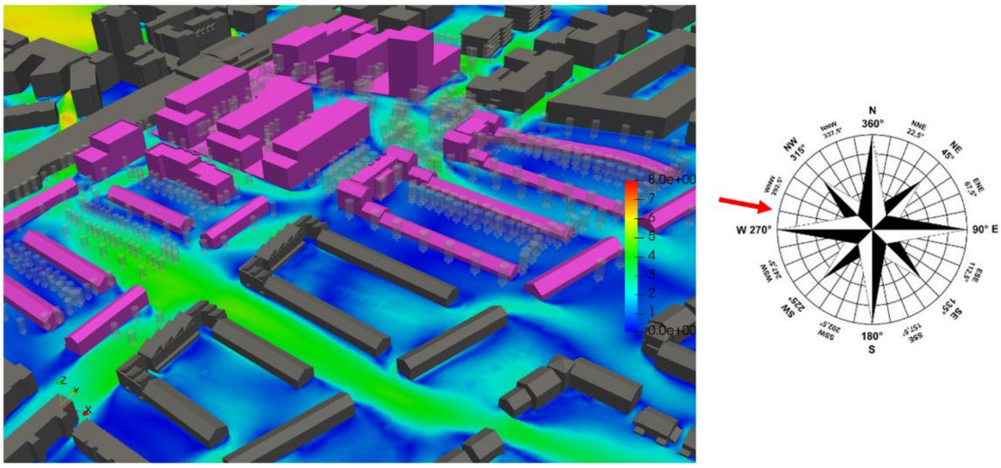


Figure 16.104: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - Top View: 315°

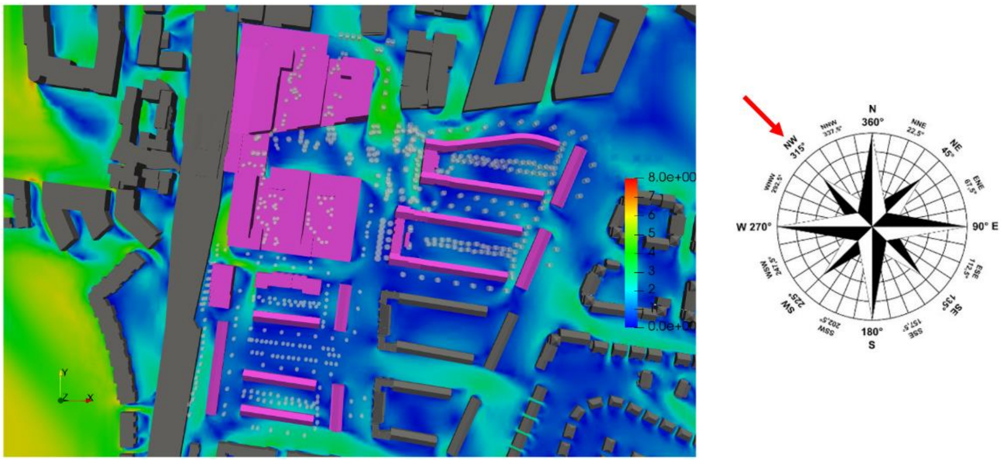


Figure 16.105: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 315°

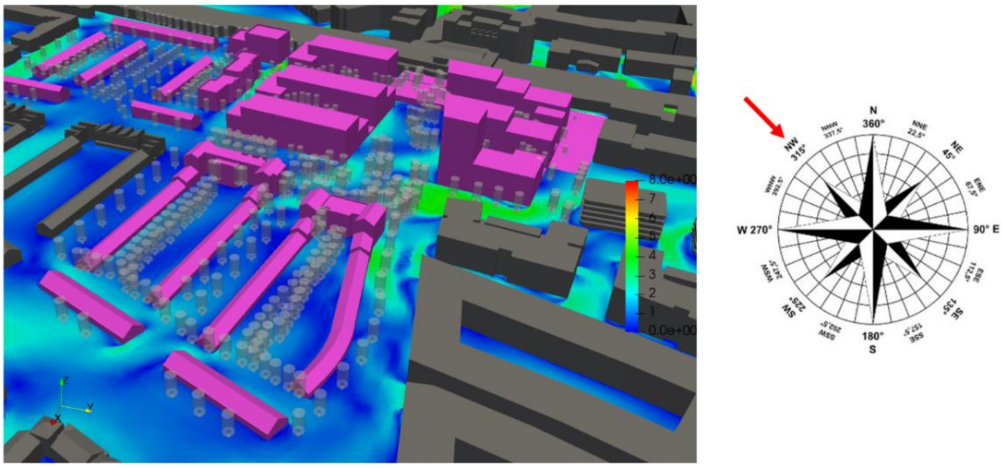


Figure 16.106: Wind Speed Results at 1.5m above Development Ground - Cumulative Scenario - 3D View: 315°

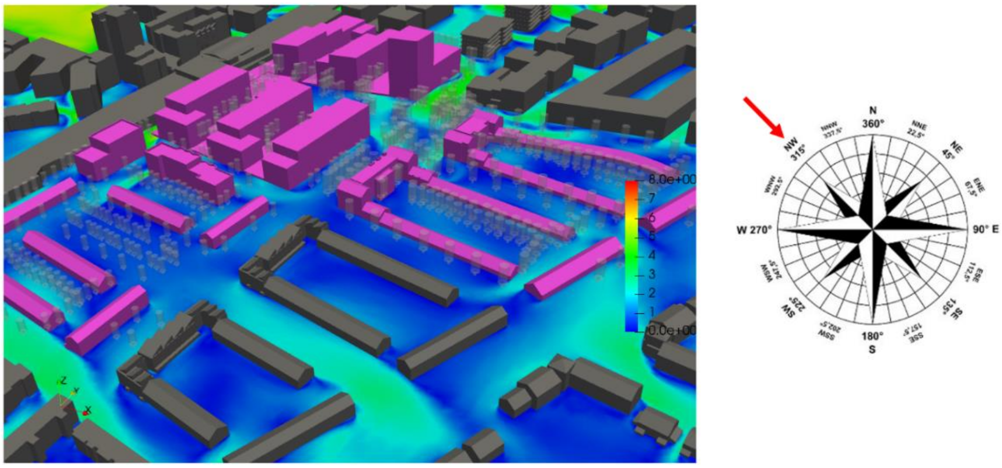


Figure 16.107: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 225°

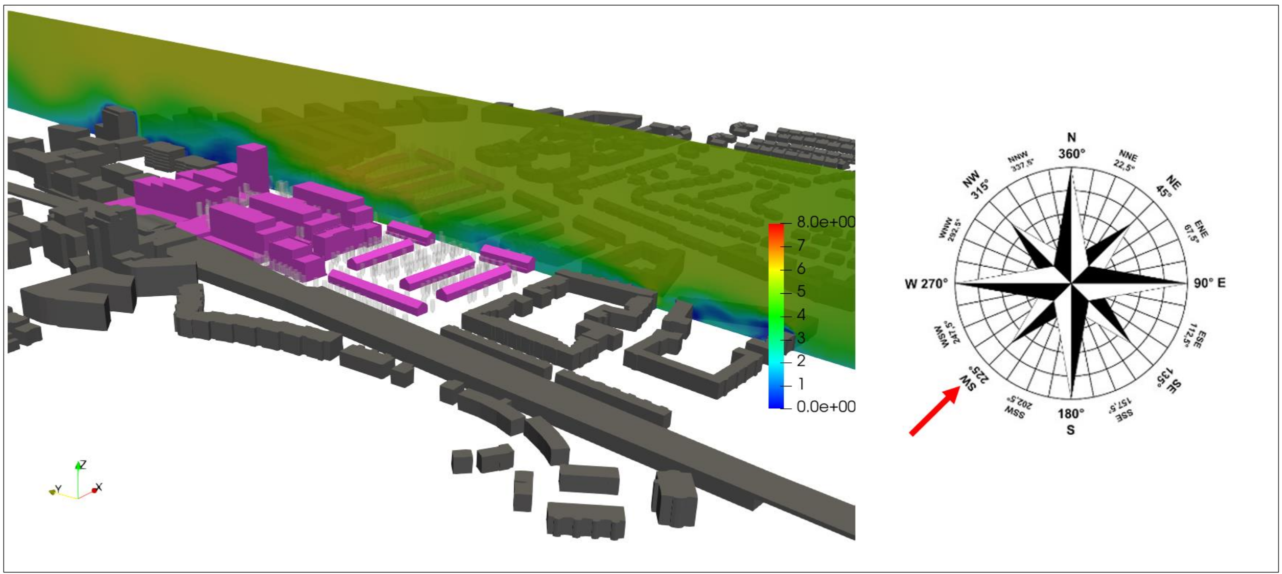


Figure 16.108: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 135°

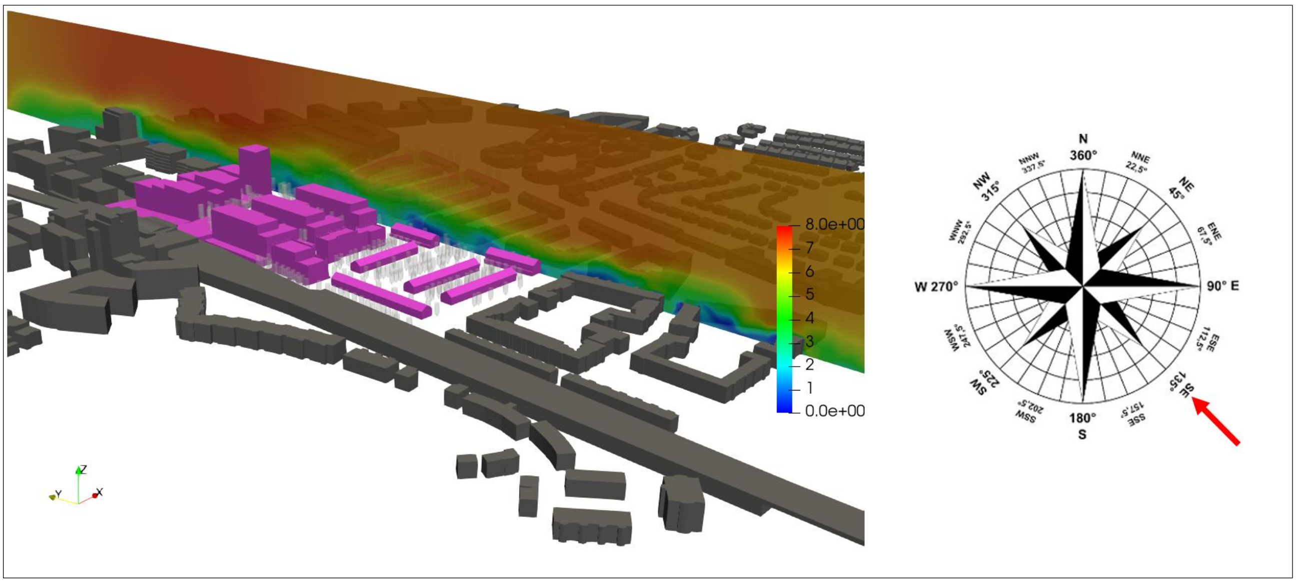


Figure 16.109: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 236°

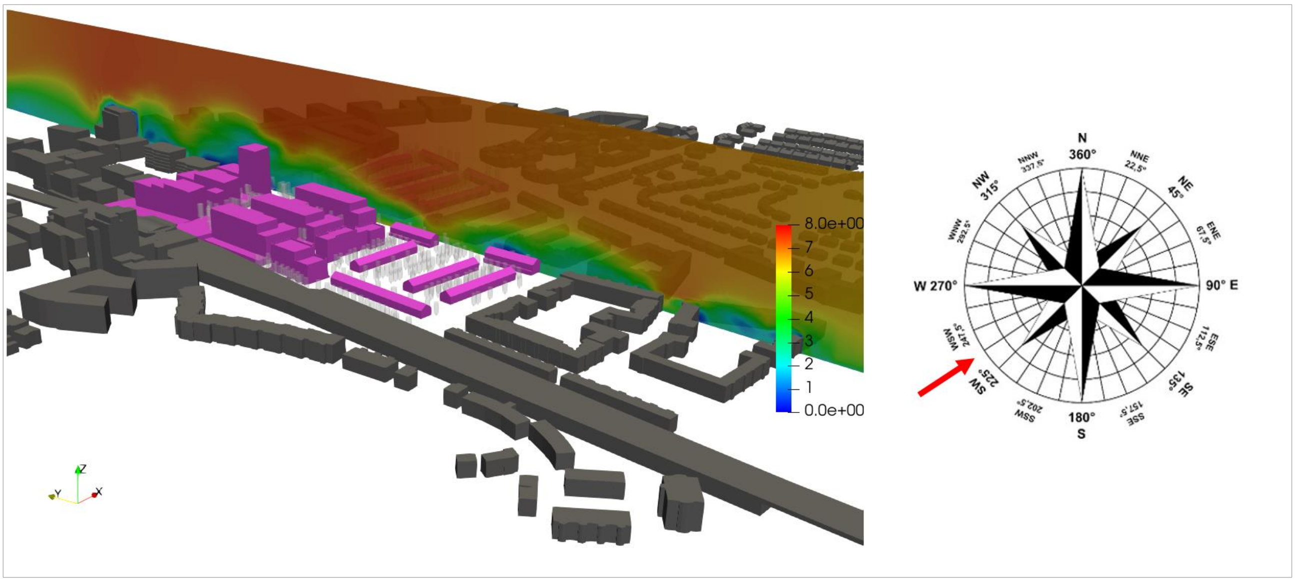


Figure 16.110: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 225°

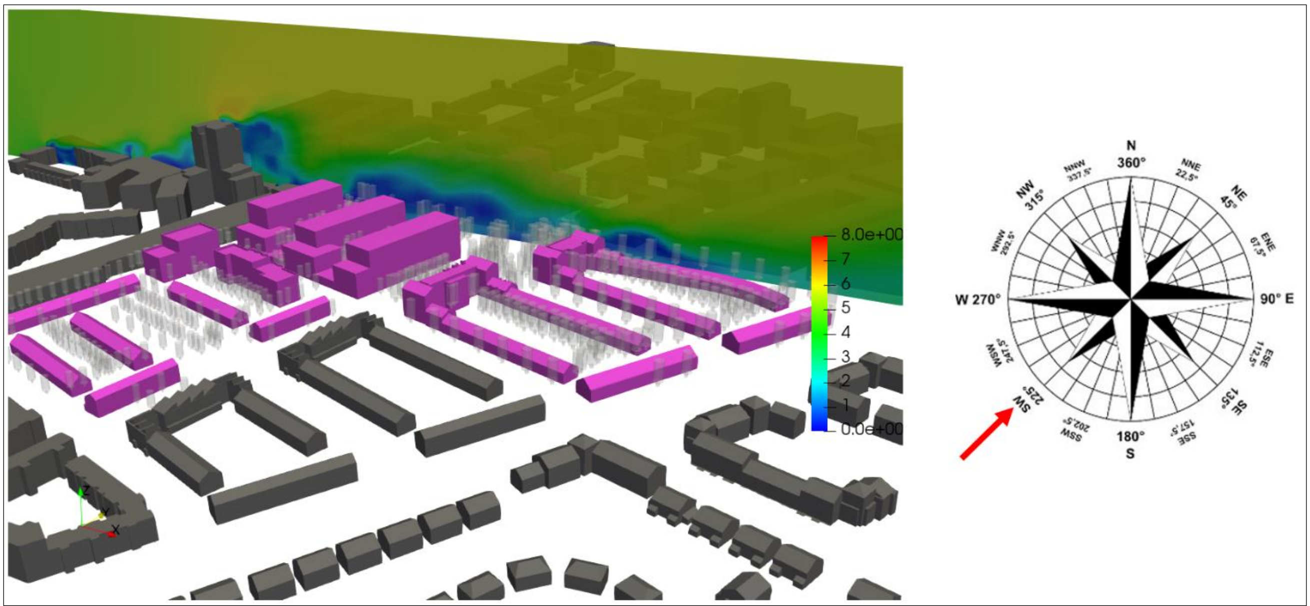


Figure 16.111: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 135°

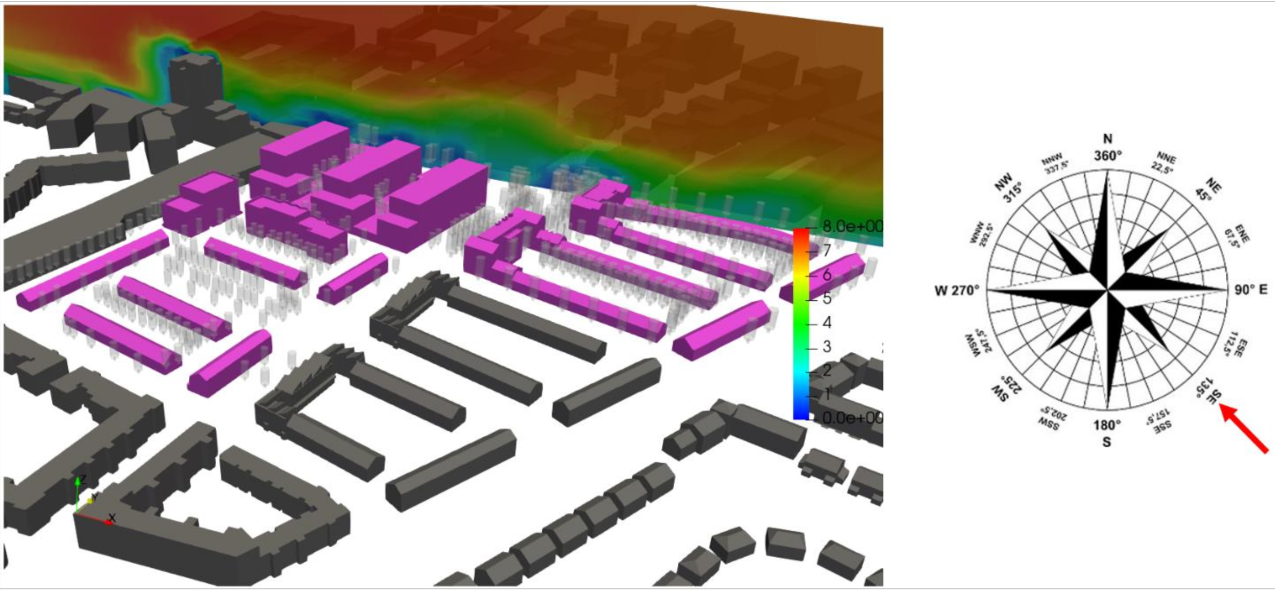
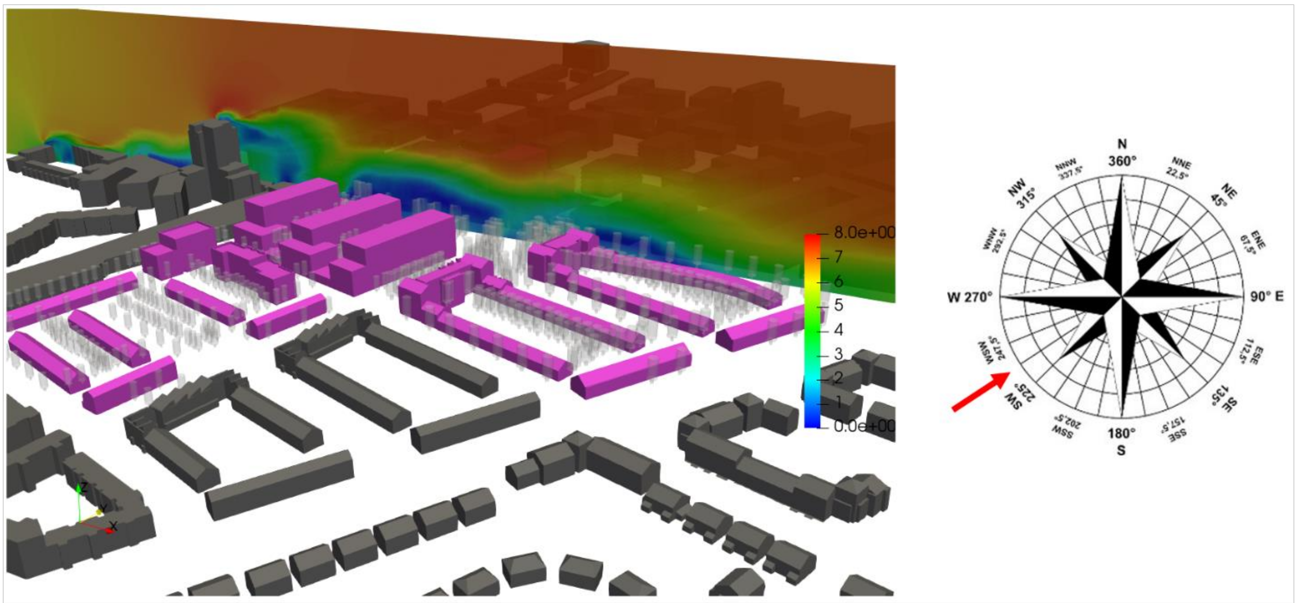


Figure 16.112: Wind Speed Results (Vertical Slice) - Cumulative Scenario - 3D View: 236°



16.7.6.2 Flow Velocity Results - Ground Floor Level with Mitigation Measures

As discussed in the previous section, porous mediums are used to model trees and wind mitigation measures to reproduce the velocity modifications and pressure drop that vegetation will create on the incoming air flows. These regions are defined within the simulation to represent the landscaping design as developed by BSLArch (Project Landscape Architects) (refer to Figure 16.113).

Figure 16.113: Mitigation Measures in CFD model

Results of wind speeds and their circulations around the proposed Project at pedestrian level of 1.5m above the development ground are presented for the 236° wind direction in Figures 16.114 to 16.120 as a comparison between the mitigated and not mitigated scenario.

As it can be seen in the example shown, results comparing the unmitigated case with the mitigated case, demonstrate that the mitigation measures in place reduce the velocities around the proposed Project. The recirculation and funnelling effects highlighted in the previous sections have been successfully reduced or eliminated.

Figure 16.114: Wind Speed Results at 1.5m above Development Ground - Mitigation Measures - Top View: 236°

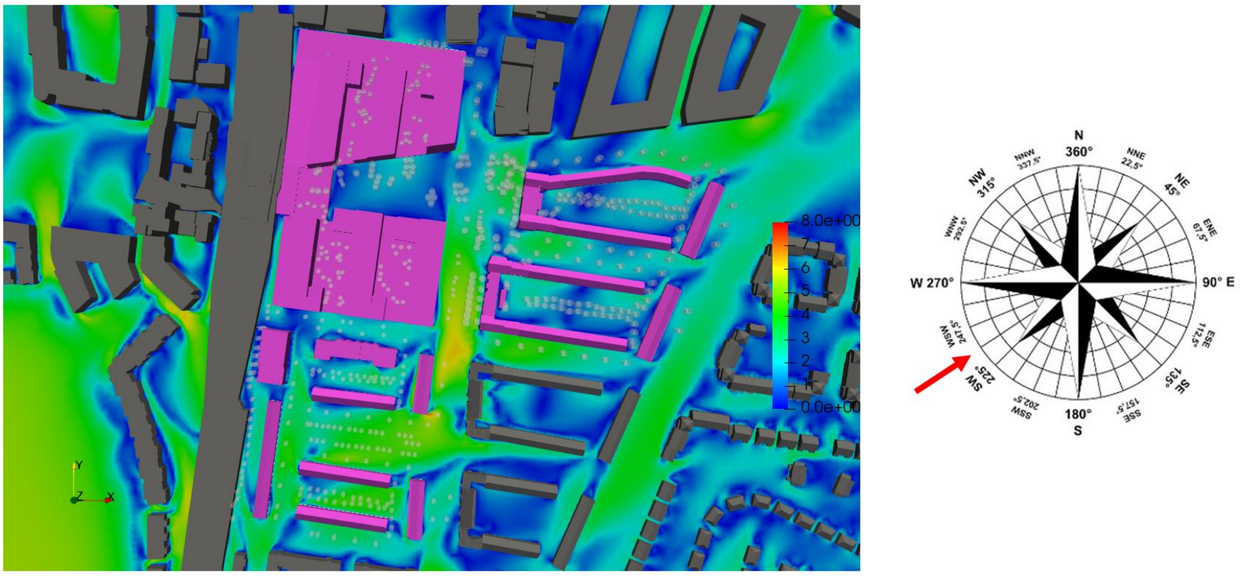


Figure 16.115: Wind Speed Results at 1.5m above Development Ground - Mitigation Measures - 3D View: 236°

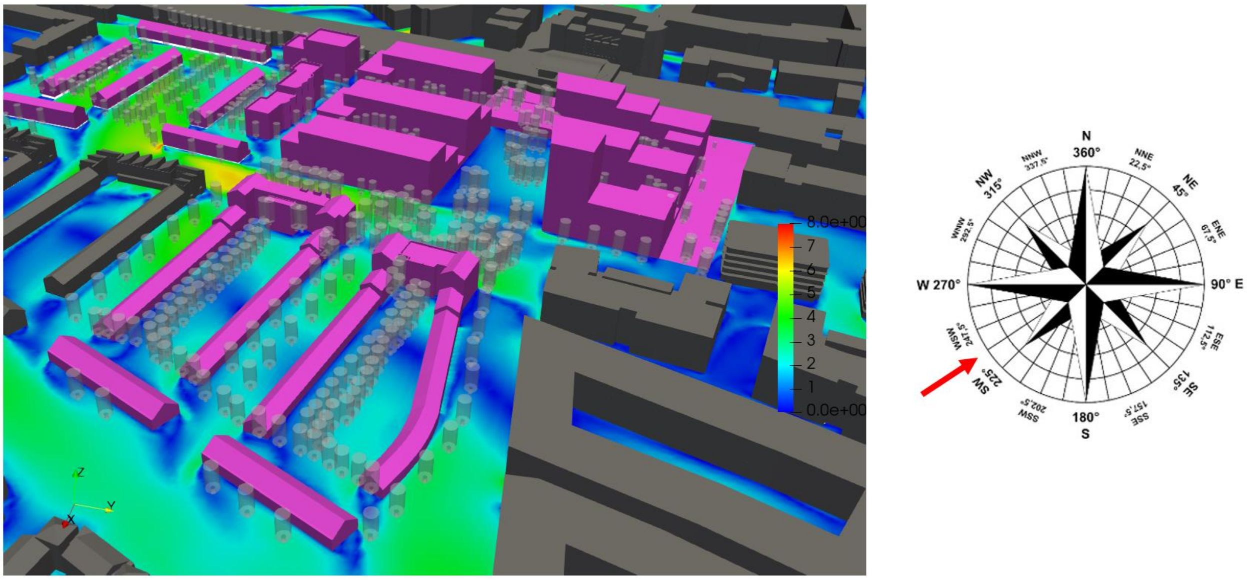
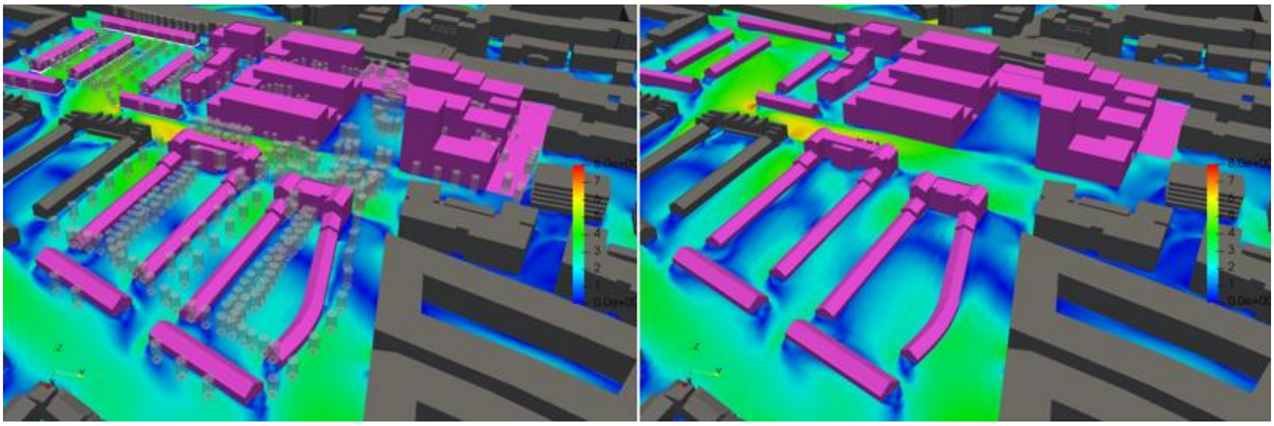
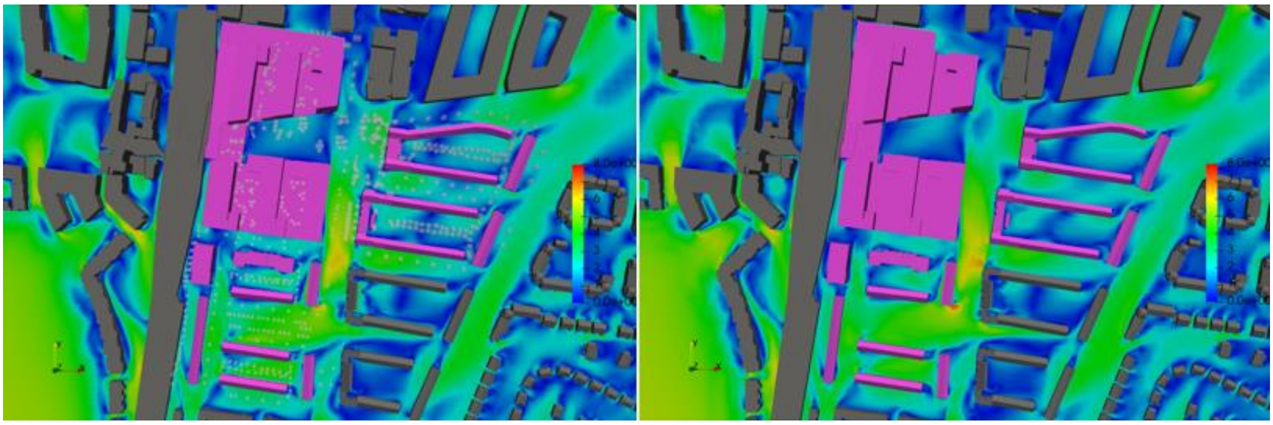


Figure 16.116: Wind Speed Results around the Development at 1.5m above Development



Ground - Comparison between mitigated case (left) and not mitigated case (right): 135° Top View

Figure 16.117: Wind Speed Results around the Development at 1.5m Above Development



Ground - Comparison between mitigated case (left) and not mitigated case (right): 135° 3D View

Figure 16.118: Wind Speed Results around the development near Block D3 (the tallest building in the Site): 236° - Cumulative Scenario - 3D view

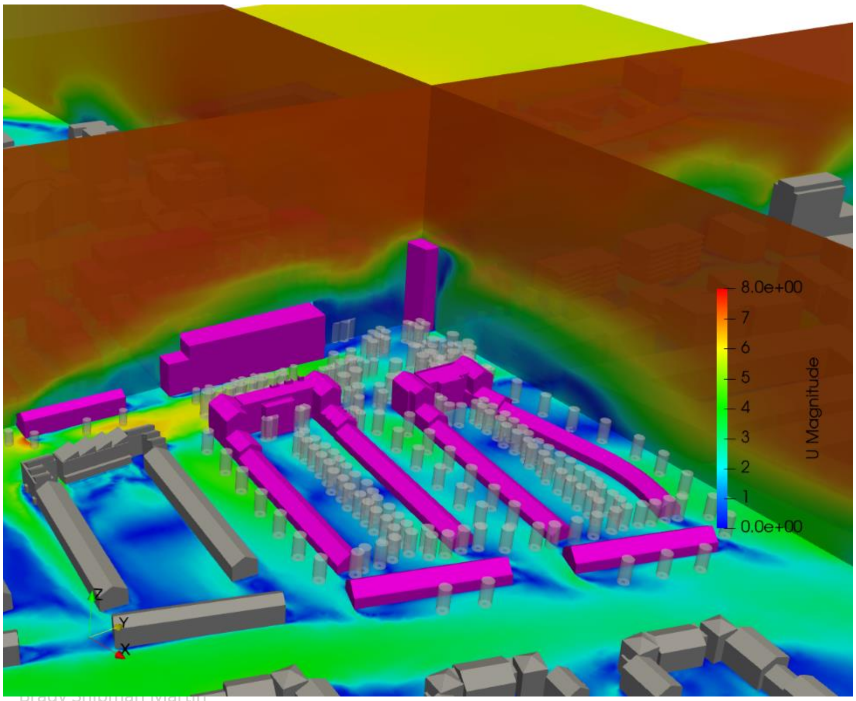


Figure 16.119: Wind Speed Results around the development near Block D3 (the tallest building in the Site): 236° - Cumulative Scenario - 3D view

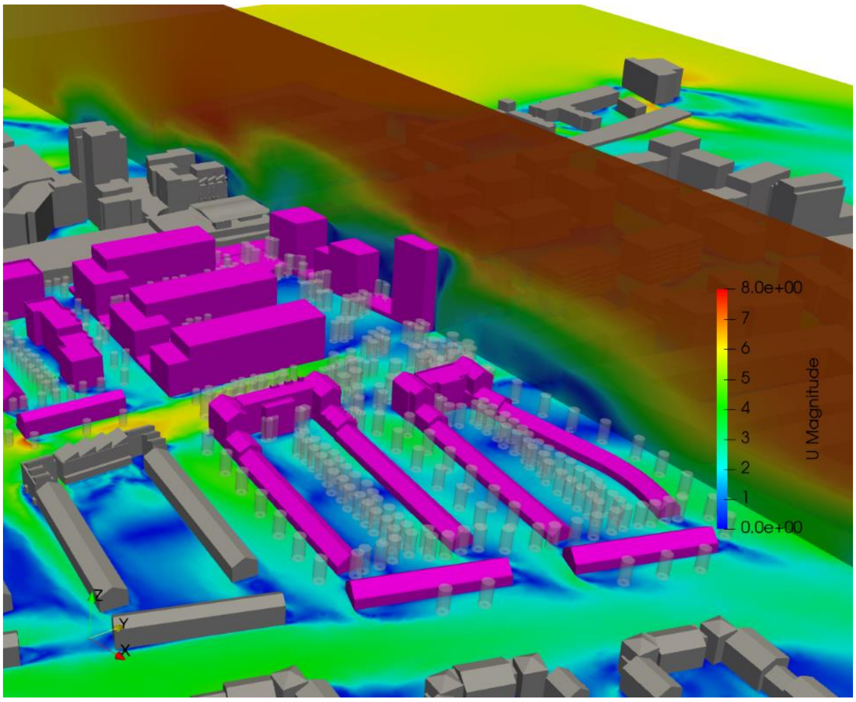
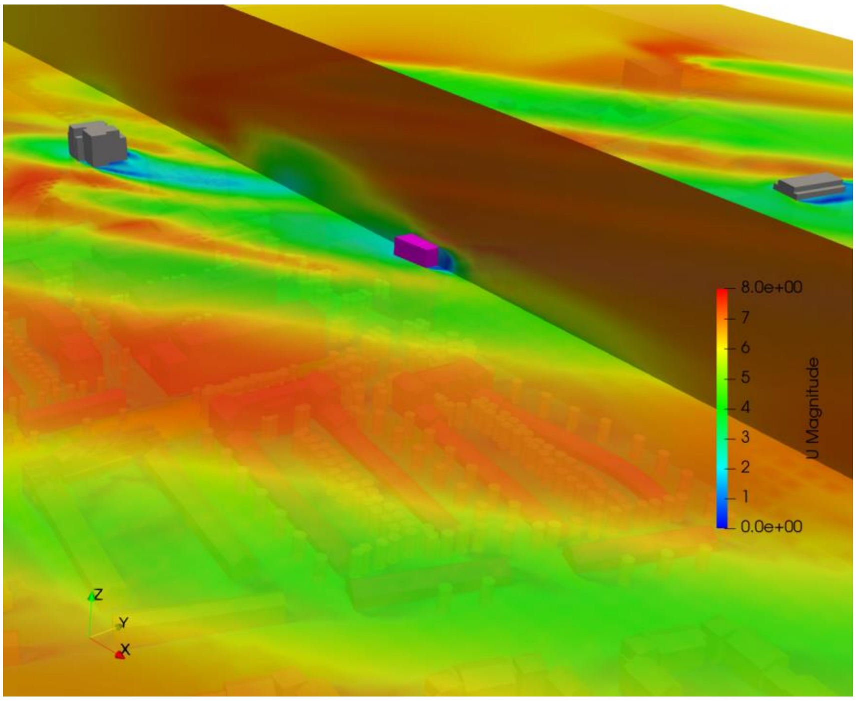


Figure 16.120: Wind Speed Results around the development near Block D3 (the tallest building in the Site): 236° - Cumulative Scenario - 3D view



16.7.8 Predicted Impact of the Proposed Project 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 has been considered and shows to be suitable to its intended use.

The existing site cumulative assessment has accounted for the modelling and simulation of all the topography and existing developments in the surrounding as the presence of adjacent buildings dictates how the wind will approach the proposed Project.

From the wind modelling results, the proposed Project will introduce no negative wind effect on adjacent, nearby or future phase developments within its vicinity. Wind modelling of future phases around this development will need to be performed for all future phase developments.

16.7.9 Risks to Human Health

This subsection aims to identify areas of the 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 1.5m above ground level.

16.7.9.1 Discomfort Criteria

Figures 16.122 and 16.125 combine all the above directions together and show the Lawson comfort categories over the ground floor area around the proposed Project. The scale used is set out in Figure 16.121.

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 really rarely are only suitable for “business walking” or “unacceptable for pedestrian comfort”.

The results shown in the map show that there is no critical area which are unacceptable for pedestrian comfort. Thus, the discomfort criteria are satisfied for all the different cases and in all directions and the amenity areas around the development appear to be suitable for long term sitting.

All the courtyards, parks and squares are always suitable for long-term sitting, short-term sitting, standing, walking and strolling activities.

Figure 16.121: Lawson Comfort Categories

Figure 16.122: Ground Floor - Lawson Discomfort Map - Existing Scenario

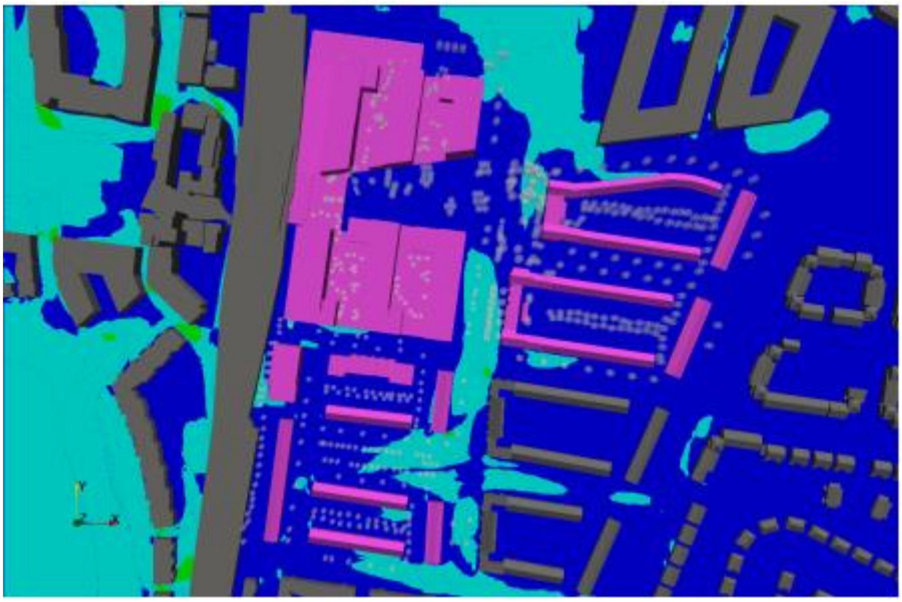


Figure 16.123: Ground Floor - Lawson Discomfort Map - Existing Scenario - 3D view

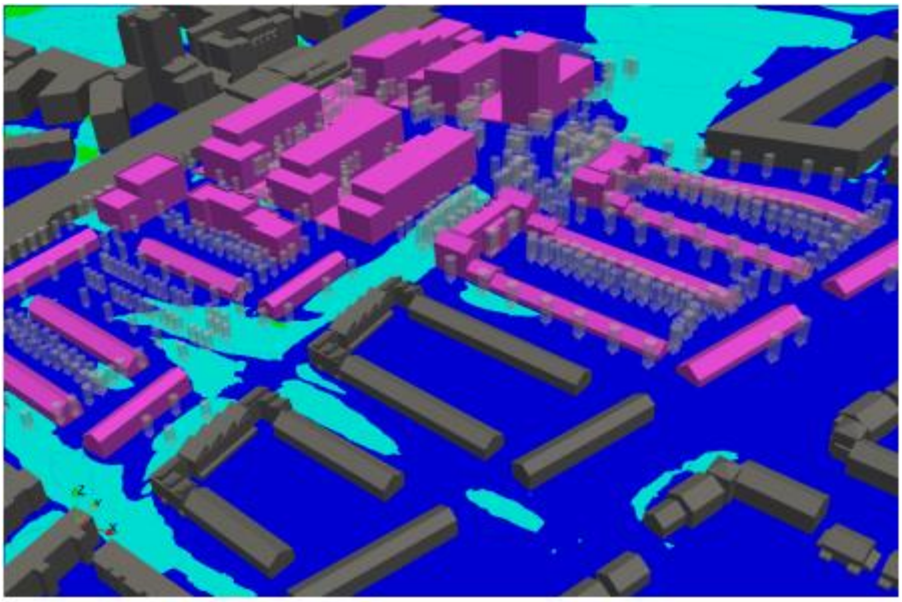


Figure 16.124: Ground Floor - Lawson Discomfort Map - Cumulative Scenario

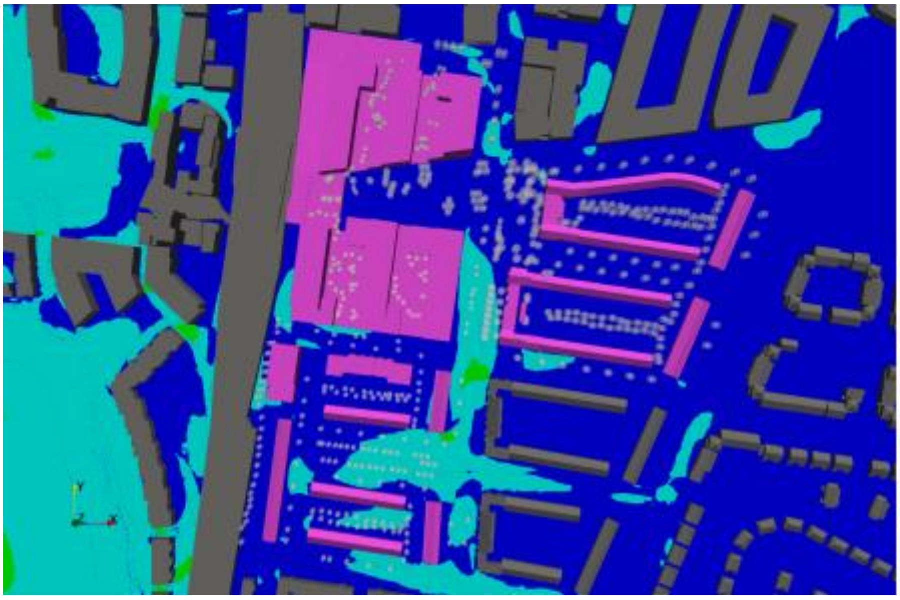
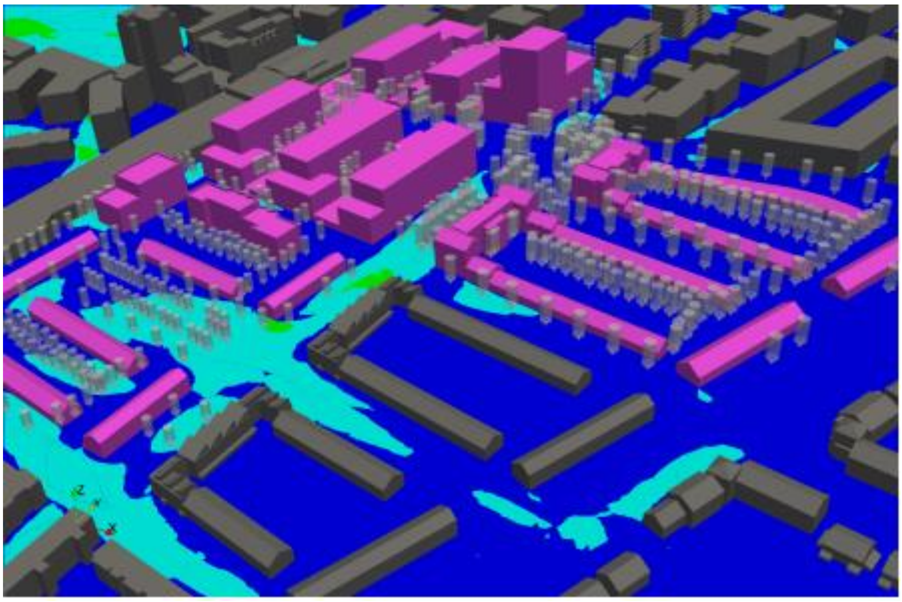


Figure 16.125: Ground Floor - Lawson Discomfort Map - Cumulative Scenario

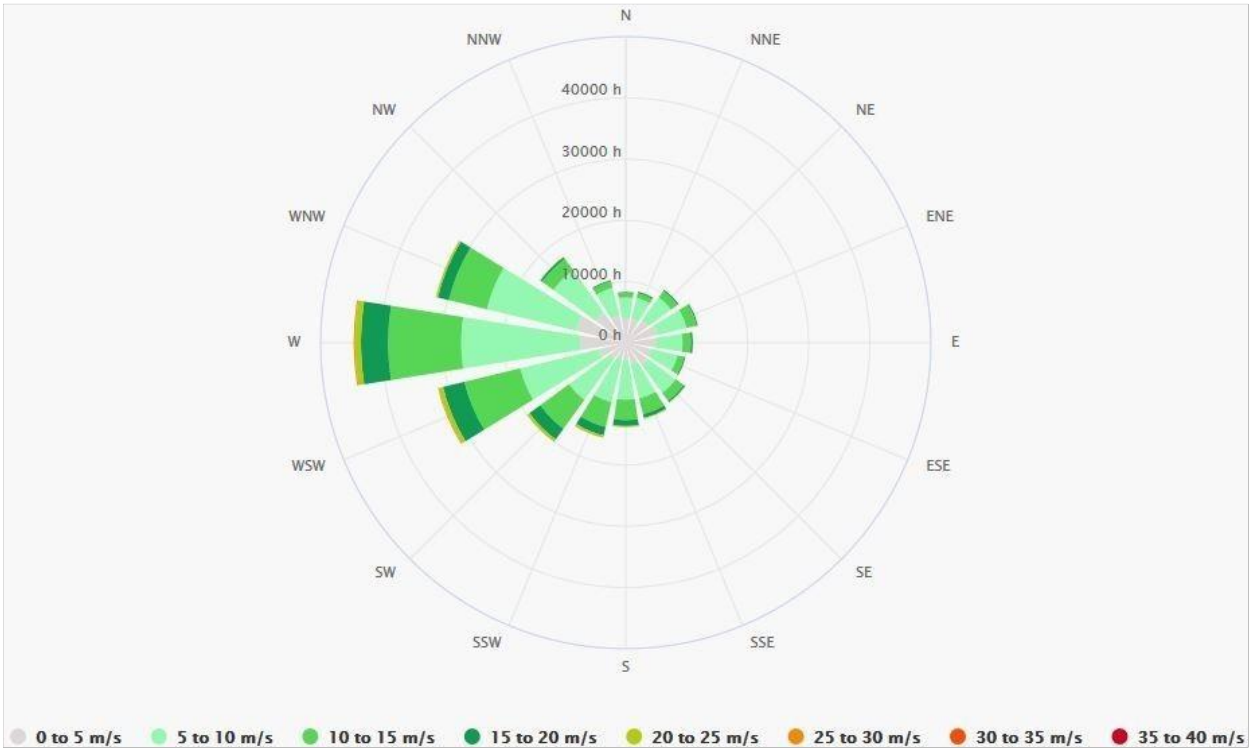


16.7.9.2 Distress Criteria

In addition to the criteria for "discomfort" the Lawson method presents criteria for "distress". The discomfort criteria focus on wind conditions which 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 16.126 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 exceed the threshold values.

Figure 16.126: Hourly Dublin Wind Gust Rose



The criteria for distress for a frail person or cyclist is 15m/s wind occurring for more than two hours per year. Limiting the results from the above wind rose to the only values above 15m/s (as reported in Figures 16.127 and 16.128 respectively as cumulative hours and cumulative percentage), it is possible to see how many hours in 30 years the gust velocity of 15m/s is exceed at pedestrian level in each direction.

Figure 16.127: Hourly Dublin Wind Gust Rose - Cumulative Hours when the Velocity is above 15m/s

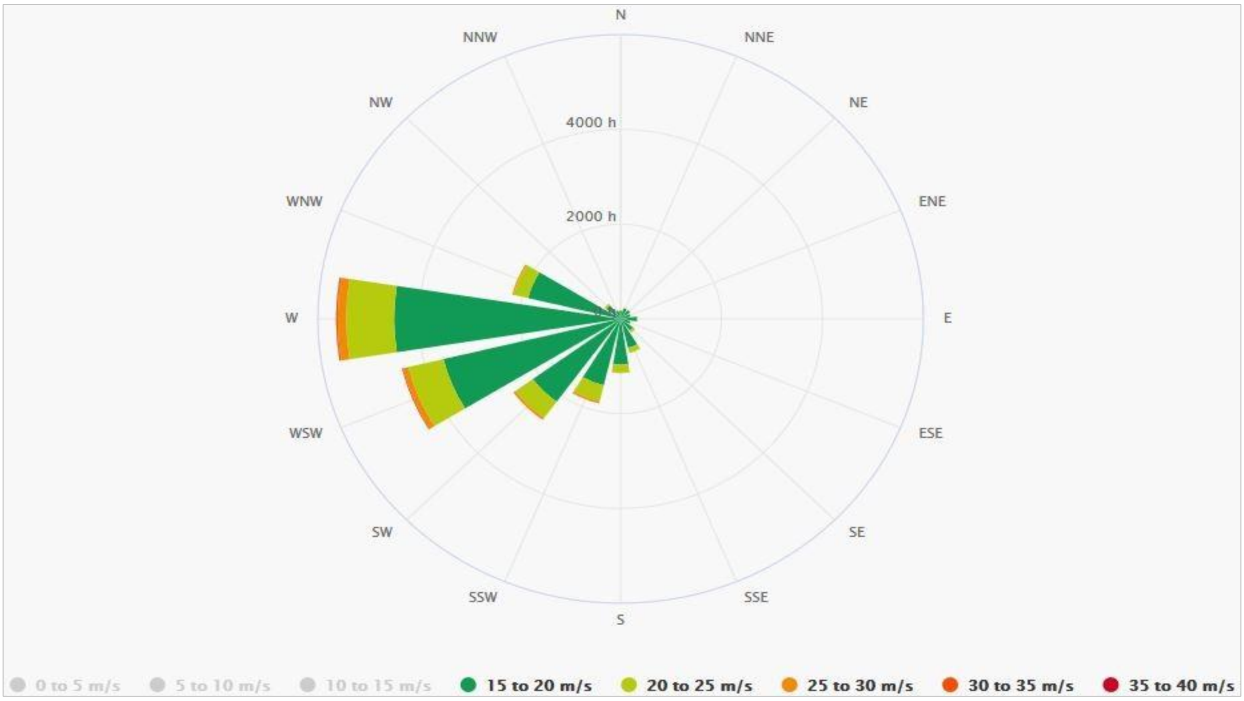
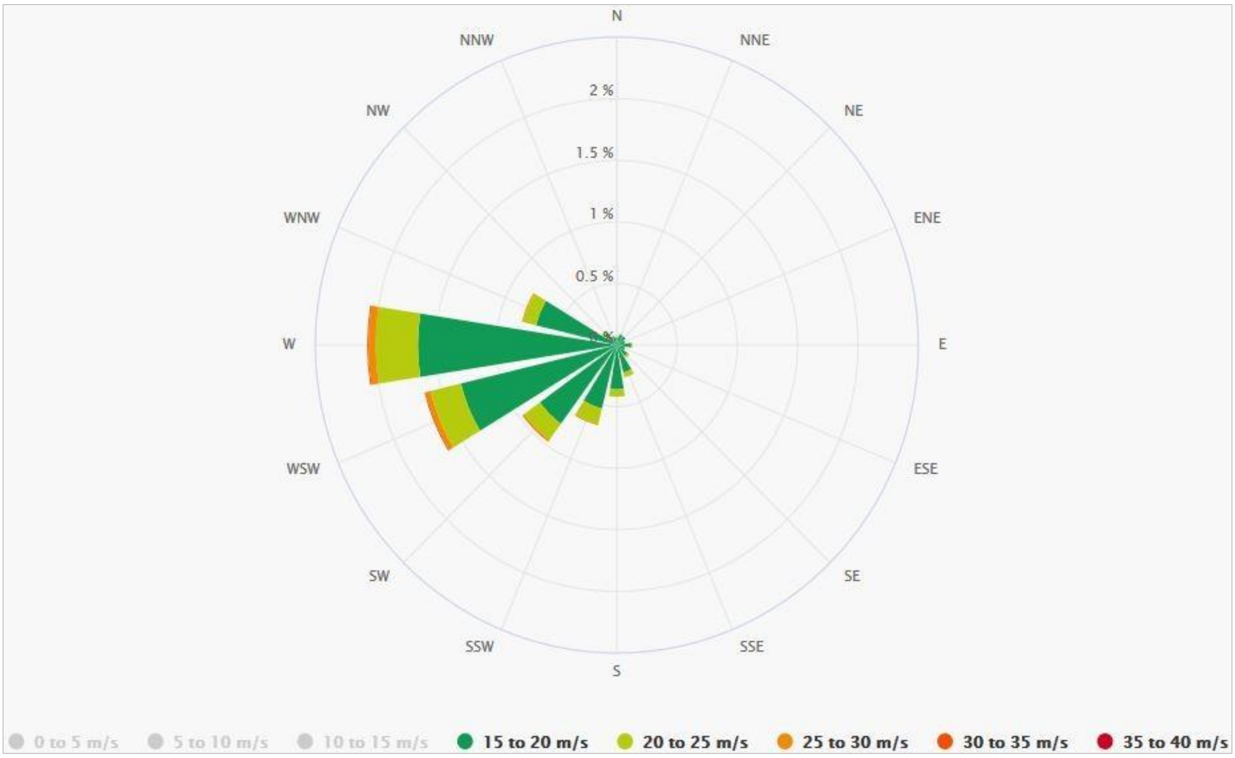


Figure 16.128: Hourly Dublin Wind Gust Rose - Cumulative Percentage (%) of time when the Velocity is above 15m/s



A total of two hours per years corresponds to 0.02% in one year, which means 0.6% in 30 years. Looking at the wind roses above, it is possible to notice that a velocity of 15m/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 16.131 and 16.132 below combines all the above directions together and shows the areas where the measured velocity is above 15m/s. Figure 16.129 shows the scale used in this case. Results show that there are not critical areas where the velocity increases above 15m/s.

Figure 16.129: Lawson Distress Categories - Frail Person or Cyclist

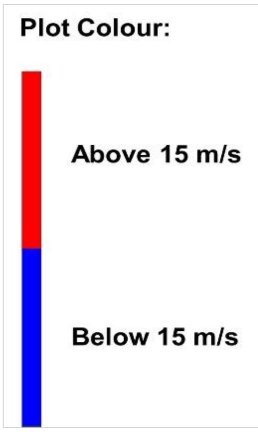


Figure 16.131: Lawson Distress Map - Frail Person or Cyclist - Existing Scenario

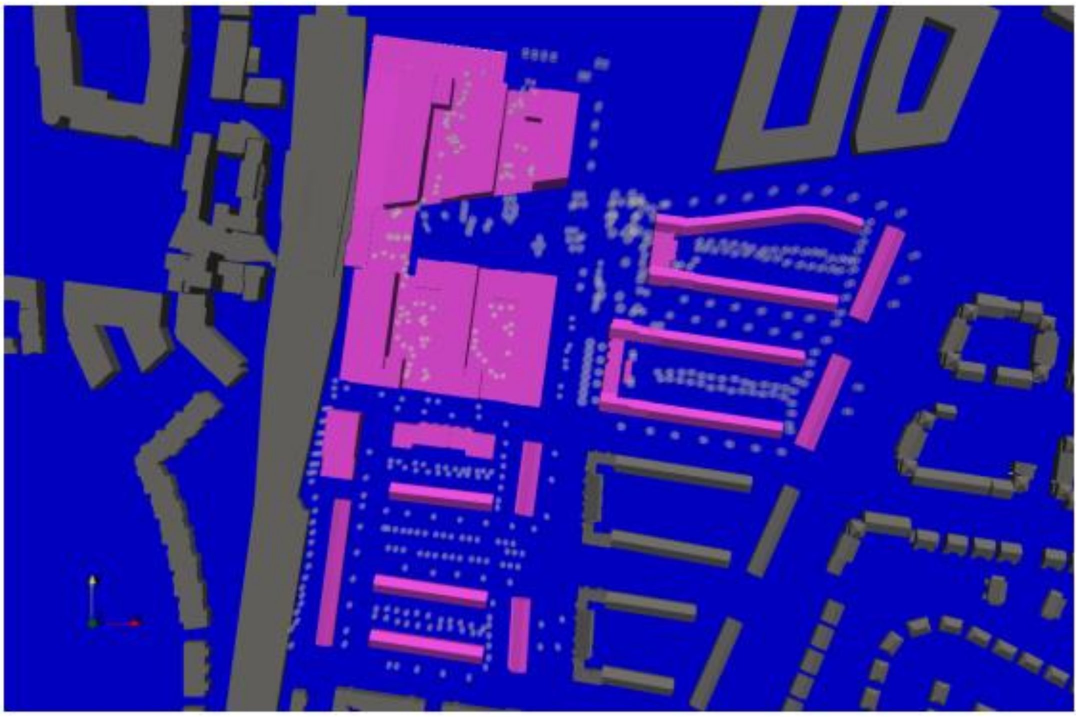
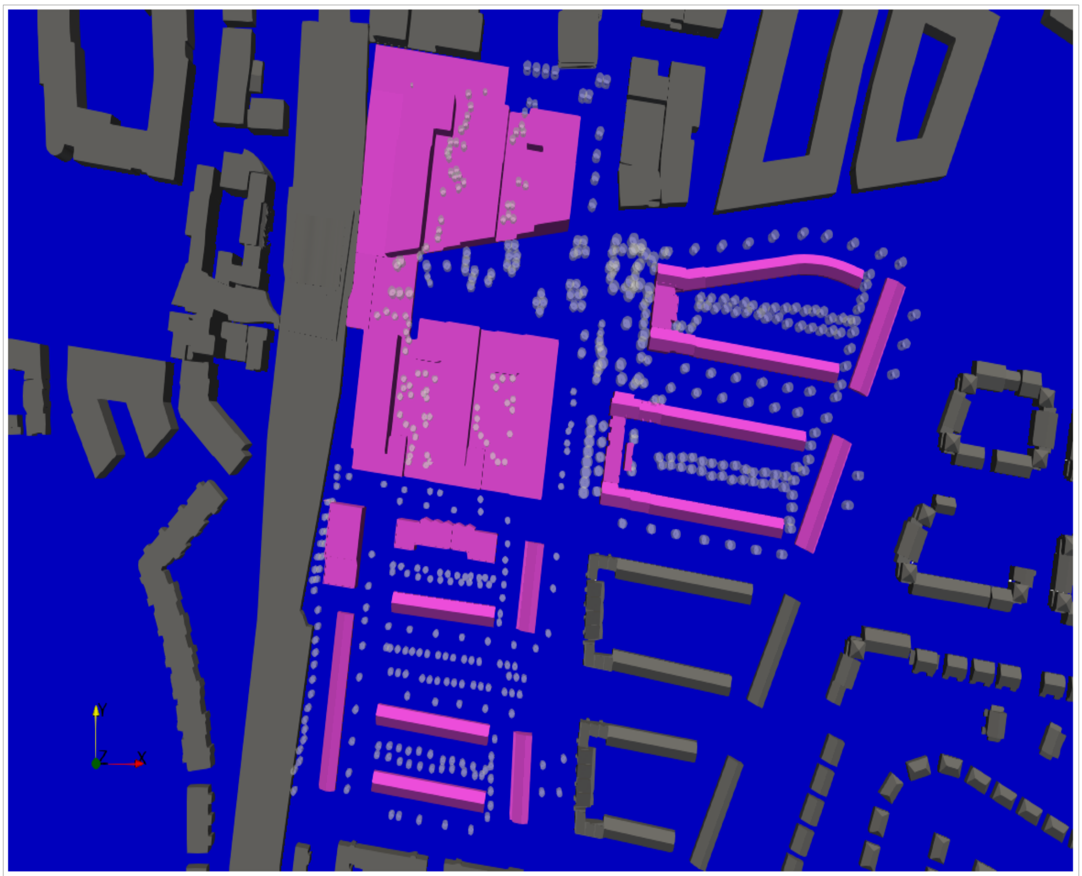


Figure 16.132: Lawson Distress Map - Frail Person or Cyclist - Cumulative Scenario



The criteria for distress for a member of the general population is 20m/s wind occurring for more than two hours per year. Limiting the results from the above wind rose to the only values above 20m/s (as reported in Figures 16.132 and 16.133 respectively as cumulative hours and cumulative percentage), it is possible to see how many hours in 30 years the gust velocity of 20m/s is exceed at pedestrian level in each direction.

Figure 16.133: Hourly Dublin Wind Gust Rose - Cumulative hours when the velocity is above 20m/s

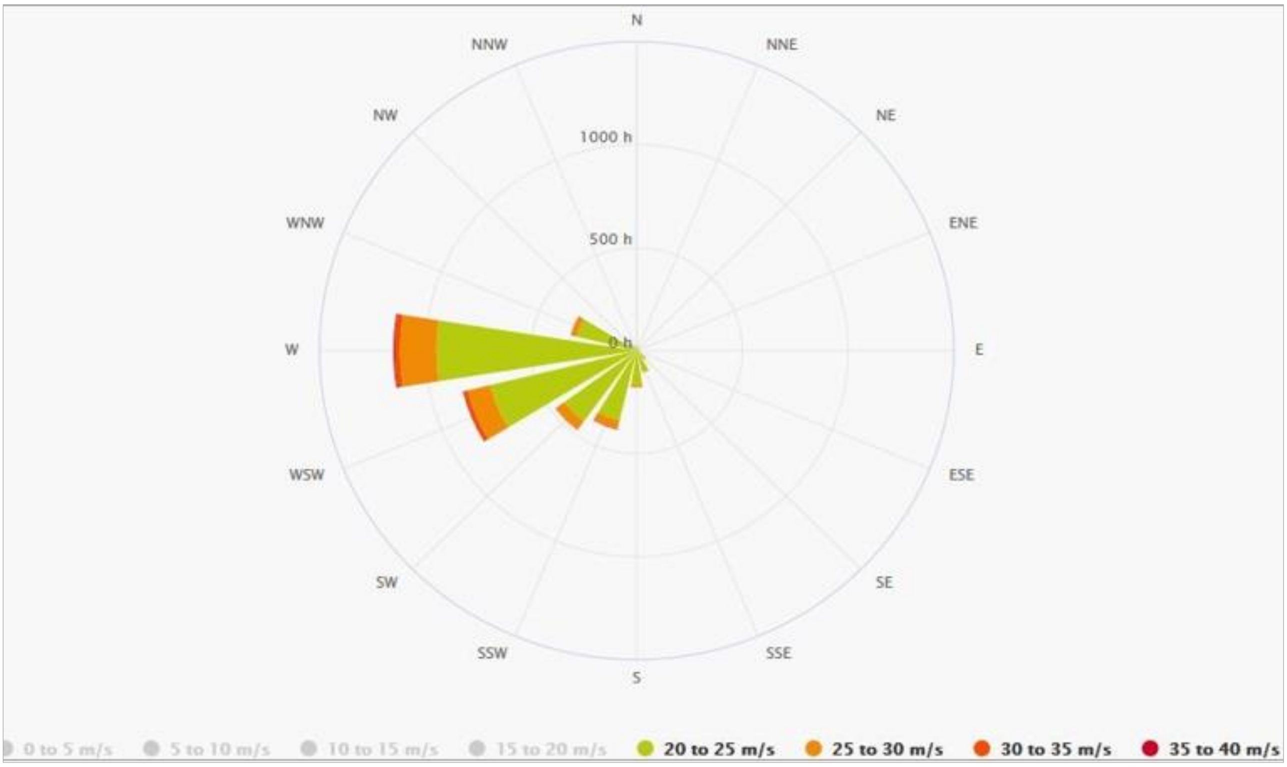
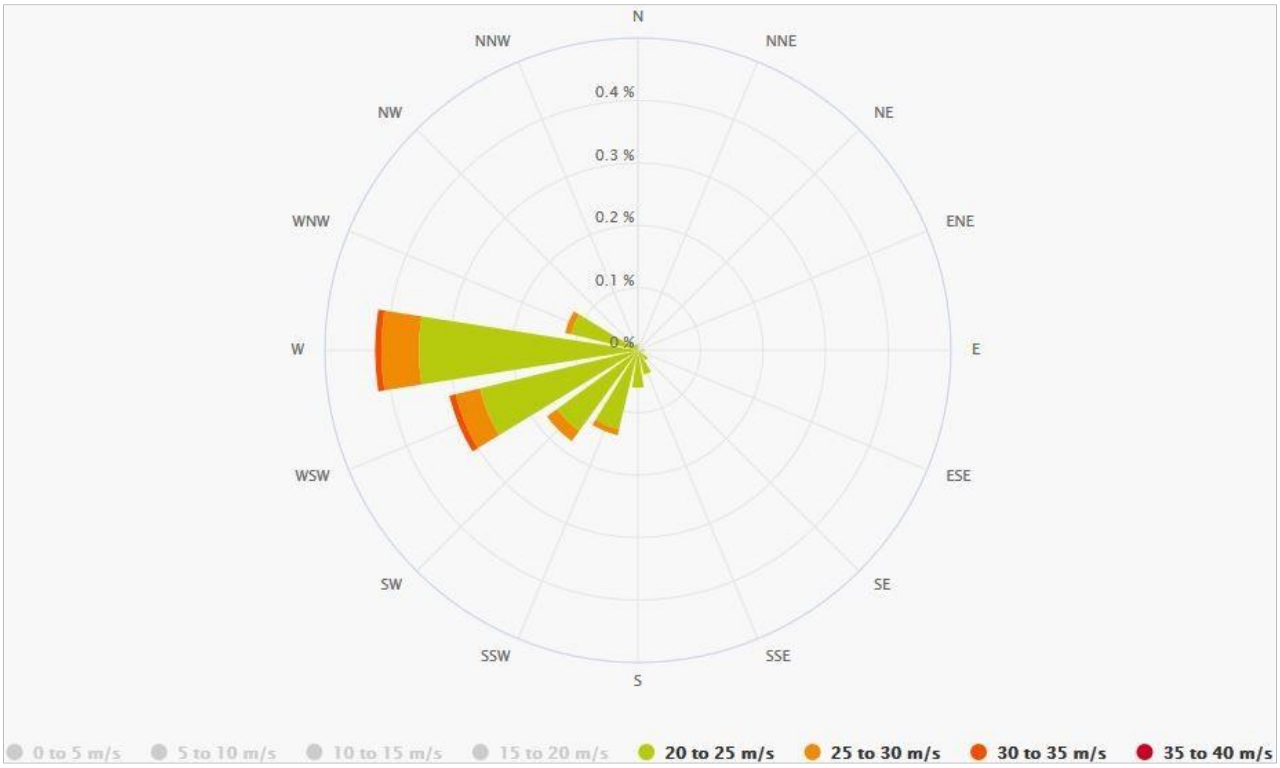


Figure 16.134: Hourly Dublin Wind Gust Rose - Cumulative percentage of time when the Velocity is above 20m/s



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 possible to notice that a velocity of 20m/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.

16.7.10 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.
- Areas around the development where velocities can be higher have been identified near the corners of the blocks, on the main road across the development. However, these were mitigated using tree landscaping, with particulate attention to the corners.
- Funnelling effects are experienced on some of the main roads around the development and on the roads in-between the different blocks. Possible solutions for this could be horizontal canopies, which 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. Finally, a colonnade on the windward face of the base building could provide the pedestrian with a calm area where to walk while being protected or a breeze walking space outside the colonnade zone. Also the implementation of tree landscaping in these areas might mitigate these effects.
- Courtyards, parks and squares seem to be well shielded. However, some recirculation effect have been found for certain wind directions. The implementation of tree landscaping in these areas will mitigate these effects.
- The mitigation measures in place significantly reduce the velocities around the proposed Project. The recirculation and funnelling 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 development. However, these velocities are below critical values.
- 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 area all around the development seems 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 for "*Frail persons or cyclists*" and "*General Public*" in the surrounding of the development.

16.8 Monitoring

16.8.1 Construction Phase

There is no particular requirement to monitor wind impact during Construction Phase for the purpose of assessing Lawson criteria, as the designated amenity areas will not be in use during this phase of the proposed Project.

16.8.2 Operational Phase

During the Operational Phase, it has been designed to conform to acceptable Lawson Criteria for Comfort and Distress in accordance with the Wind Beaufort Scale.

16.9 Reinstatement

Not applicable.

16.10 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.

16.11 Conclusions

This chapter presents the CFD modelling assumptions and results of Wind and Microclimate Modelling of the proposed Project located at Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

Results of this are utilized by the Shoreline Partnership to configure the optimal layout for the proposed Project for the aim of achieving a high-quality environment for the scope of use intended for each areas / building (*i.e*. comfortable and pleasant for potential pedestrian) and not to introduce any critical wind impact on the surrounding areas and on the existing buildings (in accordance with the Lawson Acceptance Criteria).

16.11.1 Baseline Environment Summary

The wind desktop study of the existing receiving environment showed that:

- The wind profile was built using the annual average of meteorology data collected at Dublin Airport Weather Station. In particular, the local wind climate was determined from historical meteorological data recorded 10m 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 are selected. For each direction, the reference wind speed is 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, is also compared with the one obtained using the data collected on-site. Except few differences, both the wind speed daily mean and the wind gust daily mean recorded on site follow the same patterns as the ones recorded at Dublin Airport. The speed levels registered on-site are in 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 thus much more shielded if compared with Dublin Airport. This confirms the fact that using wind data from Dublin Airport still ensures a conservative analysis of the wind impact on the proposed Project.
- The prevailing wind directions for the site are identified in the west, west south-west and south-east with magnitude of approximately 6m/s.

16.11.2 Existing and Cumulative Impact of the Proposed Project Summary

Micro-climate Model Assessment of the proposed Project and its environment was performed utilizing a CFD (Computational Fluid Dynamics) methodology. Three worst case wind scenarios are selected for presentation in this report, as these scenarios and directions showed to be the most relevant wind speeds.

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 within the existing environment (including the permitted GA2) both when the potential development GA3 was included. In the cumulative scenario, in particular, the area on the north of the site is further shielded providing some extra protection from those wind directions also for the proposed Project.

- Areas around the development where velocities can be higher have been identified near the corners of the blocks, on the main road across the development. However, these were mitigated using tree landscaping, with particulate attention to the corners.
- Funnelling effects are experienced on some of the main roads around the development and on the roads in-between some of the blocks. These have been mitigated using tree landscaping, It must be noted that the roads are not used as sitting areas therefore higher flow velocities can be accepted. These effects can be seen as being further reduced during the cumulative assessment.
- Parks and squares are well shielded from the various wind directions and well implemented with tree landscaping.
- The mitigation measures in place significantly reduce the velocities around the proposed Project for both scenarios. The recirculation and funnelling effects highlighted in the initial scheme have been successfully reduced or eliminated during the design re-iteration. Some slightly higher velocities are still found for some wind directions around some of the corners of the buildings and on the south side of the proposed Project. However, these velocities are below critical values.
- The proposed Project does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings when analysed in the existing environment and also including the cumulative scenario.
- 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 area all around the development seems 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 for "Frail persons or cyclists" and "General Public" in the surrounding of the development.

Therefore, the CFD study carried out has shown that under the assumed wind conditions typically occurring within Dublin for the past 30 years:

  - The development is designed to be a high-quality environment for the scope of use intended of each areas / building (i.*e*. comfortable and pleasant for potential pedestrian); and

- The development does not introduce any critical impact on the surrounding buildings, or nearby adjacent roads.

17 Traffic & Transportation

17.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Gordon Finn, BA, BAI, MAI, MIEI, Roads and Traffic Engineer of Cronin & Sutton (CS) Consulting Engineers.

This chapter assesses and evaluates the likely impact of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), on the existing transportation system in the vicinity of the Site, located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

This chapter identifies proposed mitigation measures to minimise any identified impacts arising from the proposed Project. The focus of the assessment is on the Operational Phase of the proposed Project, which is anticipated to have a greater impact on the prevailing environment than the Construction Phase.

It is based primarily on the Traffic Impact Assessment (TIA) prepared by CS Consulting and submitted separately in support 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 impact

This assessment has been carried out in accordance with the following guidance and established best practice:

- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Statements*.
- TII (2014). *Traffic and Transport Assessment Guidelines*.
- TII (2011). *Project Appraisal Guidelines*.
- The Institution of Highways and Transportation (1994). *Guidelines for Traffic Impact Assessments*.

Reference has also been made to the:

- Fingal Development Plan 2017-2023.
- Baldoyle-Stapolin Local Area Plan 2013 (as extended).
- DHPLG (2018). *Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities)*.

- Trip Rate Information Computer System (TRICS) database.
- CSO (2016). C*ensus data.*
- National Cycle Manual.
- Greater Dublin Area Cycle Network Plan.
- Design Manual for Urban Roads and Streets (DMURS).

17.1.1 Summary Description of the Proposed Project

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

The internal road network of the proposed Project comprises link roads along the north-south and east-west axes, allowing circulation into and through the Site, as well as a network of connecting local streets that serve the individual blocks within the development.

Figure 17.1: Site Extents and Environs[249]

The proposed Project's internal road network shall tie into the existing surrounding road network at a total of five (5 no.) locations to give vehicular access to the development (refer to Figure 17.2).

The two (2no.) primary vehicular access points are:

- (A) the northward continuation of Longfield Road, which originates at Grange Road c. 280m to the south; and
- (B) the westward continuation of Red Arches Road, which originates at Coast Road c. 930m to the east.

The proposed Project shall thereby 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 three (3 no.) vehicular access points shall be located on the western and southern boundaries of the Site of the proposed Project:

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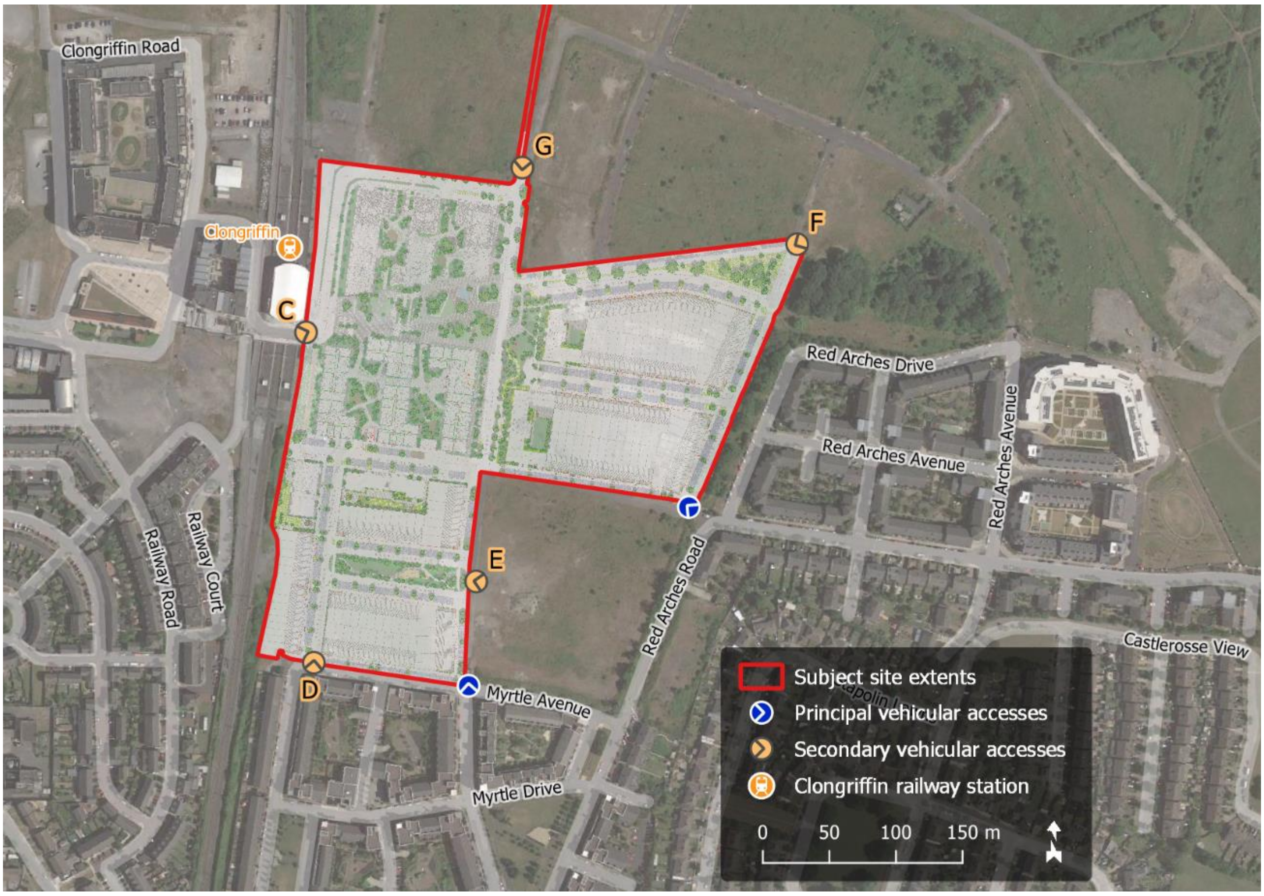
[249] NTA, OSi, OSM Contributors, Microsoft

- (C) a ramp rising to meet the existing podium-level roadway at Clongriffin train 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);
- (D) a new connection (in the form of a simple priority junction) to the existing Myrtle Avenue at the Site's southern boundary; and
- (E) a simple priority junction connecting the extended Longfield Road within the proposed Project to the east-west street of the committed development under construction to the south-east (which in turn connects to Myrtle Avenue).

Provision is also made for connectivity between the proposed Project and future development of the lands to the north:

- (F) proposed roads within the eastern and northern boundaries of the Site that may be extended into Growth Area 2 (GA2); and
- (G) the continuation of Longfield Road on a north-south axis through the entire proposed Project, allowing it to be further extended into Growth Area 3 (GA3).

Figure 17.2: Vehicular Access Points[250]



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 17.2.1.5. 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.

[250] Sources: OSi, OSM Contributors, BSLA, Google

A Site visit was subsequently made on the 11 May 2020 to confirm the existing characteristics and conditions of the above streets. Descriptions of these existing characteristics and conditions 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 Site's receiving environment. This review encompassed the *Fingal Development Plan 2017-2023*, the *Baldoyle-Stapolin Local Area Plan 2013* (as extended), 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 GDA 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 Site. Additionally, it is proposed to implement feeder routes linking the 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

It is proposed under the BusConnects Dublin Area Revised Bus Network scheme to implement Spine routes D1, D3 and H1 along Red Arches Road, Grange Road and Clongriffin Main Street in the vicinity of the Site. These routes will operate at a midday frequency of 10-15mins 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 Site.

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 Site. The delivery of these identified objectives will significantly enhance accessibility levels across the region particularly for vehicular journeys to / from the Site of the proposed Project.

- Baldoyle Public Transport Bridge - An extension of Red Arches Road and bridge over the rail line at Clongriffin DART station and connection with the east-west link of Clongriffin Main Street to accommodate buses, pedestrians and cyclists. This road objective 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 road objective 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 Committed Developments

A separate review was conducted of granted planning permissions in the vicinity of the 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 (refer to Figure 17.3):

- (A) Reg. Ref. F16A/0412 / ABP ref. PL 06F.248970 (residential development comprising 99 no. houses, currently under construction, forming part of a previously permitted planning application that also included the Site, with vehicular access to / from Longfield Road).
- (B) Reg. Refs. F11A/0290 and F11A/0290/E1 / ABP ref. PL 06F.239732 (residential development comprising 70 no. houses, 330 no. apartments, retail units with a combined GFA of 356m^2, and a 430m^2 GFA crèche, with 852 no. car parking spaces and vehicular access to / from Red Arches 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 this Traffic Impact Assessment (TIA), it has been assumed that the above-listed permitted developments shall all proceed and shall be operational by the year 2022.

Figure 17.3: Relevant Committed Developments[251]

17.2.1.5 Potential Future Development

The Site of the proposed Project forms part of Baldoyle-Stapolin Growth Area No. 1 (GA1), as defined by the *Baldoyle-Stapolin Local Area Plan 2013–2019*. The Site is bounded to the north by further zoned development lands within Baldoyle-Stapolin Growth Area No. 3 (GA3); these lands are also in the applicant's ownership. It is provisionally intended to apply for permission for a residential development on these lands, comprising 1,200 no. apartments.

For the purposes of the present assessment, it has been assumed that the future development of these lands within Baldoyle-Stapolin GA3 shall proceed and shall be completed before the year 2037.

[251] FCC, OSi, OSM Contributors, Microsoft.

Figure 17.4: Potential Future Development Lands[252]

17.2.2 Traffic Survey

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 23 of January 2020. Count information was obtained at the following nine (9 no.) sites (refer to 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

[252] FCC, OSi, OSM Contributors, Microsoft.

(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).

J9. Hole in the Wall Road / R138 / R809
(4-arm priority-controlled roundabout).

Figure 17.5: Surveyed Road Junction Sites[253]

The peak hour traffic flows across all nine (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 accompanying TIA report.

[253] OSM Contributors, Microsoft.

Table 17.1: 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 Phase 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).
- 2022 Proposed opening year.
- 2027 5 years after opening.
- 2037 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 in Table 17.2.

Table 17.2: Predicted background traffic growth

Assessment Year	2022 Year of opening	2027 5 years after opening	2037 15 years after opening
Cumulative increase over 2020 background traffic levels	+ 3.27%	+ 11.91%	+ 21.69%

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 Table 17.3 and Table 17.4.

Table 17.3: Existing Surveyed Traffic Splits at Survey Site J1 (Grange Road [R139] / Longfield Road / 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 at 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.

These network origin / destination distributions (shown in Figure 17.6 and Figure 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.

Figure 17.6: Existing Traffic Distribution to / from Longfield Road[254]

[254] OSi, OSM Contributors.

Figure 17.7: Existing Traffic Distribution to / from Red Arches Rd[255]

17.2.5 Proposed Project 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:

- 135 no. houses;
- 74 no. apartments;
- convenience retail units with a total gross floor area of 1,027m^2;
- a medical centre with a gross floor area of 462m^2;
- a pharmacy with a gross floor area of 223m^2;
- a crèche with a gross floor area of 539m^2;

[255] OSi, OSM Contributors.

- a restaurant / café with a gross floor area of 485m^2; and
- a gym with a gross floor area of 411m^2.

The following TRICS land use sub-categories have been employed, being the most appropriate for the respective elements of this development:

- 03 Residential / A - Houses Privately Owned.
- 03 Residential / C - Flats Privately Owned.
- 01 Retail / I - Shopping Centre - Local Shops.
- 05 Health / G - GP Surgeries.
- 04 Education / D - Nursery.
- 06 - Hotel, Food & Drink / B - Restaurants.
- 07 Leisure / K - Fitness Club (Private).

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 one mile of the Site (32,000 approx.);
- the population within five miles of the Site (250,000 approx.); and
- the aggregate mean car ownership rate within five miles of the Site (1.2 cars per household).

The trip rates selected are given in Table 17.5 and Table 17.6. Full details of the TRICS information used in this assessment are provided in the accompanying TIA report.

Table 17.5: Selected TRICS Arrival Trip Rates

Time Period	Arrival Trip Rates by Development Element						
	Houses (per unit)	Apartments (per unit)	Retail Units (per 100m^2)	Medical Centre (per 100m^2)	Crèche (per 100m^2)	Café (per 100m^2)	Gym (per 100m^2)
AM Peak	0.185	0.046	2.424	2.964	3.466	0.000	0.854
PM Peak	0.285	0.111	3.224	2.261	1.492	1.152	1.140

Table 17.6: Selected TRICS Departure Trip Rates

Time Period	Departure Trip Rates by Development Element						
	Houses (per unit)	Apartments (per unit)	Retail Units (per $100m^2$)	Medical Centre (per $100m^2$)	Crèche (per $100m^2$)	Café (per $100m^2$)	Gym (per $100m^2$)
AM Peak	0.374	0.165	2.051	1.491	2.741	0.000	0.493
PM Peak	0.195	0.076	3.230	2.504	2.015	0.909	0.766

The forecast trip generation of the proposed Project has been calculated from these selected TRICS rates, based upon the development characteristics. The resultant trips are given in Table 17.7 to Table 17.9.

Table 17.7: Calculated Development Arrival Trips

Time Period	Arrival Trips by Development Element							Total Arrivals
	Houses	Apartments	Retail Units	Medical Centre	Crèche	Café	Gym	
AM Peak	25	34	31	14	19	0	4	127
PM Peak	38	83	42	10	8	6	5	192

Table 17.8: Calculated Development Departure Trips

Time Period	Departure Trips by Development Element							Total Departures
	Houses	Apartments	Retail Units	Medical Centre	Crèche	Café	Gym	
AM Peak	50	123	27	7	15	0	2	224
PM Peak	26	57	42	12	11	4	3	155

Table 17.9: Calculated Combined Development Trips

Time Period	Combined Trips by Development Element							Total Trips (Combined)
	Houses	Apartments	Retail Units	Medical Centre	Crèche	Café	Gym	
AM Peak	75	157	58	21	34	0	6	351
PM Peak	64	140	84	22	19	10	8	347

17.2.6 Proposed Project Trip Distribution

The proposed Project's internal road network shall tie in to the existing surrounding road network both at Longfield Road and at Red Arches Road. 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 Section 17.2.4, the predicted distribution of peak hour development 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.

It has been assumed that the proportion of development 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 (refer to Figure 17.6) and to / from Red Arches Road (refer to Figure 17.7). It has further been assumed that 50% of development 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.

Figure 17.8: Predicted Proposed Project Traffic Distribution[256]

Development 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 development 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%

Development 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

[256] Sources: OSi, OSM Contributors

all development 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, 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).

Predicted future distributions of such traffic have therefore been established, and are shown in Figure 17.9 and Figure 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 development'* assessment scenarios.

Figure 17.9: Redistribution of Existing Longfield Road Traffic[257]

Figure 17.10: Redistribution of Existing Red Arches Road Traffic[258]

[257] OSi, OSM Contributors
[258] OSi, OSM Contributors

These future distributions have been determined in the same manner as the predicted distribution of traffic to / from the proposed Project (refer to Figure 17.8), with the following exceptions:

- all traffic generated by the existing developments accessed via Longfield Road, which departs to or 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 or 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 three (3 no.) committed developments identified in Section 17.2.1.4 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.

Trip generation figures for committed developments (A) and (B) have been calculated from the trip rates for houses and apartments given in Table 17.5 and Table 17.6, while the trip generation of committed development (C) has been sourced from the Traffic and Transport Statement submitted under reg. ref. F19A/0461.

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)	18	28	37	19	55	47
(B)	28	56	81	39	109	95
(C)	68	0	68	0	136	0

Under the '*without development*' assessment scenarios (*i.e*. without the proposed new link between Grange Road and Coast Road, via the Site of the proposed Project): exceptions:

- 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 (refer to 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 (refer to Figure 17.7).

Figure 17.11: Predicted School Traffic Distribution with Link Road[259]

Under the '*with development'* 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 Site of the proposed Project (Refer to Section 17.2.5);
- 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 (Refer to Section 17.2.7); 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 Site of the proposed Project, with the exception that no AM peak arrival trips are assumed to originate in the Baldoyle Industrial Estate (refer to Figure 17.11).

[259] OSi, OSM Contributors

17.2.9 Potential Future Development Trip Generation and Distribution

The vehicular trips predicted to be generated by the future development of the applicant's GA3 zoned lands, located immediately to the north of the Site (Refer to Section 17.2.1.5), have been included in the design year sensitivity assessment described in Section 17.10.

Trip generation for this potential future development has been calculated from the TRICS trip rates for apartments that are given in Table 17.5 and Table 17.6. Such development is provisionally assumed to comprise 1,200 no. apartments; the resultant trip generation figures (obtained through multiplying the TRICS trip rates by the number of apartments) are given in Table 17.13. These vehicular trips have been distributed across the surrounding road network in the same manner as those to / from the proposed Project (Refer to Section 17.2.5).

Table 17.13: Potential Future GA3 Development Trip Generation

Time Period	Arrivals	Departures	Total Trips
AM Peak	71	210	281
PM Peak	140	100	240

17.2.10 Network Analysis

Table 17.14 shows the absolute and proportional increases in peak hour traffic flows that shall result from the proposed Project at each of the nine (9 no.) surveyed junctions shown in Figure 17.5. The additional trips at each of these junctions are the sum of:

- vehicular trips directly generated by the proposed Project; and
- 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.

Vehicular traffic potentially to be generated by the future development of the applicant's GA3 zoned lands, as described above, is not included in the following table.

Table 17.14: 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	171	193	+10.0%	+11.6%
J2	1343	1101	83	81	+6.5%	+7.9%
J3	1393	1230	-58	-29	-4.2%	-2.4%
J4	1236	1089	40	42	+3.3%	+4.0%
J5	903	815	33	33	+3.8%	+4.3%
J6	1124	1162	61	67	+5.6%	+6.0%
J7	1045	1004	-57	-30	-5.4%	-2.8%
J8	1110	1745	-57	-30	-5.0%	-1.6%
J9	2983	3117	146	133	+5.1%	+4.5%

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 17.14, only at surveyed Junction J1 (the junction of Grange Road with Longfield Road and Grange Rise) shall the proposed Project result in an increase of more than 10% in total traffic flows in either peak hour period. Surveyed Junction J2 (the junction of Coast Road with Red Arches Road) 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 Red Arches Road. While surveyed Junction J6 shall also experience increases of over 5% in total traffic flows in both peak hour periods, this is not considered a sensitive location and its resulting total peak hour traffic flows shall remain relatively low.

Within the scope of this assessment, therefore, only the existing Junctions No. J1 and J2 required 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.

At the request of Fingal County Council, however, Junction No. 9 (the existing roundabout junction of Hole in the Wall Road with Grange Road and Clarehall Avenue) has also been included in the operational assessments detailed later in this EIAR chapter.

Figure 17.12: Modelled Road Junctions[260]

Operational assessments of the following three (3 no.) key junctions giving access to the subject site 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 (refer to Figure 17.12):

J10. Grange Road (R139) / Longfield Road / Grange Rise
(4-arm signal-controlled junction).

J1. Coast Road (R106) / Red Arches Road
(3-arm priority-controlled roundabout).

J9. Hole in the Wall Road / R138 / R809.
(4-arm priority-controlled roundabout).

[260] Sources: OSM Contributors, Microsoft

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 accompanying Traffic Impact Assessment (TIA) report:

- 2020 - surveyed traffic conditions;
- 2022 (planned year of opening) - with & without the proposed Project;
- 2027 – with & without the proposed Project; and
- 2037 (design year) – with & without the proposed Project.

In addition to the above primary assessment scenarios, a sensitivity assessment has been carried out for the design year 2037, including potential traffic flows to be generated by the future development of the adjacent GA3 zoned lands to the north of the Site (as described in Section 17.2.15). The results of this sensitivity assessment, representing 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 Passenger Car Units (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 No. 1 Modelling Parameters

Assessed Junction No. 1 (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 in the model, such as signal phasing sequence and cycle time, are given in the accompanying TIA report.

17.3 Baseline Environment

Tables 17.15, 17.16, 17.17 show the TRANSYT and ARCADY modelling results for the baseline year 2020, at the three (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 Junction No. 2) to moderate (on most Junction No. 1 approaches). More significant queueing and / or delays are however experienced on the northern and eastern approaches to Junction No. 1.

Table 17.15: Junction No. 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	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

Traffic stream movements: S = straight ahead, L = left turn, R = right turn

Table 17.16: Junction No. 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 17.17: Junction No. 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		

Junction No. 1 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.

Junction No. 2 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.

Junction No. 9 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 Impact of the Proposed Project

17.4.1 Construction Phase

During construction of the proposed Project, it is expected that vehicular traffic to and 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 ten (10 no.) 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 no. HGVs in each of the background peak hours, equivalent to 46 no. Passenger Car Units (PCU).

Allowing for a potential additional 50 no. light vehicle arrivals and five (5 no.) 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 haul road to / from the north, thereby avoiding the junctions on Grange Road and Coast Road with the greatest potential to be adversely impacted by construction traffic.

Table 17.18: 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**
TOTALS	**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. These further impacts would potentially take the form 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 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.

As the Site's peak hour vehicular trip generation shall be significantly lower during the Construction Phase than during the Operational Phase, it shall have a correspondingly lesser impact on the operation of the surrounding road network during the Construction Phase. Junction performance assessment has therefore not been conducted for the Construction Phase of the proposed Project.

17.4.2 Operational Phase

In its Operational Phase, the proposed Project shall 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.

17.5 Mitigation Measures

17.5.1 Construction Phase

The appointed Contractor for the construction of the proposed Project will be required to prepare a final Construction Environmental Management Plan (CEMP), including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network. A Designated Community Liaison Officer (DCLO) will be nominated for the Site, who will work with DCLOs on other active sites to coordinate construction activities. The DCLO will also act as a point of contact for local residents, Fingal County Council and An Garda Síochána.

The final CEMP will be based upon the outline CEMP prepared by Altemar Ltd. and submitted separately in support of this planning application. This includes (*inter alia*) the following measures for minimising construction traffic and mitigating its effects:

- routing all construction traffic via a haul road to / from the north, connecting to Moyne Road, avoiding Grange Road and Coast Road;
- conducting all loading and unloading operations within the Site, away from the public road;
- scheduling deliveries outside of peak hour periods to avoid disturbance to surrounding pedestrian and vehicular traffic;
- staggering HGV movement to / from Site to avoid site queues;
- preventing haulage vehicles travelling in convoys of more than two vehicles at any time and spacing haulage vehicles by a minimum of 250m at all times;
- installation of a wheel wash at exit from the site to prevent any dirt being carried out into the public road; and
- deployment of a road sweeper as necessary to keep the public roads around the Site clean.

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 Fingal County Council.

17.5.2 Operational Phase

The proposed Project shall incorporate several design elements intended to mitigate the impact of the development on the surrounding road network during its Operational Phase. These include:

- a reduced car parking provision, which shall discourage higher vehicle ownership rates and excessive vehicular trips to the proposed Project (by residents and visitors); and
- a high provision of secure bicycle parking, which shall serve to encourage bicycle journeys by both development occupants and visitors.

As described in the Residential Travel Plan (RTP) framework document prepared in support of this planning application, a Residential Travel Plan Coordinator shall be appointed for the proposed Project, with the remit to implement and oversee an ongoing RTP. This shall assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys to and from the development site where possible.

17.6 Residual Impacts

Table 17.19, Table 17.20 and Table 17.21 give the peak hour TRANSYT and ARCADY modelling results for the three (3 no.) assessed junctions in the design year of 2037 (15 years after development completion), with the proposed Project in place. The traffic flows used in this assessment scenario include all committed developments, as well as the effect of traffic redistribution via the proposed new link between Longfield Road and Red Arches Road.

Table 17.19: Junction No. 1 Assessment Results - Design year 2037 - With Proposed Project in Place

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	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	37	36	6	3	5	3	67	81	143	149
	R	82	73	15	8	13	7	91	102	10	24
Grange Road (east)	S / L	96	87	40	29	28	21	91	71	-6	3
	R	56	79	3	4	3	4	108	161	62	15
Grange Rise (south)	L	30	73	6	22	5	16	57	56	196	24
	S / R	69	58	5	11	5	9	113	70	30	55
Grange Road (west)	S / L	68	79	24	29	16	19	38	50	33	13
	R	95	51	28	10	16	6	103	49	-6	76

Traffic stream movements: S = straight ahead, L = left turn, R = right turn

Table 17.20: Junction No. 2 Assessment Results - Design year 2037 - With Proposed Project in Place

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	56	1	1	4	5	-1	61
Red Arches Road (west)	34	16	1	0	5	4		
Coast Road (north)	92	56	10	1	37	7		

Table 17.21: Junction No. 9 Assessment Results - Design year 2037 - With Proposed Project in Place

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)	75	68	3	2	16	10	-13	-18
Grange Road (east)	89	110	7	67	29	175		
Grange Road (south)	88	116	7	90	24	307		
Clarehall Avenue (west)	106	86	58	6	121	17		

Under this assessment scenario, Junction No. 1 shall experience:

- mean maximum vehicle queues of at most 40 PCU during the AM peak hour and at most 29 PCU during the PM peak hour; and
- mean delays per PCU of at most 113 seconds during the AM peak hour and at most 161 seconds during the PM peak hour.

Junction No. 2 shall experience:

- mean maximum vehicle queues of at most 10 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and
- mean delays per PCU of at most 37 seconds during the AM peak hour and at most 7 seconds during the PM peak hour.

Junction No. 9 shall experience:

- mean maximum vehicle queues of at most 58 PCU during the AM peak hour and at most 90 PCU during the PM peak hour; and
- mean delays per PCU of at most 121 seconds during the AM peak hour and at most 307 seconds during the PM peak hour.

The predicted residual impact of the proposed Project is obtained by 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 Table 17.22, Table 17.23 and Table 17.24.

Table 17.22: Junction No. 1 - Variation between 2037 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	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	-9	-17	0	+1	0	+1	-8	-27	+47	+78
	R	+36	+23	+9	+6	+7	+5	+16	-1	-85	-56
Grange Road (east)	S / L	-4	-1	-10	-2	-6	-1	-20	+1	+4	+1
	R	-4	+10	0	+1	0	+1	-1	+26	+12	-16
Grange Rise (south)	L	+1	+7	+1	+2	0	+1	+1	+8	-13	-13
	S / R	+16	+12	+1	+2	+1	+2	+22	+9	-41	-42
Grange Road (west)	S / L	+7	+13	+4	+7	+2	+4	+4	+10	-15	-23
	R	-3	+3	-3	0	-2	+1	-20	+5	+3	-11

Traffic stream movements: S = straight ahead, L = left turn, R = right turn

Table 17.23: Junction No. 2 – Variation between 2037 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)	-2	-1	0	0	0	0	-3	-2
Red Arches Road (west)	+7	+5	+1	0	0	0		
Coast Road (north)	+3	+4	+3	0	+8	0		

Table 17.24: Junction No. 9 - Variation between 2037 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)	+2	+3	0	0	+1	+1	-2	-2
Grange Road (east)	+7	+6	+3	+31	+11	+69		
Grange Road (south)	+3	+3	+2	+15	+5	+90		
Clarehall Avenue (west)	+3	+3	+18	+1	+31	+3		

At Junction No. 1 in the year 2037, the proposed Project shall result in:

- maximum increases in vehicle queue length of 9 PCU during the AM peak hour and of 7 PCU during the PM peak hour; and
- maximum increases in mean delay per PCU of 22 seconds during the AM peak hour of 26 seconds during the PM peak hour.

At Junction No. 2 in the year 2037, 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 8 seconds during the AM peak hour of 0 seconds during the PM peak hour.

At Junction No. 9 in the year 2037, the proposed Project shall result in:

- maximum increases in vehicle queue length of 18 PCU during the AM peak hour and of 31 PCU during the PM peak hour; and
- maximum increases in mean delay per PCU of 31 seconds during the AM peak hour of 90 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 effective capacity during one or both peak hour periods by the year 2037, 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 development itself.

17.7 Monitoring

Post-development 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 development, however, the Residential Travel Plan Coordinator shall be responsible for monitoring the travel habits of development 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 Residential Travel Plan Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of development 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

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on 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, both of which have the potential to impact human health.

Traffic flow within and around the Site has the potential to create safety risks for pedestrians and cyclists (**population and human health**), where the design does not provide for safe pedestrian / cycling environments. A Residential Travel Plan (RTP) framework document has been prepared in support of this planning application, which will ensure the impact is *imperceptible*.

Construction traffic (increased traffic movements, congestion) has the potential to have an impact in terms of **air quality**. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits.

Construction traffic (**noise**), has the potential to impact human health, from noise associated with inward traffic noise. The appointed Contractor will ensure that all best practice noise control methods will be used, to ensure impacts are not significant.

The natures, extents, and consequences of these changes are examined in Chapters 11 (Air Quality and Climate) and 12 (Noise and 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 2037, which includes potential traffic flows to be generated by the future development of the adjacent GA3 zoned lands to the north of the Site of the proposed Project (as described in Section 17.2.1.5 of this chapter). The results of this sensitivity assessment are given in Table 17.25, Table 17.26 and Table 17.27.

Table 17.25: Junction No. 1 Assessment Results – Design year 2037 – 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	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM

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 (%)	
Longfield Road (north)	S / L	42	37	7	4	6	4	65	78	114	141
	R	93	77	22	10	19	9	115	100	-4	18
Grange Road (east)	S / L	96	87	40	29	28	21	91	71	-6	3
	R	61	90	3	6	3	6	113	199	47	0
Grange Rise (south)	L	33	77	6	23	5	17	61	62	169	16
	S / R	94	68	7	12	7	10	216	77	-5	33
Grange Road (west)	S / L	71	87	25	34	17	22	40	60	27	3
	R	97	53	30	10	18	6	117	51	-8	71

Traffic stream movements: S = straight ahead, L = left turn, R = right turn

Table 17.26: Junction No. 2 Assessment Results – Design year 2037 – 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)	42	58	1	1	4	6	-4	51
Red Arches Road (west)	43	20	1	0	6	4		
Coast Road (north)	95	60	13	1	49	8		

Table 17.27: Junction No. 9 assessment results – Design year 2037 – 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)	76	71	3	2	16	11	-14	-20
Grange Road (east)	97	114	16	86	56	218		
Grange Road (south)	91	118	8	99	29	350		
Clarehall Avenue (west)	108	88	68	7	139	20		

Under this assessment scenario, Junction No. 1 shall experience:

- mean maximum vehicle queues of at most 40 PCU during the AM peak hour and at most 29 PCU during the PM peak hour; and

- mean delays per PCU of at most 216 seconds during the AM peak hour and at most 199 seconds during the PM peak hour.

Junction No. 2 shall experience:

- mean maximum vehicle queues of at most 13 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and
- mean delays per PCU of at most 49 seconds during the AM peak hour and at most 8 seconds during the PM peak hour.

Junction No. 9 shall experience:

- mean maximum vehicle queues of at most 68 PCU during the AM peak hour and at most 99 PCU during the PM peak hour; and
- mean delays per PCU of at most 139 seconds during the AM peak hour and at most 350 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

Table 17.28, Table 17.29 and Table 17.30 give the TRANSYT and ARCADY junction assessment results for the design year 2037 under the 'Do-Nothing' scenario. The traffic flows used in these assessments are those surveyed in January 2020, scaled up to 2037 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.

Under this assessment scenario, Junction 1 is shown to reach or exceed its effective capacity on two approach streams in the AM peak hour period, while Junction 9 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. Junction 2 shall operate within effective capacity on all approaches in both peak hour periods.

Table 17.28: Junction No. 1 Assessment Results – Design year 2037 – '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	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Longfield Road (north)	S / L	46	53	6	2	5	2	75	108	96	71
	R	46	50	6	2	6	2	75	103	95	80
Grange Road (east)	S / L	100	88	50	31	34	22	112	70	-10	2
	R	60	69	3	3	3	3	109	135	50	31
Grange Rise (south)	L	29	66	5	20	5	15	56	48	209	37
	S / R	53	46	4	9	4	8	91	61	71	97
Grange Road (west)	S / L	61	66	20	22	14	15	34	40	48	36
	R	98	48	31	10	18	5	123	44	-9	87

Traffic stream movements: S = straight ahead, L = left turn, R = right turn

Table 17.29: Junction No. 2 Assessment Results – Design year 2037 – '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)	44	57	1	1	4	5	2	63
Red Arches Road (west)	27	11	0	0	5	4		
Coast Road (north)	89	52	7	1	29	7		

Table 17.30: Junction No. 9 Assessment Results – Design year 2037 – '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)	73	65	3	2	15	9	-11	-16
Grange Road (east)	82	104	4	36	18	106		
Grange Road (south)	85	113	5	75	19	217		
Clarehall Avenue (west)	103	83	40	5	90	14		

Junction No. 1 shall experience:

- mean maximum vehicle queues of at most 50 PCU during the AM peak hour and at most 31 PCU during the PM peak hour; and
- mean delays per PCU of at most 123 seconds during the AM peak hour and at most 135 seconds during the PM peak hour.

Junction No. 2 shall experience:

- mean maximum vehicle queues of at most 7 PCU during the AM peak hour and at most 1 PCU during the PM peak hour; and

- mean delays per PCU of at most 29 seconds during the AM peak hour and at most 7 seconds during the PM peak hour.

Junction No. 9 shall experience:

- mean maximum vehicle queues of at most 40 PCU during the AM peak hour and at most 75 PCU during the PM peak hour; and
- mean delays per PCU of at most 90 seconds during the AM peak hour and at most 217 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.

18 Material Assets - Waste Management

18.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Chonaill Bradley of AWN Consulting Ltd. Chonaill is a Senior Environmental Consultant and an Associate Member of the Institute of Waste Management (CIWM) and has over seven years' experience in the environmental consultancy sector.

This chapter comprises an assessment of the likely impact of the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), from the proposed Project as well as identifying proposed mitigation measures to minimise any impacts. The proposed Project is located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

A site-specific Construction and Demolition Waste Management Plan (C&D WMP) has been prepared by AWN Consulting to deal with waste generation during the Construction and Demolition Phases of the proposed Project and has been included as Appendix A18.1 in Volume 3. 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[261].

A separate Operational Waste Management Plan (OWMP) has also been prepared for the Operational Phase of the proposed Project and is included as Appendix A18.2 in Volume 3 of this EIAR.

These documents will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted

[261] DEHLG (2006).

residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

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 methodology 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 Appendix A18.1 and A18.2.

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 published data by the EPA in the *National Waste Reports and National Waste Statistics*, data recorded from similar previous developments, the two operating phases of this development, 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. This information is presented in Section 18.5.

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). Chapter 9 of the EIAR also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the proposed Project.

18.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation which defines 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).

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*[262] in Ireland (2020) and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national waste targets is due to the Irish and international waste context changing 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 from 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*[263] was also consulted in the preparation of this assessment.

There are no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, plans and reports including the *EMR Waste Management Plan 2015-2021, BS 5906:2005 Waste Management in Buildings – Code of Practice, 5*. The Fingal County Council

[262] DCCAE (2020).
[263] FÁS and the Construction Industry Federation (CIF) (2002).

(FCC) *Fingal County Council (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-Laws 2020*, the EPA National Waste Database Reports 1998-2018 and the EPA National Waste Statistics Web Resource.

18.3 Baseline Environment

In terms of waste management, the receiving environment is largely defined by Fingal County Council (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 *Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021.*

The waste management plan 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 Regional 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 C&D waste 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 that these were met.

The Fingal Development Plan 2017-2023 (the '*Development Plan*') 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 Eastern-Midlands

Waste Region 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.

18.3.1 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.

18.3.1.1 Demolition Phase

There will be no demolition[264] associated with the proposed Project, there will however be some existing hardstanding excavated as part of the Site excavation works.

18.3.1.2 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, subsoil and made ground will require excavation to facilitate site levelling, construction of foundations, along with the installation of underground services. The Project Engineers[265] have estimated that c. 21,093m^3 tonnes of excavated material will be excavated, however it is envisaged that c. 21,093m^3 tonnes will be reused on-site. These estimates will be refined prior to commencement of construction. If any material requires removal from Site it is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material 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).* Any volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility.

[264] Only works associated with the removal of the temporary access to Clongriffin train station.
[265] Cronin & Sutton Consulting Engineers.

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, it will first need to be classified. Waste material will initially 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*[266]. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples 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 during the Construction Phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from Site offices.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&DWMP. The C&DWMP provides an estimate of the main waste types likely to be generated during the Construction Phase of the proposed Project and these are summarised in Table 18.1.

[266] EPA (2015).

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	1815.8	10	181.6	80	1452.7	10	181.6
Timber	1540.7	40	616.3	55	847.4	5	77.0
Plasterboard	550.3	30	165.1	60	330.2	10	55.0
Metals	440.2	5	22.0	90	396.2	5	22.0
Concrete	330.2	30	99.0	65	214.6	5	16.5
Other	825.4	20	165.1	60	495.2	20	165.1
Total	5502.6		1249.1		3736.2		517.2

18.3.1.3 Operational Phase

As noted in Section 18.1, an OWMP has been prepared for the proposed Project and is included as Appendix A18.2 in Volume 3. 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 WGM is presented in Table 18.2, below, and is based on the uses and areas as advised by the Project Architects. Further unit breakdowns can be found in Appendix A18.2 in Volume 3.

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	14.10	0.93
DMR	99.95	8.66
Glass	2.73	0.24
MNR	52.56	6.06
Confidential Paper	-	0.61
Cardboard	-	3.11
Medical	-	0.35
Total	169.33	19.96

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 WSA's can be viewed on the plans submitted with the application.

The OWMP seeks to ensure the proposed Project contributes to the targets outlined in the *EMR Waste Management Plan 2015-2021* and the FCC waste Bye-laws.

Mitigation measures proposed to manage impacts arising from wastes generated during the Operational Phase of the proposed Project are summarised below.

18.4 Potential Impact of the Proposed Project

This section details the potential waste effects associated with the proposed Project.

18.4.1 Construction Phase

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 on adjacent developments. The indirect effect of litter issues is the presence of vermin within the proposed Project and the surrounding areas. However, 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 result in indirect 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. However, in the absence of mitigation, the effect on the local and regional environment is likely to be *short-term, significant* and *negative.*

Wastes arising 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 Eastern Midlands region 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. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 9 (Land, Soils, Geology & Hydrogeology). It is anticipated that c. 21,093m^3 tonnes of excavated material will be excavated, however it is envisaged that c. 21,093m^3 tonnes 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 as well as on water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be *short-term, significant* and *negative.*

18.4.2 Operational Phase

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. However, 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 development 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 on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas. However, 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 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. However, in the absence of mitigation, the effect on the local and regional environment is likely to be *short-term, significant* and *negative.*

In the absence of mitigation measures the potential impact of operational waste generation from the development is considered to be *long-term, not 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 requirements of the guidance document issued by the DEHLG[267] is included as Appendix A18.1 in Volume 3. 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 Excavation and Construction Phases of the proposed Project. Prior to commencement, 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[268] have estimated that c. 21,093m^3 tonnes of excavated material will be excavated, however it is envisaged that c. 21,093m^3 tonnes 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 as well as on water and soil environments, both on-site.

[267] Department of Environment, Heritage and Local Government.
[268] Cronin & Sutton Consulting Engineers.

In addition, 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, where required);
- a waste manager will be appointed by the main Contractor(s) 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; and
- 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 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 and the Litter Pollution Act 1997, 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 A18.2. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the Site. 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 will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are not available; and
- 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 during the Excavation and Construction Phases as well as during the Operational Phase. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

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 effect on the environment will be *imperceptible*.

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 a high rate of reuse, recycling and recovery is achieved, the predicted effect of the Operational Phase on the environment will be *imperceptible*.

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 C&D WMP including maintenance of waste documentation.

The management of waste during the Operational Phase will be monitored to ensure effective implementation of the OWMP by the building management company and the nominated waste contractor(s).

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 appoint who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager should 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 identify trends. The data should be maintained to advise on 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. 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 Reinstatement

In the event that the proposed Project is discontinued, there is not likely to be any significant impacts on waste management at the Site.

18.9 Interactions

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

Adherence to the Mitigation Measures outlined in Section 18.5 will ensure that there are *no significant* impacts on resource or waste management from the proposed Project. The management of waste during the Construction Phase in accordance with the C&D WMP and during the Operational Phase in accordance with the OWMP will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.

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 cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&D WMP and OWMP, will ensure appropriate management of waste and avoid any negative impacts on the local population. The effects will be *imperceptible.*

Land and Soils - During the Construction Phase excavated soil, stone and made ground will be generated from the excavations required to facilitate Site levelling and construction of new foundations. However it is envisaged that the material will be reused on-site. However, it has been identified in the GII Site Investigation report that some fill material (waste material) should be removed during Site preparatory[269]. Adherence to the mitigation measures in Chapter 18 and the requirements of the C&DWMP, will ensure the effect is *imperceptible.*

Local **traffic and transportation** will be impacted by the additional vehicle movements generated by removal of waste from the Site during the Construction and Operational Phases of the proposed Project. The increase in vehicle movements as a result of waste generated during the Construction Phase will be *temporary* in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the Operational Phase but these movement will be i*mperceptible* in the context of the overall traffic and transportation increase and has been addressed in Chapter 17 (Traffic and Transportation). Provided the mitigation measures detailed in Chapter 17 and the

[269] Around location TP-65 exceeds the LQM / CIEH[269] Suitable 4 Use Level (S4UL) for future residential use.

requirements of the OWMP (included as Appendix A18.2) are adhered to, the effects will be *imperceptible*.

18.10 Cumulative Impacts

Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions, together with those generated by the proposed Project. Therefore, the potential impacts of the proposed Project cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

The potential cumulative impact projects are discussed in Chapter 21 (Cumulative impacts).

18.10.1 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*.

18.10.2 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.*

18.11 '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. There will be a *neutral* effect on the environment.

18.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered during the production of this chapter of the EIAR.

19 Material Assets - Services

19.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) was prepared by Rebecca Dunlea, Environmental Consultant with Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants. Rebecca holds a BA (Geography), MA and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

This chapter provides a description of the material assets that are potentially impacted by the proposed Strategic Housing Development (SHD) (referred to as "*the proposed Project*"), located at Baldoyle, (formerly known as The Coast), Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13.

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.

This chapter considers and assesses the effects of the proposed Project on the material assets, including the existing major utilities within and around the Site during the Construction and Operational Phases.

The development will consist of alterations to the development permitted within Growth Area No. 1 (GA1) of the Baldoyle - Stapolin Local Area Plan 2013 (as extended), under FCC Reg. Ref. F16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046).

The permitted development provides for 544 no. residential units of which, 99 no. are already constructed or are under construction. The proposed Project increases the balance of permitted residential units from 445 no. units to 882 no. units, an increase of 437 no. residential units, on a slightly extended developable area. The increase in residential units is provided for through an increase in density and height of proposed Project. Full details on the background, Site history and the proposed Project is provided in Chapter 5 (Description of the Proposed Project).

The Draft EPA Guidelines[270] state that:

[270] EPA (2017).

> *'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*.'

As such, the EIA Directive requires that Architectural and Archaeological Heritage (Cultural Heritage) is assessed as part of Material Assets. However, as this is an important element in Ireland, EIA best practice has established that it is important to address this issue separately and not part of the Material Assets section in the EIAR, see Chapter 14 (Cultural Heritage, Archaeology & Architectural) for more information.

The potential impacts associated with the proposed Project, if any, are assessed with regards to the following proposed built services:

- wastewater services (foul and surface water);
- water supply;
- gas and electricity supply; and
- telecommunications.

Furthermore, the impact on the surface water infrastructure and the road infrastructure are discussed in Chapter 10 (Water) and Chapter 17 (Traffic and Transportation) respectively.

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 made reference to:

- FCC (2017). *Fingal Development Plan 2017-2023; (including Strategic Flood Risk Assessment).*
- FCC (2013). *Baldoyle-Stapolin Local Area Plan 2013*.
- Greater Dublin regional Code of Practice for Works.
- Geological Survey of Ireland Maps.
- Local Authority Drainage Records.
- Irish Water Infrastructure Records.
- Submission of a Pre-Connection Enquiry Application to Irish Water.

Receptors were 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. The characteristic of an impact relates to the quality, significance and duration of the impact and are defined in Table 19.1 to Table 19.3, as per the Draft EPA Guidelines[271].

Table 19.1 defines *the* quality of effects from *positive* to *negative* on the environment.

Table 19.1: Quality of Effects

Quality of Effect	Description of Effect
Positive Effects	A change which improves the quality of the environment (for example, by increasing species diversity or improving the reproductive capacity of an ecosystem; or removing nuisances; or improving amenities).
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative / Adverse Effects	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing a nuisance.

Table 19.2 outlines the definitions of *significance of effects* which range from *imperceptible* to *profound* effects.

[271] EPA (2017).

Table 19.2: Definitions of Significance of Effect

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

Table 19.3 describes the *duration of effects*. Momentary effects lasting from *seconds* to *minutes* will often be less concerning than long term and permanent effects, depending on their severity.

Table 19.3: Describing Duration of Effects

Duration of Effects	Description of Duration of Effects
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.

19.3 Baseline Environment

This Section provides a description of the relevant aspects of the baseline environment in relation to Material Assets, under the built services listed in Section 19.1.

19.3.1 Study Area

The Site is located in Baldoyle-Stapolin Growth Area No. 1 (GA1), Baldoyle, Dublin 13, c. 10km north-east of the City centre. The total Site area is c. 9.1 hectares (ha), of which the development area is c. 8.89ha. The Site is on the edge of the urban extent of Dublin City, but is within the administrative area of Fingal County Council (FCC) adjacent to the Dublin City Council (DCC) administrative boundary at Clongriffin to the west.

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 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.

The Site is bound by existing residential areas at Myrtle and Red Arches to the south and east respectively. Baldoyle Racecourse Park is located further to the north and east of the Site and Baldoyle Estuary is further east beyond the R106 Coast Road. The lands surrounding the western, southern and eastern boundaries of the Site are predominately residential in nature. The Site of the proposed Project is highly accessible and benefits from a range of transport connections, including Clongriffin DART / Rail Station on the Dublin-Belfast rail line immediately east.

As the Site lies within the administrative area of FCC, it is therefore subject to the land use policies and objectives of the Fingal Development Plan 2017-2023 (the '*Development Plan*') (including Variations to the Plan).

Figure 19.1: The Site of the Proposed Project[272] (in red)

19.3.2 Ownership & Access

The Site of the proposed Project is accessible from the east via Red Arches Road. Red Arches Road is a local road with an east-west alignment, connecting the Site to the Coast Road (R106) in the east. There are no cycle or bus lanes along this road.

Longfield Road is a local road running in a north-south alignment, connecting the Site in the north to Grange Road (R809) in the south.

Grange Road (R809), is a regional road, running in an east-west alignment to the south of the Site. Grange Road links Baldoyle Village centre in the east to Clarehall Avenue in the west.

The two (2no.) primary vehicular access points to the Site are:

- the northward continuation of Longfield Road, which originates at Grange Road c. 280m to the south; and

[272] Google Earth (2020).

- the westward continuation of Red Arches Road, which originates at Coast Road c. 930m to the east.

A Traffic Impact Assessment (TIA)[273] is submitted with this planning application and addresses the level of influence of the proposed Project (Operational Phase) upon the local transportation system.

19.3.3 Wastewater Services - Foul Water & Surface Water Drainage

The Ringsend Wastewater Treatment Plant (WwTP) which serves Dublin City, parts of Fingal County Council, South Dublin County Council, Dun Laoghaire-Rathdown County Council and Meath County Council agglomeration (D0034) lies within 8km of the proposed Project.

This WwTP operates under licence from the EPA (Licence No. D0034-01). An application for the upgrade of the WwTP was lodged in June 2018, and planning permission was granted in April 2019 (ABP Reg. Ref.: 301798). Upgrade work will increase capacity from 1.64 million (m) population equivalent (PE) to 2.4m PE. The average daily load received at Ringsend WwTP in 2019 was 1.98m PE with peaks well in excess of this. The project is being progressed in stages to ensure that the plant continues to treat the wastewater to the current treatment levels throughout the delivery of the upgrade.

A comprehensive topographical survey was carried out for the Site by the Project Engineers[274] and existing drainage and utility records in the vicinity of the Site obtained and surveyed in detail.

There is an existing 375mm diameter **foul sewer** that runs in a northern direction along the eastern boundary of the Site (Stapolin Avenue). This infrastructure was installed under previous developments 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 pumping 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, which runs around the north / north-eastern boundary of the Site c. 150m away from the pumping station. The pumping station currently serves the existing Myrtle and Red Arches Developments.

[273] Cronin & Sutton Consulting Engineers (2021d).
[274] Cronin & Sutton Consulting Engineers

In addition to the 375mm foul sewer referred to above, there is an existing foul 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 is proposed to remove existing foul sewers within the Site of the proposed Project.

At present there is an existing 1,350mm **storm water** culvert traversing the Site of the proposed Project 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 Site.

In addition, there is an existing 1,050mm storm water culvert running from south to north along the line of Stapolin Avenue, which discharges into the Mayne River. Based on a previous planning application for the Site (FCC Planning Application F16A/0412), this culvert has been constructed under previous developments at a low level so that it can pass below the North Fringe Sewer located c. 200m north of the proposed Project. The depth of this outfall is c. 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.

19.3.4 Water Supply

An existing 300mm watermain runs along the eastern (Stapolin Avenue) and part of the southern (Myrtle Avenue) side of the development. This infrastructure was installed to serve future developments within the LAP.

In addition, there is existing watermain infrastructure located within the Site, however due to the condition and system layout it is not intended to make use of the existing network and these shall be removed and replaced to current Irish Water Specifications.

19.3.5 Gas & Electricity Supply

A review of **Gas Network Ireland** (GNI) maps show an existing 250mm diameter gas main passes through the Site. However, natural gas will not be used for the proposed Project and the existing gas main will remain in situ. Based on information received from **ESB Networks** (ESBN), there are no existing electrical infrastructure on-site that require diversionary works. New ESB electricity connections will be required.

19.3.6 Telecommunications

There are no existing electrical IT services on-site that require diversionary works. The proposed Project will tie into the existing network.

19.4 Potential Impact of the Proposed Project

19.4.1 Construction Phase

19.4.1.1 Study Area

The Construction Phase of the proposed Project will consist of site clearance, excavation and construction works. The Construction Phase activities will give rise to local disturbance of the existing area / settlement in the vicinity of the Site.

Construction works are likely to take place over a period of less than 10 years c. 95 month period (7 years 11 months). During this time, there will be no severance of land, loss of rights of way or amenities as a result of the proposed Project.

These works will likely have a *short-term* impact on the existing area. There may also be some additional *slight* and *short-term* impacts to the local population which may arise during the Construction Phase, see Chapter 7 (Population and Human Health), Chapter 11 (Air Quality and Climate) and Chapter 12 (Noise and Vibration) for more information. However, the potential effect overall is considered to be *not significant*.

19.4.1.2 Ownership & Access

Construction Phase site access will be via a haul route running in a north-south direction from an existing entrance off Moyne Road and via an existing road bridge over the River Mayne. This route will segregate construction traffic from any potential conflict with users of the proposed public park and two-way cycle route[275] to the northeast of the proposed Project. An existing field entrance will be improved, refer to Section 5.5.4.

It should be noted that initially Construction Phase traffic will utilise the haul route off Moyne Road to 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 the local authority.

Site security - access to Site of the proposed Project will be controlled by means of an electronic access control system and camera remote monitoring system for out of hours use. During working hours, a gateman will control traffic movements and deliveries.

Pedestrian access will be strictly controlled. All personnel working on-site will be required to have a valid Safe Pass card. Only accredited personnel will be permitted on to the Site and a daily record

[275] By Fingal County Council.

(access / egress) of Site personnel will be maintained. No pedestrian access points will be provided during the Construction Phase.

As a result, there may be *short-term* disturbance to traffic in the surrounding area, however, traffic volumes are not anticipated to be significant during construction. Appropriate warning signage will be provided for pedestrians and road users on approaches in accordance with the *Traffic Signs Manual*[276] and the CEMP – traffic management.

All **deliveries** to the Site will be scheduled to ensure their timely arrival and avoid the need for storing large quantities of materials on-site. Deliveries will be scheduled outside of rush hour traffic to avoid disturbance to pedestrian and vehicular traffic in the vicinity of the Site[277].

Access and alterations to the local road network are likely to have *a negative, short-term* impact on road users.

19.4.1.3 Wastewater Services - Foul Water & Surface Water Drainage

During the Construction Phase a temporary connection for **foul water** drainage will be made to the public network. See Chapter 10 (Water) for more information.

Surface water runoff during the Construction Phase may contain increased silt levels (*e.g.* runoff across areas stripped of topsoil) or become polluted by construction activities. There is a direct pathway from the Site to the Baldoyle Bay SAC and Baldoyle Bay SPA via the existing surface water network and the Mayne River. There is also 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 storm water drainage if run-off is not managed adequately.

During the Construction Phase, there is 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.

In the absence of mitigation, it is likely that this potential impact will have a *slight, adverse, temporary* impact on the nearby surface watercourses.

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[276] Department of Transport, Tourism & Sport (Updated 2019).
[277] Altemar Ltd. (2021a).

During the Construction Phase, 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 is in an indirect hydraulic connection to the Mayne River.

It is the requirement of the Local Area Plan (LAP) that a wetland is 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 and future developments within the LAP. This wetland and its corresponding upstream surface water network were granted under planning reference F16A/0412 and is under construction and will be in place prior to the Construction Phase of the proposed Project, refer to see Section 10.4.1 in Chapter 10 (Water). The *Engineering Services Report*[278] (ESR) outlines there is a risk of a *temporary significant* impact on the flood plain and the Mayne River itself.

Heavy **rainfall** or a high level of ground water could produce ponding in open trenches. Discharge of this rainfall pumped from excavations to existing streams could compromise the capacity or the stream and as such cause flooding. This impact may be characterised as a likely*, moderate, temporary, adverse* impact. The consequence of this shall increase the flow within the existing stream and hence potentially cause localised flooding.

19.4.1.4 Water Supply

Water supply to the Site during the Construction Phase will be provided by means of a temporary connection to a public watermain.

No significant impact to the existing watermain network is envisaged during the Construction Phase, other than minor water supply demand to Site offices. There is a minor risk of contamination to the existing water supply during the connection of the development's watermain to the public watermain, however these works will be carried out by agents of Irish Water who have detailed

[278] CS Consulting Engineers (2021c).

procedures to adhere to when working with existing live watermain networks. All new watermains within the development will be tested and cleaned to Irish water requirements prior to connection to the live network.

As a result of such works there is potential for *temporary* impacts to the local water supply network, by way of disruption in water supply to the local area. However it is likely that this potential impact will have a *neutral* effect.

19.4.1.5 Gas & Electricity Supply

There will be no supply of gas to the Site during the Construction Phase. A temporary builder's supply is now in place for electricity at the existing site compound for site power / silos / lighting etc. There will be no impact to the local gas or electricity supply network during the Construction Phase.

19.4.1.6 Telecommunications

Telecommunications will not be operational during the Construction Phase. The Construction Phase impact on local telecoms is likely to be i*mperceptible.*

19.4.2 Operational Phase

19.4.2.1 Study Area

The proposed Project is the construction of a mixed-use development to accommodate 877 no. new residential dwellings (742 no. apartments, 135 no. houses), residential tenant amenity, retail / café / restaurant, pharmacy, medical centre, crèche, gym and public realm.

The proposed Project is in accordance with the statutory land use zoning pertaining to the Site.

19.4.2.2 Ownership & Access

The Operational Phase of the proposed Project will result in the introduction of a residential land use to the Site which will provide much needed housing for the growing population of the Dublin Area. The Operational Phase of the proposed Project will have *no long-term, significant, adverse* impacts on pre-existing zoning at this Site.

In its Operational Phase, the proposed Project shall 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. A *Traffic Impact Assessment* report has been prepared by Project Engineers[279], which is submitted with this planning application. Refer to Chapter 17 (Traffic and Transportation).

19.4.2.3 Wastewater Services - Foul Water & Surface Water Drainage

Irish Water has confirmed that subject to a valid connection agreement, the proposed Project connection to the Irish Water wastewater network can be facilitated[280]. This is subject to a connection agreement with Irish Water.

The proposed Project will require a new separate drainage network to collect and convey the effluent generated by the proposed Project. All foul effluent generated from the proposed Project will be collected in separate foul pipes and flow under gravity, to the existing 375mm diameter foul sewer in the north-east corner of the Site via a new connection.

Foul drainage network calculations are provided in the *Engineering Services Report*[281].

The foul water from the Site will transfer to the Ringsend WWTP via public foul sewer. Treatment will take place at Ringsend WWTP prior to discharge into Dublin Bay. Irish Water operate this facility under licence (EPA D0034-01) and are required to comply with environmental legislation. In 2019 (ABP Ref. PL29S.301798), the facility received planning to upgrade capacity to 2.4 million PE, which will be in place by the time the proposed Project becomes operational.

The Operational Phase of the proposed Project will lead to an increase in the foul discharge from the Site, therefore increasing the pressure on the existing public foul sewer. However, Irish water has confirmed that the "proposed connection to the Irish Water network(s) can be facilitated". The potential impact is likely to be *moderate* and *long-term.*

In accordance with Section 4.3 of Appendix 1 of the Baldoyle-Stapolin Local Area Plan (LAP), the Site is located adjacent to the tidal estuary at Baldoyle and as there is no downstream development before out falling to the Irish Sea, the Site of 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 GDSDS. In addition, the lands discharge into salt wetlands which are the flood estuary of the Mayne River and extend over c. 40ha (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.

[279] Cronin & Sutton Consulting Engineers.
[280] See Appendix D of CS Consulting's *Engineering Services Report*. (2021c).
[281] CS Consulting Engineers (2021c).

Rainwater run-off from the impermeable areas of the Site, roofs and road / 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 Growth Area 1 (Plus GA2 and GA3). It has been sized to cater for a treatment volume based on 15mm 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 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 1,860m^3 and is based on treatment 15mm 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 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. As informed on the Planning Application F16A/0412, the permitted wetland has been sized to serve GA 2 and GA3 of the Local Area Plan in addition to GA 1 as proposed. Refer to CS Consulting drawings[282] for the drainage network layout and the *Engineering Services Report*[283] (ESR).

19.4.2.4 Water Supply

The proposed Project will require a new network. The network will be designed and installed to the requirements and specifications set out in the *Irish Water Code of Practice for Water*. The proposed Project will connect to the existing 300mm watermains on Myrtle and Stapolin Avenues. The potential impact is likely to be *moderate* and *long-term.*

[282] Drawing Nos. BD-CSC-ZZ-XX-DR-C-0003 and BDCSC-ZZ-XX-DR-C-0004
[283] CS Consulting Engineers (2021c).

A Pre-Connection Enquiry was submitted to Irish Water based on the water demand for the proposed Project and Irish Water has confirmed that the proposed Project connection to the Irish Water network can be facilitated. The confirmation is included with the application documentation[284].

19.4.2.5 Gas & Electricity Supply

The Operational Phase of the proposed Project will require a new ESB electricity supply. The potential impact is likely to be *neutral, imperceptible* and *long-term*.

The Operational Phase of the proposed Project will not require natural gas.

19.4.2.6 Telecommunications

The Operational Phase of the proposed Project will require telecommunication connections, which will result in a marginal increase in demand. The area appears to be serviced with telecommunication provides, and so will provide the building users with a greater choice of service. This will result in *a positive, long-term* effect for the building users.

The potential impact from the Operational Phase on the telecommunication network is likely to be *neutral, imperceptible* and *long-term*.

19.5 Mitigation Measures

The services pertaining to the proposed Project are required to facilitate this development. It is not possible to facilitate the proposed Project and not provide the services required. All services, including potable and foul water services, as well as electricity and telecommunication services have been designed in accordance with the requirements of the relevant stakeholders.

Service connections will be provided in agreement with the providers so as to ensure unplanned disruptions during the Construction Phase of the proposed Project. It should be noted that a number of mitigation measures proposed in other EIAR chapters are also of relevance to Material Assets but are not repeated here. Also refer to Chapter 22 (Schedule of Environmental Commitments).

Sufficient supplies of electricity and telecommunications services are available to the proposed Project.

[284] See Appendix D of CS Consulting's *Engineering Services Report*. (2021c).

19.5.1 Construction Phase

Construction Phase mitigation measures include avoidance, reduction and remedy measures as set out in *Section 4.7 of the Development Management Guidelines*[285] to reduce or eliminate any significant adverse impacts identified.

There will be an interface established the relevant service providers within the locality during the Construction Phase of the proposed Project. This interface will be managed in order to ensure a smooth construction schedule without disruption to the residential and business community.

The following mitigation measures are proposed for the Construction Phase of the proposed Project:

- Consultation with the relevant services providers shall be undertaken in advance of works. This will ensure all works are carried out to the relevant standards and ensure safe working practices are implemented - *i.e.* for electricity lines etc.
- All infrastructure is to be installed and constructed to the relevant codes of practice and guidelines.
- An outline CEMP included with the application, will be finalised and implemented by the appointed Contractor for the duration of the Construction Phase. This will ensure protection to the local amenities and the operation of the local road network.
- The potable water supply and wastewater infrastructure will be pressure tested by an approved method during the Construction Phase, prior to connection to the public networks, all in accordance with Irish Water Requirements.

The following requirements are likely to arise from the interface:

- Attention will need to be paid to the safety and other requirements outlined in the GNI and ESB *Safety Document: Guidelines for Builders*.
- The exact locations of known local underground services will be confirmed and the detail of overhead line relocations will be agreed.

With the above mitigation measures implemented, the magnitude of the impact is reduced to *slight / imperceptible* as the services will have been satisfactorily diverted or amended, and will therefore continue to operate in their current form as required.

The appointed Contractor will be responsible for:

[285] DEHLG (2007).

- Ensuring the **existing storm** networks are free from waste materials generated during the Construction Phase of the proposed Project.
- **Routine visual inspections** – to ensure any risk of excess construction materials causing blockages in the surface water network and any potential flooding occurring.
- **A Maintenance Schedule and Operational Schedule -** for silt and pollution control measures during the Construction Phase. This should be undertaken in consultation with the relevant statutory authorities.
- **Run-off** - from the Site or any areas of exposed soil should be channelled and intercepted at regular intervals for discharge to silt traps or lagoons with over-flows directed to land rather than to a watercourse.
- **Pouring of concrete** – will be carried out in the dry and allowed to cure. Mixer washings and excess concrete should not be discharged to surface water.
- **Oil storage tank**(s) and the associated filling area and distribution pipe work should be at least 10m distant from the surface watercourses.
- **Hazardous construction materials** – will be stored appropriately to prevent contamination of watercourses or groundwater. Spill kits should be kept in designated areas for refuelling of construction machinery. Dewatering measures should only be employed where necessary.

19.5.2 Operational Phase

As the proposed Project is completed monitoring of Site activity and operations will be the responsibility of the management company and this will include the completion of any maintenance works required.

The design and construction of the required service infrastructure will be in accordance with relevant codes of practice and guidelines. As a result this is likely to mitigate any potential impacts during the Operational Phase of the proposed Project.

19.6 Residual Impacts

Residual impacts are the final or intended impacts which occur after the proposed mitigation measures have been implemented. They refer to the degree of change that will occur after the proposed mitigation measures have taken effect.

The proposed Project will alter the current land use from an area of bare ground to a residential development and associated landscape areas.

Based on the implementation of the outline Construction Environmental Management Plan (CEMP), Construction & Demolition Waste Management Plan (C&DWMP) and all mitigation measures outlined in the EIAR, there are *no significant* residual impacts foreseen.

There will be *no negative* residual impacts on material assets as a result of the proposed Project.

19.7 Monitoring

Monitoring will be provided for by each utility company with an over-seeing responsibly by the appointed Contractor during the Construction Phase.

Prior to the Operational Phase of the proposed Project, all connections (wastewater, water supply, gas and electricity) will be tested by a suitable qualified person under the supervision of FCC. The proposed Project water supply will be tested to the satisfaction of FCC prior to the connection to the public potable water.

Any monitoring of the built services required during the Operational Phase of the proposed Project will be as advised by the relevant services providers.

19.8 Reinstatement

As the proposed Project will be a 'new build' there will be no reinstatement within the Site boundary required.

19.9 Interactions

In preparing the EIAR each of the specialist consultants have liaised with each other to consider the likely interactions between effects predicted as a result of the proposed Project. Refer to Chapter 20 (Interactions) for a detailed assessment on interactions.

The main interactions relating to **Material Assets - Services** are **population and human health** and **air quality.**

There is also implications for the local **population** if these services are disrupted during the Construction Phase. However, any impact on the local population as a result disruption to services will be *brief / temporary* and are not considered significant.

The development and installation of the services during construction has the potential to impact on the local air quality. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits.

19.10 Cumulative Impacts

The assessment has considered cumulative impact of Construction and Operational Phase in conjunction with surrounding committed developments. Refer to Chapter 21 (Cumulative Impacts).

Considering the minimal use of material assets *(i.e*. temporary power) during the Construction Phase, there *is no likely impact.*

19.11 'Do-Nothing' Impact

A '*do-nothing'* scenario is not considered valid, as the lands are zoned for redevelopment under the Development Plan.

However, in the '*do-nothing'* scenario the Site would not be redeveloped and therefore there would be no adverse impacts to the existing lands.

19.12 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in the compilation of this chapter of the EIAR.

20 Interactions

20.1 Introduction

This chapter of the EIAR was prepared by Rebecca Dunlea, Environmental Consultant with Brady Shipman Martin (BSM), Planning, Landscape and Environmental Consultants. Rebecca holds a BA (Geography), MA and MSc. (Environmental Consultancy and Project Management) and has over 6 years' experience.

As a requirement of the Planning Regulations and the Draft EPA Guidelines[286], 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 Planning and Development Act 2000 and Part 10, and Schedules 5, 6 and 7 of the Planning and Development Regulations 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.

The following Section is directed by Article 3 section 1(e) of the EIA Directive. The Draft EPA Guidelines and EPA *Advice Notes for Preparing Environmental Impact Statements*[287] were also considered.

Article 3 of the Directive states:

1. *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;*

[286] EPA (2017).
[287] EPA (2015).

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).*

20.2 Study Methodology

The consideration of impact interactions has been addressed during the preparation of the EIA in the individual environmental chapters by the relevant specialist. The relevant consultants liaised with each other and the project architects, engineers and landscape architects where necessary to review the proposed scheme and incorporate suitable mitigation measures where required.

Following an assessment of the EIAR, a matrix has been produced to summarise where interactions between effects on different factors have been addressed (refer to Table 20.1).

20.3 Description of Potential Interactions

The primary interactions are as follows:

- Population and Human Health with Air Quality and Climate, Noise and Vibration, Landscape and Visual, Wind (Microclimate), Traffic, Waste and Services.
- Biodiversity with Land, Soils, Geology and Hydrogeology, Hydrology (Surface Water), Noise and Vibration, Landscape and Waste.
- Land, Soils, Geology and Hydrogeology with Biodiversity, Hydrology (Surface Water), Air Quality and Climate and Waste Management.
- Hydrology (Surface Water) with Biodiversity and Land, Soils, Geology and Hydrogeology.
- Air Quality and Climate with Population and Human Health, Biodiversity, Land, Soils, Geology and Hydrogeology, Traffic and Transportation and Services.
- Noise and Vibration with Population and Human Health, Biodiversity and Traffic and Transportation.
- Landscape and Visual with Population and Human Health, Biodiversity and Cultural Heritage.
- Wind with Population and Human Health.
- Traffic and Transportation with Population and Human Health, Air Quality and Climate, Noise and Vibration and Waste Management.

- Waste Management with Population and Human Health, Biodiversity, Land and Soils.
- Services with Population and Human Health and Air Quality and Climate.

Most inter-relationships are neutral in impact when the mitigation measures proposed are incorporated into the design, construction or operation of the proposed Project.

20.3.1 Population and Human Health

Several disciplines have the potential to impact the population and human health, during the Construction Phase, these include:

- **Air Quality and Climate:** There is potential to impact human health from dust emissions associated with construction activities. However, the pro-active control of fugitive dust will ensure prevention of significant emissions arising. The key measure for controlling dust are set out in the Dust Management Plan (refer to Appendix A11.3) and Chapter 11 of this EIAR.
- **Noise and Vibration:** There is potential to impact human health from noise associated with construction activities and inward traffic noise. The appointed Contractor will ensure that all best practice noise control methods will be used, to ensure impacts are not significant.
- **Landscape and Visual:** Landscape and visual effects may impact residential properties located near the proposed Project, during the Construction Phase. Impacts are likely to arise from construction plant, incomplete building structures, perimeter hoardings and contractors compound areas. However, the visual impact will be *short to medium* in duration and is not considered significant.
- **Waste Management:** There is potential to impact human health in relation to the generation of waste, as a result of the incorrect management of waste resulting in littering, which could cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&D WMP will ensure appropriate management of waste and avoid any *negative* impacts on the local population.
- **Material Assets - Services:** There is potential to impact the local population during the connection of the utilities and services if these services are disrupted. However, any impact on the local population as a result disruption to services will be *brief / temporary* and are not considered significant. Refer to Chapter 19.

During the Operational Phase potential interactions include:

- **Air Quality and Climate:** There is potential to impact human health from climate change associated with greenhouse gas emissions from increased traffic movements as a result of the proposed Project. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits and therefore the predicted impact is *imperceptible*.
- **Noise and Vibration:** There is potential to impact human health from noise associated with traffic and mechanical plant associated with the operation of the development. However, the impact for the majority of road links is determined to be *neutral* and the siting of mechanical plant will achieve an *imperceptibl*e impact *to* people in nearby noise sensitive locations.
- **Wind:** There is potential to impact human health as the proposed Project will impact on the wind microclimate within and around the Site, which ultimately can impact negatively on people's health and well-being. The proposed Project will produce a high-quality environment that is attractive and comfortable for pedestrians of all categories.
- **Traffic and Transportation:** Traffic flow within and around the Site has the potential to create safety risks for pedestrians and cyclists, where the design does not provide for safe pedestrian / cycling environments. A Residential Travel Plan (RTP) framework document has been prepared in support of this planning application, which will ensure the impact is *imperceptible*. Refer to Chapter 17 and the RTP.
- **Waste Management:** There is potential to impact human health in relation to the generation of waste for the development. Incorrect management of waste could result in littering which can cause a nuisance to the public and attract vermin. The OWMP, will ensure appropriate management of waste and avoid any negative impacts on the local population.
- **Material Assets - Service:** There is potential to impact human health as the proposed Project will create a greater demand on built services *i.e.* water supply demand and wastewater services. These services will have a potential interaction with the available water supply and the potential emissions to the water cycle.

The potential impacts on human health have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, *no potential significant residual negative* impacts on human health are predicted.

20.3.2 Biodiversity

The most significant interactions with biodiversity are:

- **Land, soils geology and hydrogeology:** There is potential for impact on biodiversity via contaminated run-off and sedimentation entering the groundwater.
- **Surface Water (Hydrology):** There is potential for impact on biodiversity via contaminated run-off and sedimentation enters the local surface water.
- **Air Quality and Climate:** The Baldoyle Bay SAC and pNHA, and Baldoyle Bay SPA are located to the direct east of the Site. Dust emissions from construction works would have potential to impact vegetation in the SAC, pNHA and SPA. Traffic emissions also have potential to impact vegetation as a result of NOx emissions.
- **Noise and Vibration:** There is potential for impact on biodiversity during the Construction Phase in relation to the generation of noise and vibration. The appointed Contractor will ensure that all best practice noise control methods will be used, to ensure impacts are not significant.
- **Landscape and Visual:** The Site 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 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.
- **Waste Management:** There is potential for impact on biodiversity in relation to the generation of waste during the Construction and Operational Phases are that incorrect management of waste could result in littering.

The potential impacts on biodiversity has been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, *no potential significant residual negative* impacts on biodiversity are predicted. The landscape planting that is proposed will ensure that there will be an overall increase in biodiversity on the Site.

20.3.3 Land, Soils, Geology and Hydrogeology

The most significant interactions with land, soils, geology and hydrogeology are:

- **Biodiversity:** There is potential for impact on biodiversity via contaminated run-off containing large amounts of silt from stockpiling of soil / material, causing damage to water systems and receiving watercourses and entering groundwater sources.
- **Surface Water (Hydrology):** There is an interaction between water (hydrology) and land, soils, geology and hydrogeology. The underlying aquifer is a locally important source in the surrounding catchment areas. There zwill 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 (hydrogeology).
- **Air Quality and Climate:** Construction Phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for dust emissions. However, the pro-active control of fugitive dust will ensure prevention of significant emissions arising.
- **Waste Management:** There is an interaction between waste management and soils, geology and hydrogeology. It has been identified in the GII Site Investigation report that some fill material (waste material) around location TP-65 exceeds the LQM / CIEH[288] Suitable 4 Use Level (S4UL) for future residential use this should be removed during Site preparatory.

No potential significant Operational Phase interactions were identified.

The potential impacts on land, soils, geology and hydrogeology has been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, *no potential significant residual negative* impacts on land, soils, geology and hydrogeology are predicted.

[288] Land Quality Management and the Chartered Institute of Environmental Health

20.3.4 Hydrology (Water)

The most significant interactions with hydrology are:

- **Biodiversity**: There is potential for impact on biodiversity via contaminated run-off and sedimentation enters the local surface water.
- **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.

No potential significant Operational Phase interactions were identified. Implementation of appropriate mitigation measures as outlined in Chapters 9 & 10 will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

20.3.5 Air Quality and Climate

The most significant interactions with air quality and climate are:

- **Population and Human Health:** An adverse impact due to air quality in the *Construction Phase* has the potential to cause health and dust nuisance issues. There is potential to impact human health from climate change associated with greenhouse gas emissions from increased traffic movements as a result of the proposed Project. The key measure for controlling dust are set out in the Dust Management Plan (refer to Appendix A11.3). The Operational Phase of the proposed Project will comply with all ambient air quality legislative limits.
- **Biodiversity:** The Baldoyle Bay SAC and pNHA, and Baldoyle Bay SPA are located to the direct east of the Site. Dust emissions from construction works would have potential to impact vegetation in the SAC, pNHA and SPA. Traffic emissions also have potential to impact vegetation as a result of NOx emissions.
- **Land, Soils, Geology and Hydrogeology:** Construction Phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for dust emissions. The key measure for controlling dust are set out in the Dust Management Plan (refer to Appendix A11.3 in Volume 3) and Chapter 11 of this EIAR.
- **Traffic and Transportation:** Increased traffic movements and reduced engine efficiency, *i.e.* due to congestion, the emissions of vehicles increase. The mitigation measures that will be

put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits and therefore the predicted impact is *imperceptible*.

- **Material Assets – Services:** The development and installation of services / utilities has the potential to impact on the local air quality. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits.

The potential impacts on air quality and climate has been considered within the relevant discipline. Best practice dust mitigation measures outlined in Section 11.5 and in the Dust Management Plan (Appendix A11.3) will be implemented, dust related impacts are predicted to be *short-term* and *imperceptible.* 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 NOx concentrations within the pNHA, SAC and SPA. Therefore the impact is *long-term, negative* and *imperceptible.*

20.3.6 Noise and Vibration

The most significant interactions with noise and vibration are:

- **Population and 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. The appointed Contractor will ensure that all best practice noise control methods will be used, to ensure impacts are not significant. Similarly, during the *Operational Phase* mechanical plant has the potential to cause nuisance to local residents. However, the impact for the majority of road links is determined to be *neutral* and the siting of mechanical plant will achieve an *imperceptibl*e impact *to* people in nearby noise sensitive locations.
- **Biodiversity:** There is potential for impact on biodiversity during the *Construction Phase* in relation to the generation of noise and vibration. The appointed Contractor will ensure that all best practice noise control methods will be used, to ensure impacts are not significant.

Implementation of the mitigation measures set out and adherence to good practice noise reducing measures will ensure that the residual impact on human health is *negative, moderate-significant* and *short-term*. 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 development 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*.

20.3.7 Landscape and Visual

The most significant interactions with landscape and visual are:

- **Population and Human Health:** Landscape and visual effects may impact residential properties located near the proposed Project, during the Construction Phase. Impacts are likely to arise from construction plant, incomplete building structures, perimeter hoardings and contractors compound areas. However, the visual impact will be *short to medium* in duration and is not considered significant.
- **Biodiversity:** The Site 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 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.
- **Cultural Heritage, Archaeology & Architectural:** The surrounding landscape has been traditionally associated with large houses from the 17^{th} to 19^{th} centuries and managed as part of their estates or demesnes. However, 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 potential impacts on landscape and visual has been considered within the relevant discipline and mitigation measures outlined where required.

20.3.8 Cultural Heritage, Archaeology & Architectural

The potential impacts to **local natural and built heritage** have been considered within the relevant discipline and mitigation measures outlined where required.

However, no interactions were identified during the assessment process in relation to cultural heritage, archaeology and architecture.

20.3.9 Microclimate - Daylight and Sunlight

The potential impacts on daylight and sunlight has been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no *potential significant residual negative i*mpacts are predicted.

20.3.10 Microclimate - Wind

The most significant interactions with wind are:

- **Population and Human Health**: There is potential for impact on human health as the proposed Project will impact on the wind microclimate within and around the Site, which ultimately can impact negatively on people's health and well-being. The wind microclimate has the potential to impact on the level of pedestrian comfort and safety within the development. The proposed Project will produce a high-quality environment that is attractive and comfortable for pedestrians of all categories.

In general, the proposed Project is likely to provide a comfortable and an attractive environment for pedestrians and occupants. Without suitable mitigation, the winds can produce wind conditions that pedestrians may find distressing in certain areas of the Site. The potential impacts on wind has been considered and mitigation measures outlined where required.

20.3.11 Traffic and Transportation

The most significant interactions with traffic and transportation are:

- **Population and Human Health**: Traffic flow within and around the Site has the potential to create safety risks for pedestrians and cyclists, where the design does not provide for safe pedestrian / cycling environments. Traffic flow within and around the Site has the potential to create safety risks for pedestrians and cyclists, where the design does not provide for safe pedestrian / cycling environments. A Residential Travel Plan (RTP) framework document has been prepared in support of this planning application, which will ensure the impact is *imperceptible*. Refer to Chapter 17 and the RTP.

- **Air Quality and Climate**: Construction traffic has the potential to have an impact in terms of air quality. Increased traffic movements and reduced engine efficiency, *i.e*. due to congestion, the emissions of vehicles increase. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits and therefore the predicted impact is *imperceptible*.
- **Noise and Vibration:** There is potential to impact human health from noise associated with construction traffic / activities and inward traffic noise. The appointed Contractor will ensure that all best practice noise control methods will be used, to ensure impacts are not significant.
- **Waste Management:** The increase in vehicle movements as a result of waste generated during the Construction Phase will be *temporary* in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the Operational Phase but these movement will be i*mperceptible* in the context of the overall traffic and transportation increase and has been addressed in Chapter 17 (Traffic and Transportation).

The potential impacts on traffic and transportation has been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, n*o potential significant residual negative* impacts are predicted.

20.3.12 Material Assets - Waste

The most significant interactions with waste are:

- **Population and Human Health**: There is potential for impact 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 cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&D WMP and OWMP (refer to Volume 3) will ensure appropriate management of waste and avoid any *negative* impacts on the local population.
- **Biodiversity:** There is potential for impact on biodiversity in relation to the generation of waste during the Construction and Operational Phases are that incorrect management of waste could result in littering.

- **Land, Soils, Geology and Hydrogeology:** It has been identified in the GII Site Investigation report that some fill material around location TP-65 exceeds the LQM / CIEH[289] Suitable 4 Use Level (S4UL) for future residential use this should be removed during Site preparatory.
- **Traffic and Transportation:** The increase in vehicle movements as a result of waste generated during the Construction Phase will be *temporary* in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the Operational Phase but these movement will be i*mperceptible* in the context of the overall traffic and transportation increase and has been addressed in Chapter 17 (Traffic and Transportation).

The potential impacts on waste has been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, *no potential significant residual negative* impacts are predicted.

20.3.13 Material Assets - Services

The most significant interactions with material assets - services are:

- **Population and Human Health:** There is potential for impact on the local population during the connection of the utilities and services. However, any impact on the local population as a result disruption to services will be *brief / temporary* and are not considered significant. Refer to Chapter 19. There is potential to impact human health as the proposed Project will create a greater demand on built services *i.e.* water supply demand and wastewater services. These services will have a potential interaction with the available water supply and the potential emissions to the water cycle.
- **Air Quality and Climate:** The development and installation of services / utilities has the potential to impact on the local air quality. The mitigation measures that will be put in place at the proposed Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits.

The potential impacts on services has been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, *no potential significant residual negative* impacts are predicted.

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Table 20.1: Interactions with Environmental Factors

Inter-Relationship Matrix	Population & Human Health	Biodiversity	Land, Soils, Geology & Hydrogeology	Hydrology	Air Quality & Climate	Noise & Vibration	Landscape & Visual	Cultural Heritage	Microclimate - Daylight / Sunlight	Microclimate - Wind	Traffic & Transport	Material Assets - Waste	Material Assets - Services
Population & Human Health		-	-	-	✓	✓	✓	-	-	✓	✓	✓	✓
Biodiversity			✓	✓	✓	✓	✓	-	-	-	-	✓	-
Land, Soils, Geology & Hydrogeology				✓	✓	-	-	✓	-	-	-	✓	-
Hydrology					-	-	-	-	-	-	-	-	-
Air Quality & Climate						-	-	-	-	-	✓	-	✓
Noise & Vibration							-	-	-	-	✓	-	-
Landscape & Visual								✓	-	-	-	-	-
Cultural Heritage									-	-	-	-	-
Microclimate – Daylight / Sunlight										-	-	-	-
Microclimate - Wind											-	-	-
Traffic & Transport												✓	-
Material Assets - Waste													-
Material Assets - Services													

21 Cumulative Impact

21.1 Introduction

This chapter considers the permitted and / or planned developments (*i.e.* committed development) in the immediate and wider surrounds of the site, on which the proposed Project may have potential for cumulative impacts on the environment.

The EU Guidelines define cumulative impacts as:

> *'Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For example:*
>
> - *incremental noise from a number of separate developments;*
> - *combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and*
> - *several developments with insignificant impacts individually but which together have a cumulative effect.'*

Cumulative impacts of the proposed Project and other committed development in the area 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 proposed developments / projects in the area.

It is noted that the application relates to amendments to an existing permitted primarily residential development located on appropriately zoned lands. The site is also adjacent to similarly developed / emerging urban edge of the city. Given such context the likelihood of significant cumulative impacts rising is expected to be low and most likely of a *temporary* or *short-term* nature.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments (EIAR Chapters 7 to 19). While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant. In is not envisaged than likely significant cumulative impacts will arise during the Operational Phase.

21.2 Key Developments in the Immediate Surrounding Area

Under the Fingal Development Plan 2017-2023, the Site is zoned RA Residential: "*Provide for new residential communities subject to the provision of the necessary social and physical infrastructure*", with a Local Objective for a Local Centre at the interface with the Clongriffin train station. In the Baldoyle-Stapolin LAP, this area is indicated by a Village Centre objective.

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. Cumulative impacts were assessed by looking at a non-exhaustive list of key projects in the area surrounding the Site. It is noted that in highlighting the following key projects, 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 cumulative environmental impacts with the proposed Project. In assessing cumulative impacts the following were the principal sources consulted:

- Dublin City Council Planning Department;
- Dublin City Development Plan 2016-2022;
- Fingal County Council Planning Department;
- Fingal Development Plan 2017-2023;
- Baldoyle-Stapolin LAP 2013 (extended); and
- An Bord Pleanála.

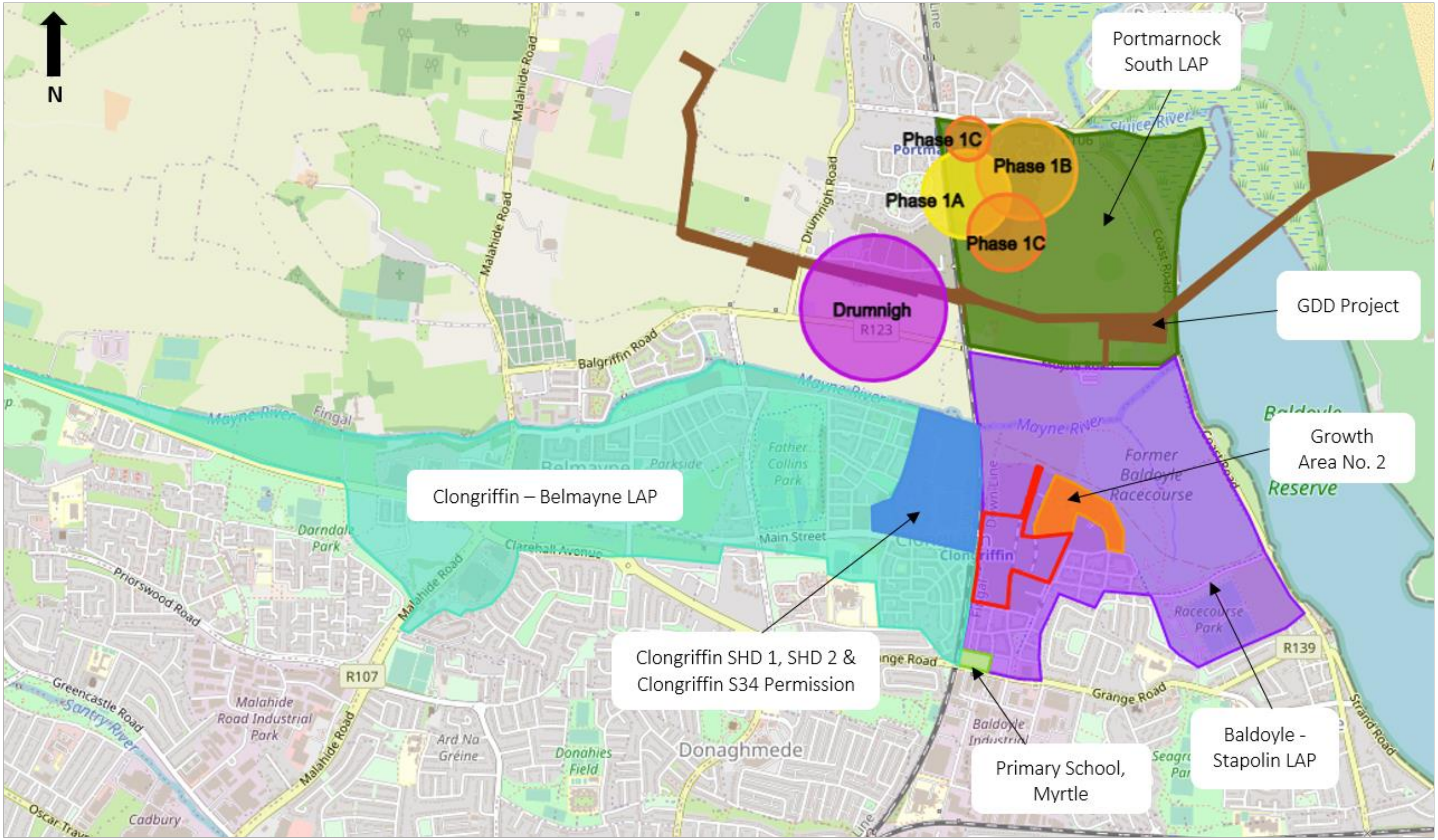
Following a review of the above sources, the following key projects in the area surrounding the proposed Project were identified. Table 21.1 provides a brief description of the key projects / developments within the Fingal County Council area and Dublin City area (immediate surrounding area), whilst Table 21.2 provides a brief description of the projects / developments in the wider area. Refer to Figure 21.1.

Table 21.1: Key Projects / Developments in the Immediate Surrounding Area

Title (Planning Reference)	Description
Baldoyle-Stapolin Local Area Plan 2013 (as Extended)	The Site forms part of a wider RA zoning as set out in the Baldoyle-Stapolin Local Area Plan (LAP) 2013 (extended), refer to Section 3.4.2. Development of the remainder of the LAP, including the future GA3 project to the north of the Site, as well as further potential future residential and landscape / amenity works as indicated in the LAP, refer to Figure 21.1.
Primary School Myrtle, Grange Road Baldoyle (FCC ref. no.: F19A/0461)	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 development also incorporates associated car parking, access road, pedestrian access, bicycle lane, construction of two (2 no.) external ball courts, landscaping, connection to public services and all associated site works. Refer to Figure 21.1.
Growth Area No. 2 (GA2) (FCC Reg. Ref. 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 No. 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. Refer to Figure 21.1.
Clongriffin - Belmayne Local Area Plan 2012-2018	Lands west of the railway lie with the functional area of Dublin City Council. The lands are covered by the Clongriffin – Belmayne Local Area Plan 2012-2018, with the Clongriffin and Marrsfield areas located directly west of the railway. Refer to Figure 21.1. 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.

Title (Planning Reference)	Description
	▪ **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). Refer to Figure 21.1.

Figure 21.1: Key Projects / Developments in the Immediate Surrounding Area and Wider Area [290] (Site Boundary in Red)



[290] EPA Maps (2021). Source: *OpenStreet Maps.*

Table 21.2: Key Projects / Developments in the Wider Area

Title (Planning Reference)	Description
Portmarnock South Local Area Plan 2013	The Baldoyle-Stapolin LAP area is linked in planning framework terms with the Portmarnock South LAP 2013 (to immediate north), which will provide for up to c. 1200 residential units. Refer to Refer to Figure 21.1.
St. Marnock's Bay Off Station Road, Portmarnock South	▪ **Phase 1A** (c. 100 no. residential units) is complete; ▪ **Phase 1B** (c. 150 no. residential units) is nearing completion; and ▪ **Phase 1C** (c. 153 no. residential units - including a small local centre) is commencing construction. An Bord Pleanála Ref.: 305619. 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. These three areas are located to the north-west of the proposed Project. Refer to Refer to Figure 21.1.
Drumnigh (F14A/0132 (ABP Ref. PL06F.244401) as amended by F17A/0412 (minor))	Construction on-going south of Drumnigh in accordance with F14A/0132 (ABP Ref. PL06F.244401) as amended by F17A/0412 (minor). Construction of 270 no. dwelling houses (terraced, semi-detached and detached), 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 (comprising 111 no. on-street car parking spaces and 445 no. on-curtilage car parking spaces); provision of a vehicular and pedestrian access to the site via a new roundabout junction onto the Drumnigh Road.
Greater Dublin Drainage (GDD) Project (An Bord Pleanála ref. 301908)	Irish Water received permission for a major wastewater infrastructure project (Greater Dublin Drainage (GDD) 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 An Bord Pleanála. 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.

21.3 Discussion of Permitted / Planned Projects and 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 has provided for the inclusion of specific measures to avoid and mitigate potential adverse impacts on the environment.

In addition, the proposed Project provides for alterations and amendments to an existing permitted development, which was also subject to Environmental Impact Assessment (EIA) and the preparation of an Environmental Impact Statement (EIS).

Developments at Portmarnock South (St. Marnock's Bay) and Drumnigh are located approximately 1km 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 attention wetlands 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 on-going 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 in the context of an area undergoing continued development, would be considered *neutral*.

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, recreational 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*. *No significant negative* cumulative impacts will arise during the operation of the proposed Project.

Where they arise, the assessment presented in each chapter of the EIAR has considered potential cumulative impacts of Construction and Operational Phases of the proposed Project.

22 Schedule of Environmental Commitments

22.1 Introduction

This chapter collates the environmental commitments / mitigation measures identified in the Specialist Chapters of the EIAR. These mitigation measures are considered necessary to protect the environment prior to the commencement of works and during both the Construction and Operational Phases of the proposed Project.

The appointed Contractor will be required to adhere to these mitigation measures of the EIAR for the protection of the environment and to ensure sustainable development.

The *Schedule for Environmental Commitments* are provided in Table 22.1 below.

Table 22.1: Schedule of Environmental Commitments

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
General Mitigation Measures		
G_1	The appointed Contractor will be required to prepare a site-specific **Construction Environmental Management Plan** (CEMP), including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network.	Construction
G_2	**Site Access:** Immediately after access to the Site is made, the Site will be secured with hoarding on all open sides and accessible approaches.	Construction
G_3	**Contractor Compound:** The proposed location of the Contractor Compound, for the infrastructure works, will be entirely within the site boundary, although in some instances located outside the phase being constructed.	Construction
G_4	**Contractor Compound:** The Contractor Compound will accommodate employee and visitor parking throughout the construction period with construction of temporary hardstanding areas. Site accommodation will include suitable washing / dry room facilities for construction staff, canteen, sanitary facilities, first aid room, office accommodation etc.	Construction
G_5	**Site Access:** to the Contractor Compound will be security controlled and all Site visitors will be required to sign in on arrival and sign out on departure.	Construction
G_6	The appointed Contractor will provide protection to existing surrounding building elements potentially impacted by the works. Protection may be in the form of screened hoardings, scaffolding and fencing, taped drop sheets and the like, all installed prior to commencement of any works on-site.	Construction
G_7	**Earthwork**s Suitable material such as rock will be crushed and used on-site where possible. Excess material will be disposed offsite to a suitably licensed facility in accordance with the project's Construction and Demolition Waste Management Plan (C&D WMP).	Construction
G_8	**Construction Hours:** The final CEMP will outline the construction hours for the proposed Project. The expected construction hours will be 07:00-19:00 Monday to Friday and 08:00-14:00 on Saturdays. There will be no works on	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
General Mitigation Measures		
	Sundays or bank / public holidays in accordance with the Environmental Noise Regulations (S.I. No. 140 of 2006 Environmental Noise Regulations) and subject to final agreement with FCC. From time to time, in exceptional instances, works may be required outside of these hours. However, written approval will be sought by the Contractor from the Local Authority, prior to any works taking place.	
G_9	**Deliveries** of material to the Site will be planned to avoid high volume periods. There may be occasions where it is necessary to have deliveries within these times. The appointed Contractor will be required to prepare a final CEMP, including a plan for the scheduling and management of construction traffic, which will outline measures to be taken to mitigate the effects of construction traffic on the surrounding road network.	Construction
G_10	**Site Access:** Construction Phase site access will be via a haul route running in a north-south direction from an existing entrance at Moyne Road via an existing road bridge over the Mayne River. This route will keep construction traffic away from any potential conflict with users of the proposed public park and two-way cycle (by Fingal County Council) to the north-east of the proposed Project. There is an existing field entrance which will be improved, to ensure safe access and egress of Site vehicles.	Construction
G_11	**Site security** - access to Site will be controlled by means of an electronic access control system and camera remote monitoring system for out of hours use. During working hours, a gateman will control traffic movements and deliveries.	Construction
G_12	**Pedestrian** access will be strictly controlled. All personnel working on-site will be required to have a valid Safe Pass card. Only accredited personnel will be permitted on to the Site and a daily record (access / egress) of Site personnel will be maintained. No pedestrian access points will be provided during the Construction Phase.	Construction
G_13	**Health and Safety**: A detailed Construction Phase Health and Safety (H&S) Plan will be prepared by the appointed Contractor in advance of any works commencing on-site. This Plan will operate in line with ISO 18001 & ISO 14001. The Construction Phase H&S Plan will apply to any persons working on the Site and in respect of passing pedestrians, motorists or other transport carriers.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
General Mitigation Measures		
G_14	**Health and Safety**: A suitably qualified and competent Project Supervisor Design Process (PSDP) has been appointed (with OLM Consultancy) and a suitably qualified and competent Project Supervisor (Construction Phase) will be appointed in line with those requirements laid down in the *Safety, Health and Welfare at Work Construction Regulations 2013* (S.I. No. 291 of 2013 Safety, Health and Welfare at Work (Construction)).	Construction
G_15	**Health and Safety**: First Aid facilities for the use of all Construction Phase staff in the form of a fully provisioned first aid area within the Site office with life-saving and safety equipment as required by relevant statues, authorities and awards will be maintained at all times by the contractor. The proposed Project will comply with all Health & Safety Regulations during the Construction Phase.	Construction
G_16	**Risk Management:** Iarnród Éireann will be consulted prior to such works commencing on the adjoining the railway corridor.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Population and Human Health (Chapter 7)		
PPH_1	A preliminary **Health and Safety** (H&S) Plan has been prepared and this Plan addresses health and safety issues from the design stage. The appointed Contractor will be required to prepare a final Construction Phase H&S Plan and any employed subcontractors will also be required adhere to this Plan. This Plan will operate in line with the requirements of ISO 18001 & ISO 14001.	Construction
PPH_2	All Site personnel will be required to understand and implement the requirements of the final CEMP and will be required to comply with all legal requirements and best practice guidance for construction sites.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Population and Human Health (Chapter 7)		
PPH_3	**Procurement:** The proposed Project will look to procure material and services from local providers, where reasonably practicable, and within the requirements of the procurement process.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Biodiversity (Chapter 8)		
B_1	**Contamination of watercourses leading to Natura 2000 Sites:** Appointment of an ecologist to oversee enabling works and the implementation of mitigation measures outlined. ▪ Staging of project to reduce risks to watercourses from contamination. ▪ Control of Water during Construction. ▪ 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. ▪ Sealing of drainage ditches at the most downstream element prior to the watercourse, with a tall 45 degree sloped earth and batted back bund prior to site clearance and re-profiling. ▪ Any discharges to the watercourse during construction must be discussed with the ecologist and undergo desilting and petrochemical interception. ▪ Should discharges be required to the watercourse the drainage network and attenuation must be implemented at initial stages. Discharges of desilted water from the site should be made to the attenuation system so that the hydrobrake and interceptor are in place during any discharges. ▪ Local watercourses must be protected from dust, silt and contaminated surface water throughout the works. ▪ Local silt traps established throughout site as discussed with the ecologist. ▪ Mitigation measures on site include dust control, stockpiling away from watercourse and drains. ▪ Stockpiling of loose materials will be kept to a minimum of 20m from watercourses and drains.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Biodiversity (Chapter 8)		
	▪ Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system and watercourses. ▪ Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches or the watercourse, excavations and other locations where it may cause pollution. ▪ Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the stream. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality. ▪ During the construction works silt traps will be put in place in the vicinity of all runoff channels the stream to prevent sediment entering the watercourse. ▪ Petrochemical interception and bunds in refuelling area. ▪ Planting in the vicinity of the stream crossings should be put in place as soon as possible to allow biodiversity corridors to establish. ▪ On-site inspections will be carried out by project ecologist during enabling works and until drainage connection is complete. ▪ Maintenance of any drainage structures (e.g. de-silting operations) must not result in the release of contaminated water to the surface water network. ▪ No entry of solids or concrete to the associated stream or drainage network during the connection of pipework.	
B_2	Monitoring ▪ Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces within 100m of Site boundary, integrity of the silt control measures, with cleaning and / or repair to be provided if necessary. ▪ Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Biodiversity (Chapter 8)		
	▪ Fully enclose specific operations where there is a high potential for dust production and the Site is active for an extensive period. ▪ Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. ▪ Cover, seed or fence stockpiles to prevent wind whipping. ▪ 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 will be regularly watered, as appropriate, during dry and/or windy conditions. ▪ Maintain a vegetated strip and vehicle exclusion zone between the works and the onsite watercourse in consultation with the project ecologist. ▪ 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. ▪ 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.	
B_3	Measures Specific to Earthworks ▪ Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable. ▪ Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. ▪ Only remove the cover in small areas during work and not all at once. ▪ During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.	Construction

<table>
<tr><th>Mitigation No.</th><th>Description of Mitigation / Environmental Commitment</th><th>Phase</th></tr>
<tr><td colspan="3">Biodiversity (Chapter 8)</td></tr>
<tr><td></td><td>Due to the proximity of the onsite watercourse an ecologist will oversee works in particular the excavation of material from the perimeter of the site.
The Contractor will be required to consult with an ecologist prior to the beginning of works to identify any additional measures that may be appropriate and / or required.</td><td></td></tr>
<tr><td>B_4</td><td>Storage / Use of Materials, Plant & Equipment
Materials, plant and equipment shall be stored in the proposed site compound location.
Plant and equipment will not be parked within 50m of the onsite watercourse at the end of the working day.
Hazardous liquid materials or materials with potential to generate run-off shall not be stored within 50m of the onsite watercourse.
All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed Project site compound. The capacity of the bunded area shall conform with EPA Guidelines - hold 110% of the contents or 110% of the largest container whichever is greater.
Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested, in good condition and have no signs of leaks or spillages.
Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements.
All persons working will receive work specific induction in relation to material storage arrangements and actions to be taken in the event of an accidental spillage. Daily environmental toolbox talks / briefing sessions will be conducted for all persons working to outline the relevant environmental control measures and to identify any environment risk areas / works.</td><td>Construction</td></tr>
</table>

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Biodiversity (Chapter 8)		
B_5	**Monitoring:** An appointed Ecologist will be appointed to monitor the Site from pre-construction surveys, during Construction Phases and Post-Construction. This would include obtaining derogation licences if necessary from the National Parks and Wildlife Service (NPWS).	Construction - Monitoring
B_6	The proposed Project will have to comply with SUDS, legislative requirements in relation to pollution control (e.g. petrochemical interception) and the provision of measures such as petrochemical interceptors and silt interception.	Operational
B_7	The **reinstatement** of the Site will be monitored by the appointed Ecologist.	N / A

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Land, Soils, Geology and Hydrogeology (Chapter 9)		
LSG_1	Due to the inter-relationship between **land, soils, geology, hydrogeology** and **hydrology,** the following mitigation measures will apply to each of these characteristics of the environment. **CEMP:** The final CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction.	Construction
LSG_2	**Control of Soil Excavation:** It is unlikely any contaminated material will be encountered during the Construction Phase of the proposed Project apart from the localised area around TP-65 noted during investigations. 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	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Land, Soils, Geology and Hydrogeology (Chapter 9)		
	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.	
LSG_3	**Stockpiling**: It is anticipated that any stockpiles will be formed within the boundary of the Site.	Construction
LSG_4	**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 A11.3 of Volume 3.	Construction
LSG_5	**Export of Material from Site:** Where material cannot be reused off-site it will be sent for recovery or disposal at an appropriately authorised facility.	Construction
LSG_6	**Sources of Fill and Aggregates:** 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.	Construction
LSG_7	**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 a 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: o any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use; o the pump or valve will be fitted with a lock and will be secured when not in use; o all bowsers to carry a spill kit and operatives must have spill response training; and o drip trays used on any required mobile fuel units.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Land, Soils, Geology and Hydrogeology (Chapter 9)		
LSG_8	**Fuel and Chemical Handling:** 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 CEMP.	Construction
LSG_9	**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.	Construction
LSG_10	**Control of Water during Construction:** 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.	Construction
LSG_11	**Control of Water during Construction:** 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.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Land, Soils, Geology and Hydrogeology (Chapter 9)		
LSG_12	**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.	Construction - Monitoring
LSG_13	**Monitoring:** Petrol / oil interceptor(s) 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.	Operational - Monitoring

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Hydrology (Water) (Chapter 10)		
W_1	At a minimum, the CEMP 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 (SP156).* ▪ 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).	Construction
W_2	**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).	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Hydrology (Water) (Chapter 10)		
W_3	Should any **discharge of construction water** be required during the Construction Phase, the discharge will be treated using a sediment trap or silt-buster as required.	Construction
W_4	A *Sediment and Water Pollution Control Plan* has been drafted (in the CEMP).	
W_5	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. This will prevent any potential negative impact on the storm water drainage and the material will be stored away from any surface water drains. 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 remove any potential impact.	Construction
W_6	**Fuel and Chemical Handling:** 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.	Construction
W_7	**Accidental Releases:** Emergency response procedures will be outlined in the CEMP. All personnel working on the Site will be suitably trained in the implementation of the procedures.	Construction
W_8	**Soil Removal and Compaction:** 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.	Construction
W_9	The proposed **new storm water drainage** arrangements will be designed and carried out in accordance with the:	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Hydrology (Water) (Chapter 10)		
	▪ 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.	
W_10	There are a number of SUDS measures that will be put in place to manage storm water drainage from the Site. Refer to Section 10.5.2 of the EIAR.	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Air Quality and Climate (Chapter 11)		
AQC_1	▪ The pro-active control of fugitive dust will ensure prevention of significant emissions arising, rather than a less effective attempt to control them once they have been released. ▪ 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 15-20kmph, and on hard surfaced roads as site management dictates. ▪ Public roads outside the Site will be regularly inspected for cleanliness and cleaned as necessary.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Air Quality and Climate (Chapter 11)		
	▪ 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. ▪ Dust may enter the on-site watercourse via air or surface water with potential downstream impacts. Mitigation measures will be carried out reduce dust emissions to a level that avoids the possibility of adverse effects on the onsite watercourse. The main activities that may give rise to dust emissions during construction include the following: o Excavation of material. o Materials handling and storage. o Movement of vehicles (particularly HGV's) and mobile plant. o Contaminated surface runoff. o Trucks leaving the site with excavated material will be covered so as to avoid dust emissions along the haulage routes. ▪ Speed limits on site (15kmh) to reduce dust generation and mobilisation. ▪ The stream is to be protected from dust on site. This may require additional measures in the vicinity of the bridge (east of the site) if this road is used for machinery e.g. placing of terram / protective material over the stream. ▪ Regular inspections of the site and boundary should be carried out to monitor dust, records and notes on these inspections should be logged. ▪ Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. ▪ Make the complaints log available to the local authority when asked.	

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Air Quality and Climate (Chapter 11)		
	▪ Record any exceptional incidents that cause dust and / or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	
AQC_2	The appointed Contractor will be responsible for the coordination, implementation and ongoing monitoring of the **Dust Management Plan.** In the event of dust nuisance occurring outside the Site boundary, movements of materials likely to raise dust would be curtailed and appropriate and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.	Construction
AQC_3	**Climate:** Nevertheless, some site-specific mitigation measures can be implemented during the Construction Phase of the proposed Project to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on-site will aid to minimise the embodied carbon footprint of the Site.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Noise and Vibration (Chapter 12)		
NV_1	The appointed Contractor will ensure that all best practice noise and vibration control methods will be used as necessary in order to ensure impacts to nearby residential noise sensitive locations are *not significant*. The total noise (LAeq) which should not be exceeded during daytime is therefore 65dB.	Construction
NV_2	**Noise:** All works on site shall comply with *BS 5228-1:2009+A1 2014* which gives detailed guidance on the control of noise and vibration from construction activities. In general, the contractor shall implement the following mitigation measures during the proposed infrastructure works: ▪ Avoid unnecessary revving of engines and switch off equipment when not required. ▪ Keep internal haul roads well maintained and avoid steep gradients. ▪ Minimise drop height of materials.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Noise and Vibration (Chapter 12)		
	▪ Start-up plant sequentially rather than all together.	
NV_3	More specifically the appointed Contractor shall ensure that: ▪ A Construction Noise and Vibration Management Plan is prepared. ▪ In accordance with Best Practicable Means, plant and activities to be employed on-site are reviewed to ensure that they are the quietest available for the required purpose. ▪ Hoarding to be provided and where required, improved sound reduction methods are used e.g. enclosures. ▪ Site equipment is located away from noise sensitive areas, as much as physically possible. ▪ Regular and effective maintenance by trained personnel is carried out to reduce noise and / or vibration from plant and machinery. ▪ Hours are limited during which site activities likely to create high levels of noise and vibration are carried out.	Construction
NV_4	**Noise:** A Site representative responsible for matters relating to noise and vibration will be appointed prior to construction on-site.	Construction
NV_5	**Monitoring:** A noise and vibration monitoring specialist will be appointed to carry out independent monitoring of noise and vibration during critical periods at sensitive locations for comparison with limits and background levels. It is proposed that noise and vibration levels be maintained below those outlined above as part of these infrastructure works.	Construction - Monitoring
NV_6	**All vehicles** and **mechanical plant** used for the purpose of the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order.	Construction
NV_7	All diesel engine powered plant shall be fitted with effective **air intake silencers**. All compressors shall be *"sound reduced"* models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silences of the type recommended by the manufacturers, and where commercially available, dampened tools and accessories shall be used.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Noise and Vibration (Chapter 12)		
NV_8	All **ancillary plant**, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance. If operating outside the normal working week acoustic enclosures shall be provided.	Construction
NV_9	Where construction activities are required in close proximity to **neighbouring noise sensitive properties**, a solid hoarding of approximately 2.4m in height should be erected to provide a degree of acoustic screening to the lower storeys. Local screening should be provided for stationary plant such as generators and compressors.	Construction
NV_10	An acoustically screened area should be provided on the site specifically for **noisy operations** such as grinding and cutting metal.	Construction
NV_11	**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.	Construction
NV_12	Referring to the potential **noise** generating sources for the works under consideration, the following best practice migration measures should be considered: ▪ 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, lining drops 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.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Noise and Vibration (Chapter 12)		
	▪ 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.	
NV_13	**Piling:** Prior to construction the planner, developer, architect and engineer, as well as the local authority, should be made aware of the proposed method of working of the piling contractor.	Construction
NV_14	**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.	Construction
NV_15	**Liaison with the Public -** A designated environmental liaison officer should be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. 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 liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.	Construction
NV_16	**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.	Construction
NV_17	**Monitoring -** Construction Phase noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the 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.*	Construction
NV_18	Some examples of 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;	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Noise and Vibration (Chapter 12)		
	▪ solid barriers screening any external plant; and ▪ anti-vibration mounts on reciprocating plant.	
NV_19	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; and ▪ 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.	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Landscape and Visual (Chapter 13)		
LV_1	**Contractor Compound**: 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.	Construction
LV_2	**Visual**: Perimeter hoardings will be installed along the Site boundaries and maintained in good condition and free of unsolicited graffiti and fly-posting.	Construction
LV_3	Full details of the landscape proposals are provided in the *Landscape Strategy*, submitted with the planning application.	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Cultural Heritage, Archaeology and Architectural (Chapter 14)		
CHAA_1	**Monitoring** of topsoil-stripping within the entire Site 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 a comprehensive archaeological mitigation measure.	Construction
CHAA_2	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.	Construction
CHAA_3	**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 the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological importance identified. The archaeologist will 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.	Construction – Monitoring

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Microclimate - Wind (Chapter 16)		
MC_W_1	Operational Mitigation measures include: ▪ **Landscaping:** the use vegetation to protect buildings from wind.	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Microclimate - Wind (Chapter 16)		
	▪ **Sculptural screening (solid or porous):** to either deflect the wind or bleed the wind by removing its energy. ▪ **Canopies and Wind gutters:** horizontal canopies are used to deflect the wind and redirect the wind around the building and above the canopy.	

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Traffic and Transportation (Chapter 17)		
TT_1	The appointed Contractor will be required to prepare a **final CEMP**, including a plan for the scheduling and management of construction traffic.	Construction
TT_2	**Access**: There is an existing field entrance which will be improved as outlined in Section 5.5.4, to ensure safe access and egress of Site vehicles.	Construction
TT_3	In order to ensure satisfactory operation of the Construction Phase the following is proposed: ▪ Construction traffic will not be permitted to use Red Arches Road to the east or Grange Road to the south unless agreed with the Local Authority. ▪ Provision of sufficient on-site parking and compounding to ensure no potential overflow onto the local network.	Construction
TT_4	**Truck wheel washes** will be installed at Construction Phase entrances and any specific recommendations regarding construction traffic management made by the Local Authority will be adhered to.	Construction
TT_5	The following mitigation measures will be incorporated into the final CEMP detailing the management of **construction traffic:** ▪ 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.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Traffic and Transportation (Chapter 17)		
	▪ The traffic generated by the Construction Phase 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's 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.	
TT_6	A **Designated Community Liaison Officer** (DCLO) will be nominated for the Site, who will work with DCLOs on other active sites to coordinate construction activities. The DCLO will also act as a point of contact for local residents, Fingal County Council and An Garda Síochána.	Construction
TT_7	This includes (*inter alia*) the following measures for minimising **construction traffic** and mitigating its effects: ▪ routing all construction traffic via a haul road to / from the north, connecting to Moyne Road, avoiding Grange Road and Coast Road; ▪ conducting all loading and unloading operations within the Site, away from the public road; ▪ scheduling deliveries outside of peak hour periods to avoid disturbance to surrounding pedestrian and vehicular traffic; ▪ staggering HGV movement to / from Site to avoid site queues; ▪ preventing haulage vehicles travelling in convoys of more than two vehicles at any time and spacing haulage vehicles by a minimum of 250m at all times; ▪ installation of a wheel wash at exit from the site to prevent any dirt being carried out into the public road; and ▪ deployment of a road sweeper as necessary to keep the public roads around the Site clean.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Traffic and Transportation (Chapter 17)		
TT_8	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 Fingal County Council.	Construction
TT_9	The proposed Project shall incorporate several design elements intended to mitigate the impact of the development on the surrounding road network during its Operational Phase These include: ▪ a reduced car parking provision, which shall discourage higher vehicle ownership rates and excessive vehicular trips to the proposed Project (by residents and visitors); and ▪ a high provision of secure bicycle parking, which shall serve to encourage bicycle journeys by both development occupants and visitors.	Operational
TT_10	Within the scope of the **Residential Travel Plan** (RTP) to be implemented for the development, however, the Residential Travel Plan Coordinator shall be responsible for monitoring the travel habits of development occupants and visitors	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Waste (Chapter 18)		
MA_W_1	The appointed Contractor will endeavour to ensure that material is reused or recovered offsite insofar as is reasonably practicable or disposed of at authorised facility.	Construction
MA_W_2	**Wastes** arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal as appropriate.	Construction
MA_W_3	A project specific **C&D WMP** has been prepared in line with the requirements of the requirements of the guidance document issued by the DEHLG is included as Appendix A18.1 in Volume 3. Prior to commencement, 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	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Waste (Chapter 18)		
	specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream. The C&D WMP specifies the need for a **waste manager** to appoint who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Recording of waste generation during the Construction Phase of the proposed Project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.	
MA_W_4	**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 as well as on water and soil environments, both on-site.	Construction
MA_W_5	In addition, 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: o Concrete rubble (including ceramics, tiles and bricks); o Plasterboard; o Metals; o Glass; and o 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, where required);	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Waste (Chapter 18)		
	▪ a waste manager will be appointed by the main Contractor(s) 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; and ▪ all waste leaving the Site will be recorded and copies of relevant documentation maintained.	
MA_W_6	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 anticipated that Article 27 will be used.	Construction
MA_W_7	A project specific **Operational Waste Management Plan (OWMP)** has been prepared and is included as Appendix A18.2. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the Site. 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.	Operational
MA_W_8	In addition, the following mitigation measures will be implemented: ▪ on-site segregation of all waste materials into appropriate categories including (but not limited to): o organic waste; o dry mixed recyclables; o mixed non-recyclable waste; o glass; o waste electrical and electronic equipment (WEEE); o batteries (non-hazardous and hazardous);	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Waste (Chapter 18)		
	o cooking oil; o light bulbs; o cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.); o furniture (and from time to time other bulky waste); o abandoned bicycles; and o 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 will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are not available; and ▪ all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.	
MA_W_9	**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 C&D WMP including maintenance of waste documentation.	Construction - Monitoring
MA_W_10	**Monitoring:** The management of waste during the Operational Phase will be monitored to ensure effective implementation of the OWMP by the building management company and the nominated waste contractor(s).	Operational - Monitoring

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Services (Chapter 19)		
MA_S_1	Construction Phase mitigation measures include avoidance, reduction and remedy measures as set out in *Section 4.7 of the Development Management Guidelines* to reduce or eliminate any significant adverse impacts identified.	Construction
MA_S_2	The following mitigation measures are proposed for the Construction Phase of the proposed Project: ▪ Consultation with the relevant services providers shall be undertaken in advance of works. This will ensure all works are carried out to the relevant standards and ensure safe working practices are implemented - *i.e.* for electricity lines etc. ▪ All infrastructure is to be installed and constructed to the relevant codes of practice and guidelines. ▪ An outline CEMP included with the application, will be finalised and implemented by the appointed Contractor for the duration of the Construction Phase. This will ensure protection to the local amenities and the operation of the local road network. ▪ The potable water supply and wastewater infrastructure will be pressure tested by an approved method during the Construction Phase, prior to connection to the public networks, all in accordance with Irish Water Requirements.	Construction
MA_S_3	The appointed Contractor will be responsible for: ▪ Ensuring the **existing storm** networks are free from waste materials generated during the Construction Phase of the proposed Project. ▪ **Routine visual inspections** – to ensure any risk of excess construction materials causing blockages in the surface water network and any potential flooding occurring. ▪ **A Maintenance Schedule and Operational Schedule -** for silt and pollution control measures during the Construction Phase. This should be undertaken in consultation with the relevant statutory authorities. ▪ **Run-off** - from the Site or any areas of exposed soil should be channelled and intercepted at regular intervals for discharge to silt traps or lagoons with over-flows directed to land rather than to a watercourse.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Services (Chapter 19)		
	▪ **Pouring of concrete** – will be carried out in the dry and allowed to cure. Mixer washings and excess concrete should not be discharged to surface water. ▪ **Oil storage tank**(s) and the associated filling area and distribution pipe work should be at least 10m distant from the surface watercourses. ▪ **Hazardous construction materials** – will be stored appropriately to prevent contamination of watercourses or groundwater. Spill kits should be kept in designated areas for refuelling of construction machinery. Dewatering measures should only be employed where necessary.	
MA_S_4	**Monitoring** will be provided for by each utility company with an over-seeing responsibly by the appointed Contractor during the Construction Phase.	Construction
MA_S_5	Prior to the Operational Phase of the proposed Project, all connections (wastewater, water supply, gas and electricity) will be tested by a suitable qualified person under the supervision of FCC. The proposed Project water supply will be tested to the satisfaction of FCC prior to the connection to the public potable water.	Operational

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