ENVIROMENTAL IMPACT ASSESSMENT REPORT

FOR A

Proposed Residential Development on Lands

AT

St Paul's College

Raheny

Dublin 5

ON BEHALF OF

Crekav Trading GP Limited

Volume 2 Chapters 1 -15

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1 INTRODUCTION & METHODOLOGY

1.1 Introduction

This Environmental Impact Assessment Report (**EIAR**) has been commissioned by the applicant, Crekav Trading GP Limited, in respect of an application for a residential development on lands to the east of St Paul's College, Sybil Hill Road, Raheny, Dublin 5.

This EIAR has been compiled in accordance with all current legislation and best practice guidance. This Chapter describes the methodology by which the Environmental Impact Assessment (**EIA**) was carried out and the EIAR was completed. The methodology used is broadly consistent across all Chapters in order to ensure the EIAR is clear and easy to navigate.

The Proposed Development (as defined in Chapter 2 (Project Description & Description of Alternatives) comprises:

- The construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, residential tenant amenity spaces and a crèche;

- Car parking spaces, bicycle parking, storage, services and plant areas at basement level;

- Landscaping, to include extensive communal amenity areas, and a significant area of public open space;

- The widening and realignment of an existing vehicular access onto Sybil Hill Road;

- The demolition of an existing prefab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College (Secondary School) incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road; and

- The laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River.[1]

[1] It should be noted that the terms Naniken River and Naniken Stream are interchangeable and for the purpose of this planning application and all supporting reports and documentation both names refer to the same waterbody.

1.2 Definition of EIA and EIAR

EIA is a systematic examination of the potential impacts of a proposed development on the environment. In assessing the environmental impacts this EIAR will evaluate the existing situation and assess any potential impacts of the Proposed Development. Where potential impacts are identified proposed mitigation measures will be identified. In addition, the in-combination effects of any other known plans or projects will be identified and assessed.

Under Schedule 5 of the Planning and Development Regulations 2001, as amended (the **Planning Regulations**), an EIAR (formerly an Environmental Impact Statement (**EIS**) is required to accompany certain planning applications for specified projects as part of the EIA process.

The EIAR describes the outcomes of the iterative EIA process which was progressed in parallel with the project design process. In doing so, it forms the first part of the EIA process that will be completed by An Bord Pleanála, as the competent authority, which in turn will be required to examine, analyse and evaluate the direct and indirect effects of the development on the various factors listed in Directive 2011/92/EU, as amended by 2014/52/EU (the **EIA Directive**).

> *"The EIAR should be prepared at a phase in the design process where changes can still be made to avoid adverse effects. This often results in the modification of the project to avoid or reduce effects through redesign" (EPA, 2017)*

Where significant and likely environmental effects are identified that are unacceptable, the EIA process aims to quantify and minimise the effects of the impact that the specified development has on the environment through appropriate mitigation measures and where necessary, subsequent monitoring.

This process is illustrated in Figure 1-1.

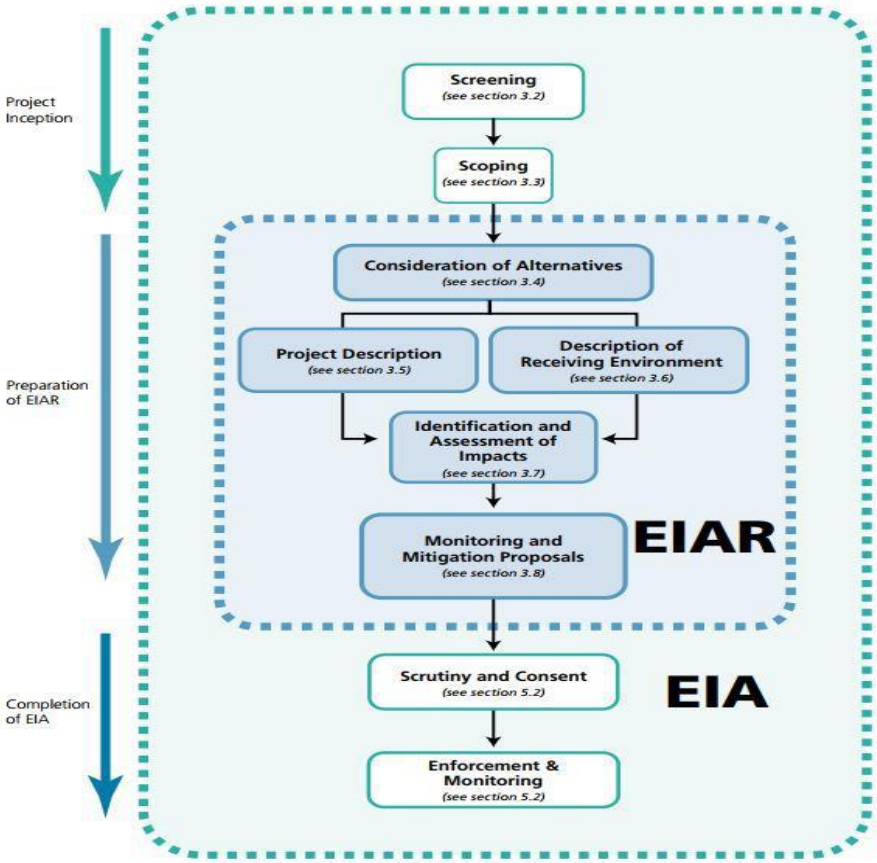

Figure 1-1: EIA Process

The purpose of the EIAR is to provide An Bord Pleanála with information on the likely and significant effects on the environment by the Proposed Development. This EIAR was prepared in parallel with the project design process and reflects the potential cumulative impact of other developments anticipated in the grounds of the St Paul's College lands, as described in a Masterplan submitted to Dublin City Council (**DCC**) with this planning application in accordance with the requirements of the Z15 zoning objective contained in the current Dublin City Development Plan 2016-2022 (**DCDP**). The Masterplan was prepared to describe the future strategic vision and structure for the redevelopment of lands at St Paul's College, Sybil Hill Road, Raheny, namely, *to accommodate education and religious community facilities with improved and increased capacity sports and community facilities and new residential development.*

1.3 EIA Legislation

The EIA Directive requires EIA to be carried out for certain projects as listed in Annex I of the Directive. The EIA Directive is transposed into Irish law through the Planning and Development Act 2000 (as amended) (the **Planning Act**) and the Planning Regulations.

1.4 EIA Guidelines

This EIAR has been prepared in accordance with all relevant guidance. The documents listed below are common to all Chapters. Additional specific guidelines will be referred to in each specific Chapter.

- *Guidelines on the Information to be contained in Environmental Impact Statements* (EPA 2002);
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA 2003);
- *Draft Advice Notes for Preparing Environmental Impact Statements* (EPA draft September 2015a);
- *Draft Revised Guidelines on the Information to be Contained in Environmental Impact Statements (*EPA draft September 2015b);
- *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA draft August 2017);
- *Environmental Assessments of Plans, Programmes and Projects – Rulings of the Court of Justice of the European Union (*European Union 2017);
- *Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (*European Union 2017);
- *Guidance of Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Union 2013);
- *Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report* (European Union 2017);
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Environment, Community and Local Government 2013);
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Government of Ireland 2018);
- *Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems;* (Department of Housing, Planning, Community and Local Government 2017);
- *Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) And Revised Guidelines for Planning Authorities and An*

Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government 2018);

- *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (European Communities 1999); and

- *Implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (*European Communities 2003).

The EIA Directive defines EIA as a process. Article 1(2)(g) states that EIA means:

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

The EIA Directive requires the EIAR to identify, describe and assess, in an appropriate manner and in light of each individual case, the direct, indirect and cumulative significant effects of the Proposed Development on factors of the environment including:

(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 (respectively, the **Habitats Directive** and the **Birds Directive**)

(c) land, soil, water, air and climate

(d) material assets, cultural heritage and the landscape

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

1.5 Screening for EIA

'Screening' is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory legislative threshold requirements or in the case of sub threshold development, by reference to the type and scale of the Proposed Development and the significance or the environmental sensitivity of the receiving baseline environment.

Annex 1 of the EIA Directive requires as mandatory an EIA for all development projects listed therein.

Schedule 5, Part 1, of the Planning Regulations transposes Annex 1 of the EIA Directive directly into Irish planning legislation. An EIAR is required to accompany a planning application for development of a class set out in Schedule 5, Part 1 of the Planning Regulations which exceeds a limit, quantity or threshold set for that class of development.

Schedule 5, Part 2 of the Planning Regulations defines projects that are assessed on the basis of set mandatory thresholds for each of the project classes including:

> *"Schedule 5, Part 2 - Infrastructure projects*
>
> *(b) (i) Construction of more than 500 dwelling units.*
>
> *(ii) Construction of a car-park providing more than 400 spaces, other than a car-park provided as part of, and incidental to the primary purpose of, a development.*
>
> *(iii) Construction of a shopping centre with a gross floor space exceeding 10,000 square metres.*
>
> *(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere. (In this paragraph, "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)"*

The Proposed Development triggers the requirement for mandatory EIA due to the number of residential units.

1.6 Scope of the EIAR

'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 EC Guidance on EIA Scoping 2001[2] as:

> *'Determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR'.*

[2] Guidance on EIA Scoping European Commission June 2001

The content of this EIAR was informed by a scoping process carried out by the applicant, design team and EIAR consultants to identify the core issues likely to be most important during the EIA process.

Informal scoping of potential environmental impacts was also undertaken with the Planning Authority through pre-application meetings. Direct and formal public participation in the EIA process will be through the statutory planning application process under the new Strategic Housing Development (**SHD**) procedures under the Planning and Development (Housing) and Residential Tenancies Act 2016 (the **2016 Act**).

The EIAR prepared for the Proposed Development has endeavoured to be as thorough as possible and therefore all of the issues listed in Schedule 6, Sections 1 and 2 of the Planning Regulations have been addressed in the EIAR.

The scope of this EIAR has had regard to the documents listed in Section 1.4 above, together with:

- The requirements of Part X of the Planning Act and Part 10 of the Planning Regulations
- The requirements of the DCDP
- Relevant Regional and National Planning Policy Documents
- Issues raised during meetings with technical staff of DCC and An Bord Pleanála
- Consultation process with statutory bodies and local stakeholders
- The receiving environment and any vulnerable or sensitive local features and current uses
- Previous relevant planning history and applications that have been submitted on the subject and adjoining lands
- The likely and significant impacts of the Proposed Development on the environment
- Available mitigation measures for reducing or eliminating any potentially significant undesirable impacts.

In addition, the individual Chapters of this EIAR should be referred to for further information on the documents consulted by each individual consultant.

1.7 Purpose and Objectives of the EIAR

The purpose of this EIAR is to assist in the EIA process, by identifying likely significant environmental impacts resulting from the Proposed Development, to describe the means and extent by which they can be reduced or mitigated, to interpret and communicate information about the likely impacts and to provide an input into the decision making and planning process.

The fundamental principles to be followed when preparing an EIAR are:

- Anticipating, avoiding and reducing significant effects
- Assessing and pursuing preventative action
- Maintaining objectivity
- Ensuring clarity and quality
- Providing relevant information to decision makers
- Facilitating public and stakeholder consultation.

EIA is an iterative process. The EIAR captures this assessment process and describes its outcomes. The EIAR documents the consideration of environmental effects and provides transparent, objective and replicable documentary evidence of the EIA evaluation and decision-making processes.

The EIAR provides information on any identified effects arising as a consequence of the Proposed Development and which:

- Are environmentally based
- Are likely to occur
- Have significant and adverse effects on the environment.

It also documents how the design of the Proposed Development incorporates measures for the purposes of impact avoidance, reduction or amelioration; as well as to explain how significant adverse effects will be avoided.

The key objective of this EIAR is to inform An Bord Pleanála on the acceptability of the Proposed Development, in carrying out an EIA, in order to reach a decision in the full knowledge of the Proposed Development's likely significant impacts on the environment, if any.

1.8 Format and Structure of this EIAR

The formation of an EIAR necessitates the co-ordination and collation of associated, yet diverse specialised areas of assessment. The EIA approach involves the examination of each environmental factor, describing the existing baseline environment, the Proposed Development, its likely impacts and direct and indirect significant effects pertaining to that environmental factor and mitigation measures, where appropriate.

The topics examined in this EIAR are categorised under the environmental factors prescribed under the EIA Directive:

- Population and Human Health
- Biodiversity
- Land and Soils
- Water
- Air
- Climate
- Material Assets

- Cultural Heritage
- Landscape

The expected effects deriving from the vulnerability of the Proposed Development to risks of major accidents and/or disasters must also be examined.

The structure of the EIAR is set out in Table 1-1 below.

Table 1-1: Structure of the EIAR

Chapter	Title	Content
1	Introduction and Methodology	Chapter 1 sets out the purpose, methodology and scope of the document
2	Project Description and Description of Alternatives	As required under Article 5(1)(a), Chapter 2 provides a description of the site, design and scale of the Proposed Development, and, as required under Article 5(d), an evaluation of the reasonable alternative design approaches.
3	Planning and Policy Context	Chapter 3 sets the national, regional and local policy framework for the Proposed Development.
4	Population and Human Health	Chapter 4 covers the requirement for assessment on potentially significant effects to population and human health as required under Article 3(1)(a).
5	Biodiversity	Chapter 5 covers the requirement of Article 3(1)(b) to assess potentially significant effects on biodiversity (which previously referred only to 'fauna and flora'), having particular attention to species and habitats protected under the Habitats Directive and the Birds Directive.
6	Land and Soils	Chapter 6 covers the requirement under Article 3(1)(c) on Land and Soil to assess the type of soil and geology in the area of the Proposed Development and identifies any potentially significant effects.
7	Hydrology, Hydrogeology and Water	Chapter 7 covers the requirement under Article 3(1)(c) to assess potentially significant effects to water quality arising from the Proposed Development. This Chapter will assess any potential effects from pollution and discharges to surface water via the Naniken River.

Chapter	Title	Content
8	Air Quality, Climate and Microclimate	Chapter 8 covers the requirement under Article 3(1)(c) on Air and Climate to assess potentially significant effects to air quality in the surrounding environment.
9	Noise and Vibration	Chapter 9 covers the requirement to assess potentially significant effects from airborne noise and vibration as required under Article 3(1)(a) on Human Health.
10	Landscape and Visual Amenity	Chapter 10 covers the requirement under Article 3(1)(d) to assess potentially significant effects on the landscape. This Chapter will assess any potential visual impacts to landscape caused by the Proposed Development.
11	Archaeological, Architectural and Cultural Heritage.	Chapter 11 covers the requirement under Article 3(1)(d) to assess potentially significant effects on cultural heritage.
12	Material Assets: Traffic, Waste and Utilities	Chapter 12 covers the requirement under Article 3(1)(d) to assess potentially significant effects on material assets. This Chapter will identify impacts to existing utilities and infrastructure from the development of the Proposed Development. Article 5(1), Annex IV, point 1(d) requires estimates of quantities and types of waste produced during construction and operation phase. Chapter 12 will also present an assessment of how resources and waste will be managed for the Proposed Development.
13	Risk Management	Chapter 13 covers the requirement under Article 3(2) to include the expected effects deriving from the vulnerability of the Proposed Development to risks of major accidents and/or disasters.
14	Interactions	As required under Article 3(1)(e), Chapter 14 provides an assessment of the interaction between all the environmental aspects referred to in this EIAR.
15	Mitigation and Monitoring Measures	Chapter 15 describes mitigation and monitoring as required under Article 5(1) in order to avoid, prevent, reduce, or if possible, offset any identified significant adverse effects on the environment and, where appropriate, describes any proposed monitoring arrangements.

This approach employs standard descriptive methods, replicable prediction techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration.

1.9 Methodology Used to Produce this EIAR

The methodology employed to produce this EIAR is detailed in Table 1-2. The objective is to evaluate each environmental topic, both individually and collectively, in a systematic and objective manner.

The methodology will outline the methods used to describe the baseline environmental conditions as well as predict the likely impacts on the environment of the Proposed Development during both the Construction Phase and the Operational Phase. The data and survey requirements for each Chapter will vary depending on the environmental topic and will be chosen by the particular specialist based on relevant legislation, best practice guidance, policy requirements, and professional judgement. Similarly, the study area is also defined for each environmental topic based on professional judgement and experience.

All environmental topics require desktop reviews of all relevant data at a minimum. These desktop studies are then supplemented by field studies and consultations with relevant stakeholders, for example interested parties, statutory bodies and local authorities, as required for each environmental topic.

An outline of the methodology that was used to ensure consistent in each Chapter of the EIAR and to examine each environmental topic is provided in Table 1-2 below:

Table 1-2: Methodology Employed to Produce each EIAR Chapter

Section	Description
Introduction	Provides an overview of the specialist area and specifies the specialist who prepared the assessment.
Study Methodology	This subsection outlines the method by which the relevant impact assessment has been conducted within that Chapter.
The Existing Receiving Environment (Baseline Situation)	This section will describe and assess the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the Proposed Development will fit. This analysis also takes account of any other proposed developments that are likely to proceed in the immediate surroundings.
Characteristics of the Proposed Development	Consideration of the '*Characteristics of the Proposed Development'* allows for a projection of the '*level of impact'* on any particular aspect of the environment that could arise. For each Chapter those characteristics of the Proposed Development which are relevant to the study area are described; for example, the

Section	Description
	Chapter on landscape and visual impact addresses issues such as height, design and impact on the surrounding landscape.
Potential Impact of the Proposed Development	This section provides a description of the specific, direct and indirect, effects that the Proposed Development may have. This analysis is provided with reference to both the Existing Receiving Environment and Characteristics of the Proposed Development sections, while also referring to the: (i) magnitude and intensity, (ii) integrity, (iii) duration and (iv) probability of impacts. The assessment addresses whether the impacts are direct, indirect, secondary or cumulative in nature. It also looks at the timescale of such impacts e.g. are they short, medium, long-term, and are they of a temporary, permanent, continuous or intermittent nature, and are they positive or negative impacts. The impact of interactions is also addressed.
Residual Impacts of the Proposed Development	This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term, temporary, permanent, continuous, or intermittent, positive and negative effects as well as impact interactions which the Proposed Development may have, assuming all mitigation measures are fully and successfully applied.
Do Nothing Impact	In order to provide a qualitative and equitable assessment of the Proposed Development, this section considers the Proposed Development in the context of the likely impacts upon the receiving environment should the Proposed Development not take place.
Avoidance, Remedial and Mitigation Measures	This section describes the mitigation measures which are required. The requirement to describe mitigation measures is laid out in the EIA Directive, as implemented by the Planning Act and the Planning Regulations Avoidance, remedial and mitigation measures describe any corrective or mitigate measures that are either practicable or reasonable, having regard to the potential impacts of the Proposed Development. This includes avoidance, reduction and remedy measures as set out in Section 4.7 of the Development Management Guidelines 2007, to reduce or eliminate any significant adverse impacts identified.
Monitoring	This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring.
Reinstatement	While not applicable to every aspect of the environment considered within the EIAR, certain measures may need to be proposed to ensure that in the

Section	Description
	event of the Proposed Development being discontinued, there will be minimal impact to the environment.
Interactions	This section provides a description of impact interactions together with potential indirect, secondary and cumulative impacts.
Difficulties Encountered in Compiling Information	The EIA Directive requires that the EIAR includes *'details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information, and the main uncertainties involved'* (EIA Directive, Annex IV, Part 6). Each Chapter that contains an environmental baseline and assessment contains a section outlining any difficulties encountered in compiling that Chapter.

1.10 EIAR Project Team

Table 1-3: EIAR Project Team

Chapter	Consultant Name and Address	Specialist Area
1.0 Introduction and Methodology including Non-Technical Summary	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Jim Dowdall	Multidisciplinary Planning and Environmental Consultants
2.0 Project Description and Description of Alternatives	Brady Shipman Martin, Canal House, Canal Road, Dublin 6 Pauline Byrne Sorcha Turnbull	Planning and Landscape Specialists
	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Jim Dowdall	Contributor
	O'Mahony Pike Architects The Chapel, Mount St. Anne's, Milltown Avenue, Dublin 6. James Murphy Evelyn Moran	Contributor
	Simon Clear and Associates, 3 Terenure Road West, Terenure, Dublin 6W Simon Clear	Contributor
3.0 Planning and Policy Context	Brady Shipman Martin, Canal House, Canal Road, Dublin 6 Pauline Byrne Sorcha Turnbull	Planning and Landscape Specialists

Chapter	Consultant Name and Address	Specialist Area
4.0 Population and Human Health	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Janet O'Shea	Environmental Consultants EIAR Division
5.0 Biodiversity	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Muriel Ennis	Environmental Consultants Ecology Division
6.0 Land and Soils	O'Connor Sutton Cronin, 9 Prussia St. Stoneybatter, Dublin 7 Ahmed Thamer	Multidisciplinary Consulting Engineers
7.0 Hydrology, Hydrogeology and Water	O'Connor Sutton Cronin, 9 Prussia St. Stoneybatter, Dublin 7 Jonathan Burke	Multidisciplinary Consulting Engineers
8.0 Air Quality, Climate & Microclimate (Air Quality & Climate)	AWN Consulting, The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17 Avril Challoner	Environmental and Engineering Consultants – Air Quality Division
	Walls/ Marlet Construction Jonathan Murphy	Contributor
(Daylight and Sunlight)	O'Connor Sutton Cronin, 9 Prussia St. Stoneybatter, Dublin 7 Carlota Álvarez Dónal O'Connor	Multidisciplinary Consulting Engineers
(Microclimate)	B-Fluid Ltd, 18 Herbert Street, Dublin 2 Cristina Paduano Patrick Okolo Eleonora Neri	Buildings Fluid Dynamics Consultants

Chapter	Consultant Name and Address	Specialist Area
9.0 Noise and Vibration	AWN Consulting, The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17 Jennifer Harmon	Environmental and Engineering Consultants – Acoustics Division
10.0 Landscape and Visual Amenity	Brady Shipman Martin, Canal House, Canal Road, Dublin 6 Thomas Burns	Planning and Landscape Specialists
11.0 Archaeology, Architectural, and Cultural Heritage	Shanarc Archaeology, Unit 39a, Hebron Business Park, Kilkenny Sean Shanahan Marion Sutton	Archaeological Consultants
	Rob Goodbody, Old Bawn, Old Connaught, Bray, Co. Wicklow Rob Goodbody	Historic Building Consultants
12.0 Material Assets: Traffic, Waste, and Utilities	O'Connor Sutton Cronin, 9 Prussia St. Stoneybatter, Dublin 7 Anthony Horan	Multidisciplinary Consulting Engineers.
	ILTP Consulting, St. Alberts House, Dunboyne, Co. Meath Christy O'Sullivan Ken Swaby	Multidisciplinary Consulting Engineers
	AWN Consulting, The Tecpro Building, 17 Clonshaugh Business and Technology Park, Dublin Chonaill Bradley	Engineering Consultants (Contributor)

Chapter	Consultant Name and Address	Specialist Area
13.0 Risk Management	O'Connor Sutton Cronin, 9 Prussia St. Stoneybatter, Dublin 7 Jonathan Burke	Multidisciplinary Consulting Engineers
	Maurice Johnson and Partners, The Anchorage, Charlotte Quay, Dublin 4 Stefan Hyde Niall McBrearty	Fire Safety Engineers And Access Consultants (Contributor)
	Walls Construction, Rosemount House, Malahide Rd, Northern Cross, Dublin 17 Jonathan Murphy	Construction Contractor (Contributor)
	Ashview Consultants, 115 Baggot Street Lower Dublin 2 Cathal Killen Ben Byrne	Health & Safety Consultants (Contributor)
	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Jim Dowdall	Multidisciplinary Planning and Environmental Consultants (Contributor)
14.0 Interactions	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Mercedes Kavanagh	Multidisciplinary Planning and Environmental Consultants
15.0 Mitigation and Monitoring Measures	Enviroguide Consulting, 3D Core C, The Plaza, Park West, D12F9TN Mercedes Kavanagh	Multidisciplinary Planning and Environmental Consultants

1.11 Non-Technical Summary

A Non-Technical Summary of the EIAR has also been prepared. The EIA Directive states that one of the objectives of the EIA process is to ensure that the public are fully aware of the environmental implications of any decisions. The Draft EPA Guidelines note that the non-

technical summary of the EIAR should facilitate the dissemination of the information contained in the EIAR and that the core objective is to ensure that the public is made as fully aware as possible of the likely environmental impacts of projects prior to a decision being made by An Bord Pleanála. A Non-Technical Summary of the EIAR has therefore been prepared which summarises the key environmental impacts and is provided as a separately bound document.

1.12 Links between EIAR and Appropriate Assessment

A Screening Report for Appropriate Assessment (**AA**) was carried out for the Proposed Development to determine if there is a risk of effects to any Natura 2000 site. As the AA screening could not screen out potential impacts on the neighbouring Natura 2000 sites, a full Natura Impact Statement (**NIS**) was prepared. Both documents accompany this EIAR as part of the planning application to An Bord Pleanála.

While AA is required by the proposer of any plan or project likely to have an adverse effect on a Natura 2000 site, EIA is required for projects listed in Annex I of the EIA Directive. The requirement for EIA relative to projects listed in Annex II of the EIA Directive is determined on a case by case. While these two different types of assessment are independent and are required by separate legislation, namely the Birds and Habitat Directives (i.e. AA) and the EIA Directive (i.e. EIAR) there is a degree of overlap, particularly in the Biodiversity Chapter (Chapter 5) of the EIAR.

1.13 Availability of EIAR Documents.

A copy of this EIAR document and Non-Technical Summary is available for purchase at the offices of An Bord Pleanála and DCC at a fee not exceeding the reasonable cost of reproducing the document. The application can also be viewed on the SHD website www.stpaulsshd2.ie set up by the applicant.

1.14 Statement of Difficulties Encountered

No exceptional difficulties were experienced in compiling the necessary information for the Proposed Development. Where any specific difficulties were encountered these are outlined in the relevant Chapter of the EIAR.

1.15 Quotations

It is important to acknowledge that the EIAR by its nature contains statements about the Proposed Development, some of which are positive and some less than positive. Selective quotation or quotations out of context can give a very misleading impression of the findings of the study. Therefore, the study team urge that quotations should, where reasonably possible, be taken from the conclusions of specialists' sections or from the Non-Technical Summary and not selectively.

The EIA Regulations require that difficulties such as technical deficiencies, lack of information or knowledge encountered in compiling any specified information for the EIAR be described. There were no such difficulties encountered in the production of this EIAR.

2 PROJECT DESCRIPTION & DESCRIPTION OF ALTERNATIVES

2.1 Introduction and Terms of Reference

This Chapter provides a detailed description of the Proposed Development together with details of the existing environment. In accordance with Article 5(1)(a) of the EIA Directive, the description of the project should comprise:

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

A description of the Proposed Development and its surroundings is provided in this Chapter, together with the proposed design parameters. This description sets the basis against which the specialist assessments presented in this EIAR have been undertaken.

The EIAR must contain information in relation to the environmental impact of both the Proposed Development and all other "*reasonable*" alternatives studied. An indication of the mains reasons for the option chosen must be given, taking into account the effects of the Proposed Development on the environment.

This Chapter of the EIAR has been prepared initially by Simon Clear of Simon Clear and Associates **(SCA),** Planning Consultants. Simon holds a degree in Geography and Economics and is a qualified Town Planner with 35 years professional planning experience, particularly in the area of development assessment and appraisal. The description of alternatives has been prepared by James Murphy MRIBA Architect from O' Mahony Pike (**OMP**) Architects, James has over 20 years' experience working on a large variety of projects and masterplans including large mixed-use and high-density residential developments from inception through to completion.

2.2 Site Location and Description

The Proposed Development is located in the northern suburbs of Dublin City, circa (**c.**) 5km from the City centre, in an established residential area.

The site of the Proposed Development is located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School) and Sybil Hill House (a protected structure), in Raheny, Dublin 5; see Figure 2-1 below. The R808 Sybil Hill Road runs north-south connecting the R105 Howth Road (north of the Proposed Development) with the R807 Clontarf Road (to the south).

The site of the Proposed Development is enclosed:

(i) by the grounds of St Anne's Park to the north, east and south;

(ii) by the sports grounds of St Paul's College to the south; and

(iii) to the west by the residential development at 'The Meadows' residential estate, Sybil Hill House and St Paul's College.

The 4-storey Convent building / grounds of the Little Sisters of the Poor is located to the immediate west of Sybil Hill Road.

Figure 2-1: Site Location Map

The Proposed Development will be accessed via the R808 Sybil Hill Road and is well served by public transport with five (5) no. Dublin Bus services currently running on the nearby R105 Howth Road. The R105 Howth Road is currently one of sixteen Quality Bus Corridors (**QBCs**) in Dublin. These bus routes serve Dublin City centre, Howth and Malahide.

There are pedestrian routes in the adjacent St Anne's Park which can facilitate pedestrian access to the Proposed Development.

Harmonstown and Killester railway stations are both located c. 1km (10 minutes' walk) from the Proposed Development, with both stations providing access to regular DART services which run between Malahide / Howth to the north and Bray / Greystones to the south.

There is cycle infrastructure in the local area; however, there are no dedicated cycle provisions on the R808 Sybil Hill Road. The R105 Howth Road is located 200m to the north of the access to the Proposed Development and has dedicated cycle lanes. There are significant improvements planned for the bicycle network in the vicinity of the Proposed Development. The planned improvements are set out in the National Transport Authority (**NTA**) *Greater Dublin Area Cycle Network Plan* (2013).

Local shops are within c. 500m of the site of the Proposed Development, with more shops and services available in the nearby areas of Raheny and Killester.

2.3 Site History / Background

In 1939 Dublin Corporation (now Dublin City Council (**DCC**)) acquired St Anne's Estate of 170ha and turned part of the lands, 80ha into suburban residential public housing estates. The area was developed in the 1940s by Dublin Corporation as part of a large-scale building programme to alleviate overcrowding and poor housing conditions in the inner City with c. 3,000 houses built in the area. Further housing development was constructed in the 1950s.

Today, St Anne's Park is an extensive, historic parkland and a major amenity and public open space. The c. 109ha Park is a well-used, popular amenity and recreational resource extending from its entrance off Sybil Hill Road in the west to the coast at Dollymount in the east.

St Paul's College was established by the Vincentians Order in 1950 and forms part of a belt of religious lands located on both sides of Sybil Hill Road. St Paul's College once accommodated over 800 no. pupils at peak enrolment in the late 1980's. School records show that enrolment has not exceeded 594 no. pupils at any time over the past 10 years, with the highest number enrolled in the academic year 2015 / 2016 (594), up from 574 in 2014 / 2015. The planned capacity of the school is 600 no. pupils, with the ability to accommodate up to 650 no. pupils without significant additional accommodation.

The site of the Proposed Development, together with the lands of Sybil Hill House and of St Paul's College, are Zoned Z15 under the Dublin City Development Plan 2016-2022 (**DCDP**). Land-Use Zoning Objective Z15 is:

> *"To protect and provide for institutional and community uses".*

As the site of the Proposed Development is Zoned Z15, which zoning includes residential development as '*Open for Consideration Uses'* within the associated land use matrix, the logic for residential development is that it: (i) can benefit from established urban infrastructure and services; (ii) can tie into an established residential community and (iii) can contribute to population rejuvenation and support for economic provision of urban services.

It is important to note that, on two occasions, the Department of Education and Skills (**DES**) has provided a letter of support for a residential development at this location as the lands are deemed excess to school requirements, see Appendix 2-1.

2.4 Project Overview

The Proposed Development comprises the construction of a residential development to accommodate apartments and tenant amenity spaces and a crèche, located on lands east of St Paul's College, Sybil Hill Road, Raheny, Dublin 5. The redline boundary for the Proposed Development is c. 6.7 hectares (**ha**) and the Site (development site) is c. 6.4ha.

As a general overview, the Proposed Development comprises:

a) Nine (9) no. residential apartment blocks, ranging in height from 5 storeys to 9 storeys, accommodating 657 no. apartments consisting of:

   (i) 224 no. 1 bed units

(ii) 378 no. 2 bed units

(iii) 55 no. 3 bed units

b) Tenant amenity spaces

c) A crèche

d) Public open space provided to the south of the residential development

e) Balconies and terraces to be provided on all elevations at all levels for each residential apartment block

f) 465 no. basement car parking spaces

g) 34 no. surface visitor car / crèche drop-off car parking spaces

h) 1646 no. bicycle parking spaces

i) Refuse storage, services, plant areas

j) All associated site development works necessary to facilitate the Proposed Development, which includes widening and realignment of the existing vehicular access onto Sybil Hill Road, to facilitate the construction of an access road with footpaths and on-road cycle tracks

k) A proposed pedestrian crossing on Sybil Hill Road.

The detailed description of the Proposed Development, as set out in the site notices is as follows:

"The development will consist of:

1. *The construction of a residential development with a gross floor area of c. 65,125sq.m (excluding basement parking areas) set out in 9 no. blocks, ranging in height from 5 to 9 storeys to accommodate 657 no. apartments, residential tenant amenity spaces, and a crèche. The site will accommodate 499 no. car parking spaces, 1646 no. bicycle parking spaces, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a significant public open space provision.*

2. *The 9 no. residential buildings range in height from 5 storeys to 9 storeys accommodating 657 no. apartments comprising 224 no. 1 bed units, 378 no. 2 bed units and 55 no. 3 bed units. Balconies and terraces to be provided on all elevations at all levels for each block. The breakdown of residential accommodation is as follows:*

    - ***Block 1** is a 5 to 8 storey building, accommodating 143 no. units*

    - ***Block 2** is an 8 storey building, accommodating 63 no. units*

- ***Block 3*** *is a 9 storey building, accommodating 71 no. units*
- ***Block 4*** *is an 8 storey building, accommodating 63 no. units*
- ***Block 5*** *is a 9 storey building, accommodating 71 no. units*
- ***Block 6*** *is a 7 storey building, accommodating 124 no. units*
- ***Block 7*** *is a 5 to 6 storey building, accommodating 36 no. units*
- ***Block 8*** *is a 5 to 6 storey building, accommodating 43 no. units*
- ***Block 9*** *is a 5 to 6 storey building, accommodating 43 no. units*
- *Residential tenant amenity space is provided at ground and basement level of* ***Block 1*** *(c. 719sq.m) and ground level of Block 6 (c. 162sq.m). External residential open space is provided to the west, east and between all blocks. A crèche is provided at ground level in* ***Block 7*** *with a total floor area of c. 612sq.m.*

3. ***Blocks 1 to 6*** *are located above a proposed basement accessed from the new access road. The basement will accommodate 465 no. car parking spaces (456 no. for residential and 9 no. for crèche staff) and 1314 no. bicycle parking spaces, storage, services and plant areas. 34 no. surface car parking is provided for visitors, crèche drop-off and shared parking / club car adjacent to* ***Block 7*** *and 332 no. cycle parking spaces, are provided throughout the landscaped areas*

4. *A new 1.6ha public open space is provided to the south of the site. Proposed pedestrian access from the site to the adjacent St Anne's Park is proposed in the north-west, north-east, east and south-east boundaries of the site.*

5. *Widening and realignment of an existing vehicular access onto Sybil Hill Road to facilitate the construction of an access road with footpaths and on-road cycle tracks from Sybil Hill Road between Sybil Hill House (Protected Structure) and St Paul's College incorporating new accesses to Sybil Hill House and St Paul's College and the provision of new wall and railing boundary treatment along the new road and new pedestrian / vehicular gates to the new and existing accesses to Sybil Hill House and St Paul's College. To facilitate this new access road it is proposed to demolish an existing pre-fab building. The application also includes for a proposed pedestrian crossing on Sybil Hill Road.*

6. *The laying of a foul water sewer in Sybil Hill Road. The routing of surface water discharge from the site via St Anne's Park to the Naniken [3]River and the demolition and reconstruction of existing pedestrian river crossing in St Anne's Park with*

[3] It should be noted that the terms Naniken River and Naniken Stream are interchangeable and for the purpose of this planning application and all supporting reports and documentation both names refer to the same waterbody.

integral surface water discharge to the Naniken River.

7. *The proposed application includes all site landscaping works, green roofs, substations, PV panels, boundary treatments, lighting, servicing, signage, surface water attenuation facilities and associated and ancillary works, including site development works above and below ground.*

8. *The application contains a statement indicating why permission should be granted for the proposed development, having regard to a consideration specified in section 37(2)(b) of the Planning and Development Act 2000, notwithstanding that the proposed development materially contravenes a relevant development plan or local area plan other than in relation to the zoning of the land.*

9. *An Environmental Impact Assessment Report and a Natura Impact Statement have been prepared in respect of the Proposed Development.*

10. *The application may also be inspected online at the following website set up by the applicant: www.stpaulsshd2.ie*

The application is accompanied by a Design Statement and drawings prepared by OMP Architects, which provide a rationale for the design and layout of the Proposed Development, the apartment types and residential amenity spaces. Also included as part of this application is a Landscape Design Report prepared by Brady Shipman Martin, Landscape, Planning and Environmental Consultants, which provides a rationale for the landscape proposals within the Proposed Development, including proposals relating to pedestrian movement through the site. The Landscape Design Report has been designed to provide high quality amenity space for the residents of the Proposed Development.

2.5 Statutory Planning Context

The site of the Proposed Development is subject to National, Regional and Local level planning policy. The following outlines the key planning policy documents of relevance to the Proposed Development.

This section will not address in detail the policies and objectives contained in the various plans / policies that are relevant to the Proposed Development. These are addressed in Chapter 3 *(Planning and Policy Context)* and in a separate report, '*Planning Report and Statement of Consistency*' prepared by Brady Shipman Martin which accompanies the planning application.

2.5.1 *National*

- The National Development Plan (**NDP**) 2018-2027 (Government of Ireland, 2018).

- The National Planning Framework (**NPF**): Project Ireland 2040 (Government of Ireland, 2018).

- Guidelines for Planning Authorities on '*Sustainable Urban Housing: Design Standards for New Apartments*' (Department of Housing, Planning and Local Government, 2018).

- Urban Development and Building Heights, Guidelines for Planning Authorities, (Department of Housing, Planning and Local Government, 2018).

- '*Rebuilding Ireland - Action Plan for Housing and Homelessness'* (Department of Housing, Planning and Local Government, 2016).

- Social Housing Strategy 2020 (the **Housing Strategy**) (Department of Housing, Planning and Local Government, 2014).

- Design Manual for Urban Roads and Streets (Department of Transport, Tourism and Sport, 2013).

- National Policy Position on Climate Action and Low Carbon Development (Department of Communications, Climate Action & Environment, 2013).

- Climate Action Plan 2019. To Tackle Climate Breakdown (Government of Ireland, 2019).

- Guidelines for Planning Authorities on '*The Planning System and Flood Risk Management'* (OPW, 2009).

- Guidelines for Planning Authorities on '*Sustainable Residential Development in Urban Areas and Best Practice Urban Design Guidelines*' (Department of Environment, Heritage & Local Government, 2009).

- Urban Design Manual (A Best Practice Guide) (Department of Environment, Heritage and Local Government, 2009).

- Smarter Travel, a Sustainable Transport Future. A New Transport Policy for Ireland 2009-2020 (2009).

- Delivering Homes, Sustaining Communities. Statement on Housing Policy (Department of Environment, Heritage and Local Government, 2008).

- Guidelines for Planning Authorities on Childcare Facilities (Government of Ireland, 2001).

2.5.2 *Regional*

- Eastern & Midland Regional Assembly (**EMRA**). Regional Spatial & Economic Strategy (**RSES**) 2019-2031 (2019).

- Transport Strategy for the Greater Dublin Area 2016-2035 (NTA, 2016).

2.5.3 *Local*

- DCDP.
- Dublin City Parks Strategy.

The DCDP sets out policies and objectives relating to the proper planning and sustainable development of Dublin City, including the area of the Proposed Development and its environs. It details land use and development objectives, settlement hierarchy, development control standards and policies and objectives for the protection of the built and natural environment of Dublin City. It is the most relevant document pertaining to the Proposed Development.

2.6 Description of Alternatives

2.6.1 *Introduction*

Consideration of reasonable 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 of the Proposed Development within the constraints imposed by environmental and planning conditions. This section provides a description of the reasonable alternatives that have been considered.

Article 5 of the EIA Directive requires that that the EIAR contain:

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

This section of the EIAR provides an explanation of the reasonable alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the Proposed Development, taking into account and providing a comparison of the environmental effects. The alternatives may be described at four levels:

- Alternative locations
- Alternative designs
- Alternative layouts
- Alternative processes

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'…"*

In accordance with Draft EPA Guidelines (EPA, 2017), different types of alternatives may be considered at several key phases 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 (EPA, 2017) 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.

2.6.2 *Alternative Locations*

The Proposed Development is for the construction of a residential development, including tenant amenity facilities, such as a crèche, tenant amenity rooms and a gym. The location of the Proposed Development lies within Zone Z15 of the DCDP, which zoning includes residential development as '*Open for Consideration Uses'* within the associated land use matrix. Having regard to the above it was not considered necessary to consider alternative sites for the Proposed Development.

Within the DCDP, Z15 lands are identified as lands that have a contribution to make in respect of:

- The Vision for Dublin
- The Core Strategy consistency with National and Regional strategic guidance
- The development plan policies underpin the creation of a compact city with mixed-use environments, sustainable neighbourhoods and green infrastructure, to reduce the city's reliance of fossil fuels and provide for carbon soakage, all in accordance with the National Climate Change Strategy (2007-2012)
- Support for an effective Public Transport system
- The Housing Strategy, which identifies lands zoned as Z15 as incorporating strategic residential use potential.

The Housing Strategy identifies a need for 4,217 new housing units per annum in Dublin City during the DCDP period, and this demand will be ongoing. The Housing Strategy analysis shows that, other than the Inner City, the city population in the suburbs is falling.

The DCDP and all its constituent elements have been subject to Strategic Environmental Assessment (**SEA**) and Appropriate Assessment (**AA**), as required, during the plan preparation period. Therefore, as the potential of the lands has been identified in a superior plan, no alternative location for the residential development requires to be considered.

2.6.3 *Alternative Uses*

As previously stated, the location of the Proposed Development lies within lands Zoned Z15 of the DCDP. An objective of a Z15 zoning would allow for the following uses on the zoned lands:

- **Permissible Uses**

  Buildings for the health, safety and welfare of the public; childcare facility, community facility, cultural / recreational building and uses, education, medical and related consultants, open space, place of public worship, public service installation, residential institution.

- **Open for Consideration Uses**

  Bed and breakfast, car park ancillary to main use, conference centre, funeral home, guest house, hostel, hotel, municipal golf course, residential, student accommodation, training centre.

Having regard to the above, the overall land use was already providing a range of the permissible uses. The Masterplan for the lands was seeking to consolidate these uses therefore it would not be sustainable to provide more on the lands.

As an alternative to this current main use, the Zoning Objective includes residential development as '*Open for Consideration Uses'* within the associated land use matrix. As such it was then not considered necessary to consider alternative uses for the Proposed Development.

2.6.4 *Alternative Design & Layouts*

The development proposals for the Site were the subject of detailed discussions with the relevant DCC departments, Planning, Roads & Traffic, Parks & Water and Drainage prior to the Proposed Development being prepared. These detailed discussions highlighted the environmental issues to be addressed, which informed the design process. These considerations have informed the consideration of alternative layouts and designs, open space provision, addressing the issues of population and human health in a city environment, biodiversity, archaeology and traffic and access arrangements up to the formalisation of the final scheme which is submitted to An Bord Pleanála for approval.

During the design process for the Proposed Development, a number of iterations of the site layout and alternative designs have been prepared and considered.

The Proposed Development has been designed in accordance with the requirements of the DCDP and has been the subject of a number of pre-application meetings with DCC, as the planning authority, prior to lodgement. The proposal has also been the subject of a pre-

application SHD consultation with An Bord Pleanála, with design alterations arising out of this process also.

The key considerations and amendments to the design of the scheme, having regard to and comparing the key environmental issues, are set out and discussed below, including:

- Design options and changes which were incorporated into the scheme as the proposals progressed through pre-application discussions with DCC.
- Key design changes arising following the lodgement of the SHD pre-application to An Bord Pleanála.
- Specific section on the alternative bridge design options that were considered in respect of the outfall to the Naniken River, as required by the DCC, as the Sanitary Authority, and which resulted in the proposed design option. This option provides an acceptable approach in respect to ecology, archaeology and flood risk impacts within St Anne's Park.
- Overview of the scheme submitted for approval.

2.6.4.1 *Alternative Design No. 1: Application DCC Ref. 4185/15 (withdrawn)*

An alternative design approach was used in a previous, withdrawn planning application (DCC Ref. 4185/15). That alternative was described in detail in a planning application accompanied by an Environmental Impact Statement, as it was referred to at that time. The main differences from the Proposed Development were that Design No 1:

- Spread the houses out across the site.
- Located the apartments outside the zone where height would be allowed.
- Did not achieve a density of development on the site that planning policy for such a location would demand.
- Did not allow for the 25% public open space requirement.

In assessing that application, DCC indicated a preference that it would strongly favour a situation where it was evident that the sports facilities primarily serve the institutional / community use and would be retained by the Vincentian Order. For this reason, a separate planning application was lodged for all-weather pitches and a sports hall. This application was subsequently appealed to An Bord Pleanála. No decision has yet been made on this application (DCC Ref. 3177/17, ABP-301482-18).

Figure 2-2: Site Layout Plan for Planning Reg. Ref. 4185/15 (Source: Reddy Architecture, 2015)

2.6.4.2 *Alternative Design No. 2: Application SHD Ref. ABP-300559-18*

Prior to entering pre-application discussions, the design team undertook a site appraisal to identify the key constraints of the site which would need to be addressed as part of the Proposed Development.

Two of the key constraints on developing the alternative design were:

- the relationship with the protected structure at Sybil Hill House; and
- protecting existing trees, hedgerows and stone walls around the perimeter of the site.

As this proposed option progressed through pre-application discussions with DCC, key layout and design changes were proposed, discussed and implemented.

The resultant residential development contrasted with the previous extensive and less dense Alternative Design No. 1. Various iterations were subject to scrutiny before the selection of the preferred option emerged

The design process for the site began with the consideration of the site layout. The layout plans focused on the position and orientation of each aspect of the development. The final preferred layout is shown below.

Figure 2-3: Alternative Design No. 2 (Source: OMP Architects, 2017)

This design submitted in July 2017 provided for:

- 536 no. residential units;
- a c.50m set back from the north-west boundary with 'The Meadows' residential estate ;
- community facilities, gym, meeting and function room; and
- a crèche.

The main differences from the Proposed Development were that Design No 2:

- Located houses next to the Avenue through St Anne's Park.
- Split the 25% public open space requirement across the site.

- Allowed vehicles to access the site across the southern half of the site.

This proposal was granted permission by An Bord Pleanála in March 2018; however, this decision was quashed following a judicial review and subsequently refused.

2.6.4.3 *Alternative Design No. 3: The Proposed Development*

The final scheme, as revised and updated, reconsidered the issues raised with the previous alternatives / designs. Along with incorporating the concerns of DCC, this option provides for a development which has been optimised to reduce the negative environmental impacts, as far as possible.

As set out in more detail in Section 2.4 above, the Proposed Development will consist of a residential development comprising 657 no. apartments accommodated in nine (9) no. blocks ranging in height from 5 to 9 storeys (over basement).

The Proposed Development includes:

- Tenant amenity rooms at ground and basement levels of Block 1.
- Tenant amenity gym facility on the ground floor in Block 6.
- A crèche facility is provided on the ground floor in Block 7.
- A single large area of public open space to the southern boundary.
- 2 no. substation / switch room buildings.
- Basement level providing 465 no. car parking spaces, 1314 no. bicycle parking spaces, refuse storage and plant.
- Basement access pavilion for Blocks 7-9.
- All other site development works and services including roads and footpaths, surface parking, bicycle parking, refuse storage, landscaping and boundary treatments and surface water attenuation facilities.

The design concept has been devised by OMP Architects collaborating with a multi-disciplinary team and the design has progressed through several iterations prior to arrival at the preferred option, see Figure 2-4 below.

Figure 2-4: Alternative Design No. 3 (Source: OMP Architects, 2019)

2.6.4.4 *Key aspects supporting the Chosen Design*

The aspects of the chosen design for the Proposed Development that distinguishes it from the alternatives and reinforces its selection are set out below against relevant key headings:

- Visitor and crèche parking to be provided at ground level.
- Residential and crèche staff parking provided in the basement.
- Maximise public open space provision into one large area with easy access from St Anne's Park.
- 25% of the Site is proposed as public open space.
- Public open space provided next to the park to provide integration.
- Public and Semi-private open space provides appropriate buffers between the Proposed Development and St Anne's Park / 'The Meadows' residential estate.
- Provide a set back from St Anne's Park to the southern boundary to respect the setting of The Avenue.

- Height transition across the Site from lowest apartment blocks facing south onto St Anne's Park Avenue, with the tallest blocks placed at the core of the Site.
- C. 30m separation between taller Blocks 1-6 (5-9 storey) to minimise shading and maximise daylight in units.
- C. 23m separation between shorter Blocks 7-9 (5-6 storey) will ensure minimal shading and maximise daylight in units.

Figure 2-5: Proposed Site Layout Plan (Source: OMP Architects, 2019)

The Proposed Development is well served by community infrastructure including schools, village neighbourhood centres, shops and crèches.

A new crèche is proposed as part of the Proposed Development to cater for the needs of the residents. It has a secure adjacent play area and is located beside the main open space area within the Proposed Development.

The Proposed Development will include a gym, and a variety of tenant amenity spaces are distributed throughout. Ground floor tenant amenity spaces have associated external break out terraces.

The chosen design and layout incorporate all the following points which set out how it responds best to the requirements for this site.

2.6.5 *Context*

- Retain the majority of trees on site.
- Minimise impact on adjacent dwellings by maximising separation (50m) and lowering ground floor of apartment block by c. 2m.

2.6.5.1 *Site*

- Visitor parking and crèche drop-off parking to be provided at ground level.
- Resident and crèche staff parking provided in the basement.
- Provide pedestrian links through the site to St Anne's Park.
- Maximise public open space provision into one large area with easy access from St Anne's Park.
- 25% of the Site is proposed as public open space.
- Public open space provided next to St Anne's Park to provide integration.
- Semi-private and public open space provides appropriate buffers between the Proposed Development and St Anne's Park / 'The Meadows' residential estate.
- Provide passive supervision of open space within the Site and along the boundary of St Anne's Park to improve security and increase use.
- Provide a set back from St Anne's Park to the east and south boundary.
- Provide a variety of apartment blocks and types, which have their own identities and communities.
- Height transition across the Site from lowest blocks facing the St Anne's Park Avenue, with the tallest blocks at the core of the Site.
- Crèche and tenant amenities offer edge animation and passive surveillance.

2.6.5.2 *Apartments*

- The apartment blocks will be in a parkland setting surrounded by open space.
- East-west orientation to apartment blocks.
- C. 30m separation between taller Blocks 1-6 (5-9 storey) to separation between blocks to minimise shading and maximise daylight in units.
- C. 23m separation between shorter Blocks 7-9 (5-6 storey) will ensure minimised shading and maximise daylight in units.
- Provide tenant amenity including, gym, meeting, kitchen, cinema, games and function rooms and hot desks.
- Provide a crèche.
- Underground parking to be provided for apartments and crèche staff.
- Secure bike parking to be provided at a rate of two per apartment, with visitor bicycle parking at ground level.
- The inclusion of shared tenant amenity spaces will foster a sense of community.
- Concierge and amenity space provided at entrance to provide security and animation.

2.6.6 *Alternative Process*

This is not considered relevant to this EIAR having regard to the nature of the Proposed Development, i.e. a SHD, where the planning application will be submitted to An Bord Pleanála.

2.7 The Existence of the Project

2.7.1 *Construction Phase*

The Construction Phase will commence in Q1 2020 with the projected completion of the buildings by Q4 2024.

The preliminary Construction Environmental Management Plan (**CEMP**) incorporating a Construction & Demolition Waste Management Plan (**CDWMP**), which are included with this planning application, should be referred to for more detail on the Construction Phasing and Environmental Measures associated with same. The appointed Contractor will prepare a detailed final CEMP, including detailed construction phasing and a Traffic Management Plan (**TMP**).

2.7.2 *Description of the Operational Phase*

The Proposed Development is a development consisting of residential apartments ranging in height from 5 to 9 storeys and tenant amenity spaces.

The primary direct significant environmental effects will arise during the Construction Phase. As a result, the Operational Phase of the Proposed Development 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 Development are fully addressed in the relevant specialist Chapters of this EIAR. These impacts relate to Population & Human Health, Landscape & Visual, Noise and Air Quality & Climate associated with the traffic generated.

The Proposed Development also has the potential for cumulative, secondary and indirect impacts (i.e. traffic) and can be difficult to quantify due to complex inter-relationships.

However, all interactions and cumulative impacts are unlikely to be significant, have been addressed in Chapter 14 (Interactions) and the cumulative impacts are fully addressed in the relevant specialist Chapters of this EIAR.

3 PLANNING & POLICY CONTEXT

3.1 Introduction

This Chapter sets out the strategic and statutory context governing the planning and development of the Proposed Development. This includes a review of the planning policy context at a National, Regional and Local level and other relevant statutory and non-statutory planning policy documents.

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

The Proposed Development falls under the definition of SHD, as set out under Section 3 of the Planning and Development (Housing) and Residential Tenancies Act 2016, on the basis of it being a development '*of 100 or more houses on land zoned for residential use or for a mixture of residential and other uses'.*

3.2 National Planning Context

3.2.1 *National Development Plan 2018-2027*

The National Development Plan (**NDP**) 2018-2027 sets out the investment priorities and level of investment, which underpins the National Planning Framework - Project Ireland 2040 (**NPF**) and drives its implementation over the next ten years.

Under the NDP, **National Strategic Outcome 1** states:

> '*The aim is to secure the sustainable growth of more compact urban and rural settlements supported by jobs, houses, services and amenities, rather than continued sprawl and unplanned, uneconomic growth.'*

3.2.2 *National Planning Framework - Project Ireland 2040*

The NPF requires delivery of a baseline of 25,000 homes annually to 2020, followed by a likely level of 30-35,000 annually up to 2027. As a result, 112,000 households are expected to have their housing needs met in a social housing home 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 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. With regard to Dublin, the NPF identifies that the 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.'*

3.2.3 *Sustainable Urban Housing: Design Standards for New Apartments (2018)*

These Guidelines set out both qualitative and quantitative standards, in an effort to promote sustainable living patterns and thus curb urban sprawl. The Proposed Development has been designed to these current standards.

This planning application is accompanied by a Housing Quality Assessment document prepared by O' Mahony Pike (**OMP**) Architects which demonstrates the consistency of the Proposed Development with the relevant standards in the '*Quality Housing for Sustainable Communities'* (DEHLG, 2007) and the Dublin City Development Plan 2016-2022 (**DCDP**), where relevant.

3.2.4 *Urban Development and Building Heights, Guidelines for Planning Authorities (2018)*

The Urban Development and Building Height Guidelines were published by the Minister for Housing, Planning and Local Government under Section 28 of the Planning and Development Act 2000 (as amended) in December 2018. The implementation of the NPF requires increased density, scale and height of development in our town and city cores, including an appropriate mix of the living, working, social and recreational space in our urban areas.

In relation to individual Planning Applications the Guidelines identify that there is a presumption in favour of buildings of increased height in town and city cores and in other urban locations with good public transport accessibility. The Guidelines in turn reference National Policy Objective 13 specifically, see Section 3.2.2 above.

Furthermore, the Guidelines set out National planning policy that:

> "*Applies those requirements in setting out relevant planning criteria for considering increased building height in various locations but principally (a) urban and city-centre locations and (b) suburban and wider town locations*" (taken from Section 1.11).

The Guidelines seek to secure "…*compact and sustainable urban growth*' which means '...*either reusing or redeveloping existing sites and buildings, in well serviced urban locations,*

particularly those served by good public transport and supporting services, including employment opportunities" (taken from Section 1.17).

In context of the Proposed Development this planning application is considered to meet the criteria of the Guidelines. The Site's suitability for this approach is set out in detail in the accompanying Planning Report.

It is considered that the Site,

> "*is well served by public transport with high capacity*, *frequent service and good links to other modes of public transport";* is sensitively designed to *"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*."

3.2.5 *Rebuilding Ireland - Action Plan for Housing & Homelessness (2016)*

The aim of this Action Plan is to ramp up the delivery of housing from its current undersupply across all tenures and to help individuals and families meet their housing needs, and to help those who are currently housed to remain in their homes or be provided with appropriate options of alternative accommodation, especially those families in emergency accommodation.

This Plan sets ambitious targets 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 housing stock and laying the foundations for a more vibrant and responsive private rented sector.

The Proposed Development will contribute to the number of residential homes being constructed and will also provide social housing units.

3.2.6 *Social Housing Strategy 2020 (2014)*

The Social Housing Strategy commits to the following:

- Supplying 35,000 additional social housing units at a cost of €3.8 billion over the next six years.
- Meeting the housing needs of some 75,000 households through local authority provision via the private rented sector - using Housing Assistance Payment and Rental Accommodation Scheme.
- Reforming social housing delivery and management in Ireland.
- Establishing the Dublin Social Housing Delivery Taskforce, to respond to the current supply difficulties and focus on the delivery of social housing in the Dublin area.
- Sets out road map to accommodate everyone on the Housing Waiting Lists by 2020 (90,000 households).

It is proposed that the housing required for the purposes of compliance with Part V of the Planning and Development Act 2000, as amended, will be a mix of apartment types.

3.2.7 *Design Manual for Urban Roads & Streets (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. The Engineering Services Report (**ESR**), prepared by O'Connor Sutton Cronin (**OCSC**) Consulting Engineers, submitted as part of this planning application, provides further detail in respect of the compliance of the Proposed Development with this Design Manual.

3.2.8 *National Policy Position on Climate Action & Low Carbon Development (2013)*

In 2014, the Government adopted the National Policy Position on Climate Action and Low Carbon Development. This Policy Position establishes the fundamental national objective of achieving transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. It sets out the context for the objective, clarifies the level of greenhouse gas (**GHG**) mitigation ambition envisaged and establishes the process to pursue and achieve the overall objective. Specifically, the Policy Position envisages that policy development will be guided by a long-term vision based on:

- an aggregate reduction in carbon dioxide (**CO_2**) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors; and

- in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

The Proposed Development is compliant with the objectives of the National Policy Position on Climate Action and Low Carbon Development through the implementation of the following:

- Combined Heat and Power (**CHP**) system for apartments.

- Green roofs.

- Provision for electric vehicles and GoCar.

- High density due to proximity to public transport.

- Building Energy Rating (**BER**) A3 rating.

3.2.9 *Climate Action Plan 2019. To Tackle Climate Breakdown (2019)*

The Climate Action Plan 2019 sets out a course of actions over the coming years to address the impacts on Ireland's environment, society, economic and natural resources. The Plan outlines the current state of play across key sectors including electricity, transport, built environment, industry and agriculture and charts a course towards ambitious decarbonisation targets.

Chapter 9 (Built Environment) of the Plan states the importance of improving the energy efficiency of buildings which includes homes, workplaces and schools. Addressing the energy efficiency of buildings "*will not only reduce Ireland's dependence on fossil fuels but will also improve our living standards by making our buildings more comfortable, healthier, safer, and less costly to heat*."

The Plan identifies a number of targets to meet the required level of emissions reduction by 2030, along with a series of measures to deliver these targets. These targets include:

- "*Reduce CO_2 eq. emissions from the sector by 40-45% relative to 2030 pre-NDP projections.*
- *Sharply reduce fossil fuel use, given the current heavy reliance on gas, oil, coal and peat in the sector.*
- *Complete 500,000 building retrofits to achieve a B2 BER / cost optimal equivalent or carbon equivalent.*
- *Install 600,000 heat pumps (400,000 to be in existing buildings).*
- *Increase the number of Sustainable Energy Communities to 1,500.*
- *Complete the rollout of the Support Scheme for Renewable Heat (**SSRH**), including support for biomass and anaerobic digestion heating systems.*
- *Deliver two initiatives of municipal scale which have the potential to provide heat equivalent to the needs of about 50,000 homes*."

3.2.10 *The Planning System & Flood Risk Management (2009)*

The Planning System and Flood Risk Management Guidelines were under Section 28 of the Planning & Development Act 2000 (as amended). The Planning System and Flood Risk Management 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; adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk; and incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

A Site-Specific Flood Risk Assessment (**SSFRA**) has been prepared in accordance with these guidelines by OCSC Consulting Engineers and is submitted separately as part of this planning application.

3.2.11 *Sustainable Residential Development in Urban Areas & Best Practice Urban Design Guidelines (2009)*

These Guidelines encourage increased densities in appropriate zoned residential land within inner suburban areas of cities, proximate to existing and due to be improved public transport corridors.

The Proposed Development is located c. 5km from Dublin City centre within the Dublin Metropolitan Area in an area served by the DART Rail (Harmonstown) and the Howth Road Quality Bus Corridor (**QBC**), which bus routes serve Dublin City centre. The Proposed Development is adjacent to St Paul's College (Secondary School) and St Anne's Park. As such it would be categorised as inner suburban / greenfield. In the case of the Proposed Development, the density is 103 no. dwellings per hectare which accords fully with strategic planning policy, particularly the Urban Development and Building Height Guidelines (2018).

A Statement of Consistency with the guidelines, prepared by OMP Architects, is submitted with this planning application.

3.2.12 *Urban Design Manual (A Best Practice Guide) (2009)*

The Urban Design Manual was published as a companion document to the Guidelines for Sustainable Residential Development in Urban Areas. The Manual is intended to assist in the assessment of residential applications, to identify the principles and criteria that are important in the design of housing and to set out a design framework for a new residential neighbourhood.

The Manual sets out 12 key urban design criteria that all new residential developments should be tested against, in order to establish if the scheme is a well-designed proposal including Context, Connections, Inclusivity, Variety, Efficiency, Distinctiveness, Layout, Public Realm, Adaptability, Privacy / Amenity, Parking and Detailed Design.

In accordance with the Guidelines, the residential component of the Proposed Development has been assessed against these criteria by OMP Architects and a Statement of Consistency with the Urban Design Manual is included as part of this planning application.

3.2.13 *Smarter Travel, a Sustainable Transport Future. A New Transport Policy for Ireland 2009-2020 (2009)*

Chapter 3 of this policy document outlines the Key Goals of the initiative, which are as follows:

- Improve quality of life and accessibility to transport for all and, in particular, for people with reduced mobility and those who may experience isolation due to lack of transport.
- Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks.
- Minimise the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions.
- Reduce overall travel demand and commuting distances travelled by the private car.
- Improve security of energy supply by reducing dependency on imported fossil fuels.

The second Key Goal as defined within the policy document, in relation to maximising the efficiency of the transport system and alleviating congestion and infrastructure bottlenecks aligns entirely with the ambitions of the subject improvement scheme.

Chapter 5 of the policy document highlights that roads will continue to be the main source of transport for people and goods. There is a focus on the need to improve the efficiency of motorised means of transport with a view to "*limiting the development of traffic jams with their associated negative consequences for fuel consumption and emissions*" (pg. 51). There is also recognition that the "*efficient movement of goods is vital to our competitiveness and economic welfare*" (pg. 36). Transport by roads is vital to the efficient movement of goods and people. Therefore, continued investment in roads will remain an important element of sustainable travel to 2020 while relieving congestion problems.

A Traffic & Transport Assessment (**TTA**) and Mobility Management Plan (**MMP**) has been prepared by ILTP Consulting and is submitted with this planning application, see Appendix 12-2. The TTA and MMP demonstrate the consistency of the Proposed Development with this policy.

3.2.14 *Delivering Homes, Sustaining Communities. Statement on Housing Policy (2008)*

This Policy Statement on *Delivering Homes, Sustaining Communities,* 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. The quality of the housing environment is stated as being central to creating a sustainable community.

3.2.15 *Guidelines for Planning Authorities on Childcare Facilities (2001)*

The Guidelines Childcare Facilities indicate that Development Plans should facilitate the provision of childcare facilities in appropriate locations. These include larger new housing estates where planning authorities should require the provision of a minimum of one childcare facility with 20 places for each 75 dwellings. The threshold for provision should be established having regard to existing location of facilities and the emerging demography of the area where new housing is proposed. The Guidelines advise that sites should be identified for such facilities as an integral part of the pre-planning discussions.

In accordance with the Childcare Facilities Guidelines a crèche facility is proposed as part of the Proposed Development (ground floor level of Block 7).

3.3 Regional Planning Context

3.3.1 *Eastern & Midland Regional Assembly - Regional Spatial & Economic Strategy 2019-2031 (2019)*

The Regional Spatial and Economic Strategy 2019-2031 (**RSES**) is a strategic plan and investment framework to shape the future development of the Eastern & 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 Strategy 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 Strategy is underpinned by key 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 within the Dublin Metropolitan Area, as designated by the Strategy. The Metropolitan Area Strategic Plan (**MASP**) which is part of the RSES, identifies a number of large-scale employment and mixed-use development areas within in the metropolitan area, which should be developed in co-ordination with the sequential delivery of infrastructure and services.

The RSES sets out an ambitious target to achieve compact growth with 50% of housing to be provided within or contiguous to the built-up area of Dublin City and suburbs.

> **RPO 4.3:** to "*support the consolidation and reintensification of infill / brownfield sites to provide high density and people intensive uses within the existing built up area of Dublin city and suburbs and ensure that the development of future development areas is co-ordinated with the delivery of key water infrastructure and public transport projects.*"

The Proposed Development will contribute to the target to achieve compact growth with 50% of housing to be provided within or contiguous to the built-up area of Dublin City and suburbs.

Some of the guiding principles of the Dublin Metropolitan Area include:

Integrated Transport & Land Use:

> *"To focus growth along existing and proposed high quality public transport corridors and nodes on the expanding public transport network and to support the delivery and integration of 'BusConnects', DART expansion and LUAS extension programmes, and Metro Link, while maintaining the capacity and safety of strategic transport networks."*

The Proposed Development is located within 500m of the Harmonstown DART station and the Howth Road QBC, which is serviced by several bus routes.

Another Policy Objectives relating to Housing Delivery include:

> **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 Draft 'Urban Development and Building Heights Guidelines for Planning Authorities."*
> **RPO 5.5:** *"Future residential development in the Dublin Metropolitan Area shall follow a clear sequential approach, with a primary focus on the consolidation of Dublin and*

suburbs, supported by the development of Key Metropolitan Towns in a sequential manner as set out in the Metropolitan Area Strategic Plan (MASP) and in line with the overall Settlement Strategy for the draft RSES. Identification of suitable residential development sites shall be supported by a quality site selection process that addresses environmental concerns."

The Proposed Development has been designed in accordance with the above guidelines, objectives of the NPF and the RSES Eastern & Midland Regional Assembly. Please refer to the enclosed Statement of Consistency for further details on compliance with Section 28 Guidelines and the DCDP.

3.3.2 *Transport Strategy for the Greater Dublin Area 2016-2035 (2016)*

The purpose of the National Transport Authority's transport strategy published in April 2016 is:

"*To contribute to the economic, social and cultural progress of the Greater Dublin Area by providing for the efficient, effective and sustainable movement of people and goods*."

The Strategy provides a framework for the planning and delivery of transport infrastructure and services in the GDA over the next two decades. It also provides a transport planning policy around which other agencies involved in land use planning, environmental protection, and delivery of other infrastructure such as housing, water and power, can align their investment priorities.

At the heart of the Strategy is the requirement for land use planning and transport planning to be considered in unison. Fundamental to future land use planning will be the consolidation of development areas to enable service by various modes of traffic. The need to consolidate and concentrate development in a manner that allows the effective provision of public transport is a central theme throughout the Strategy.

The Proposed Development, which is located in an established residential area in the City, is within walking distance to existing DART and bus services on a QBC, is considered a wholly appropriate form of development in the context of the Transport Strategy.

3.4 Local Level

3.4.1 *Dublin City Development Plan 2016-2022 (DCDP)*

The Site is located within the administrative area of Dublin City Council (**DCC**). The DCDP sets the statutory planning policy for development within the City Boundary, having regard to national and regional plans and policies.

The DCDP sets out a new approach to meet the needs and aspirations of citizens of Dublin and the country, not only for the 6-year life of the plan, but for the long-term. This approach is based on the principles of sustainability and resilience on the social, economic and environmental fronts. The DCDP has been informed by the Regional Planning Guidelines (RPGs) and the environmental sensitivities of the County.

3.4.1.1 *Vision for Dublin*

The vision for the City as expressed in the DCDP is:

> *"Within the next 25 to 30 years, Dublin will have an established international reputation as one of Europe's most sustainable, dynamic and resourceful city regions. Dublin, through the shared vision of its citizens and civic leaders, will be a beautiful, compact city, with a distinct character, a vibrant culture and a diverse, smart, green, innovation-based economy. In short, the vision is for a capital city where people will seek to live, work, experience, invest and socialise, as a matter of choice." (pg. 10)*

3.4.1.2 *Core Strategy*

It is the Core Strategy of the DCDP to achieve the Vision for Dublin in a manner that is consistent with the guidance, strategies and policies at national and regional level. Within the DCDP, lands zoned Z15 form part of the Core Strategy for residential development.

The NSS 2002-2020, the Regional Planning Guidelines for the GDA 2010-2022 and the government's Smarter Travel - *A Sustainable Transport Future 2009-2020*, all guide and direct the fundamentals of the City Council's housing, settlement and retail strategies, which in turn are integrated into the overall CDP Vision and Core Strategy for 2016-2022.

The future structure of the institutional lands is in accordance with the DCDP, **Schools and Education Policies**, particularly in relation to an established school, as follows

> **SN12:** "*To facilitate the provision of educational facilities in accordance with the requirements of the relevant education authorities and to encourage the shared use of school or college grounds and facilities with the local community, outside of core hours, anchoring such uses within the wider community.*
> **SN13:** *To facilitate multi-campus-style school arrangements, where appropriate, in close proximity to residential neighbourhoods and public transportation routes, and to promote an urban typology of school building design sustainable in a city context and which responds to the local character or streetscape and reflects the civic importance of a school to a local community."*

3.4.1.3 *Land Use Zoning*

The entirety of the site of the Proposed Development is zoned objective Z15 (Institutional and Community) in the DCDP, which provides:

> "*To protect and provide for institutional and community uses. These generally large blocks of land, consisting of buildings and associated open spaces, are located mainly in the suburbs. The present uses on the lands generally include community - related development including schools, colleges, residential institutions and healthcare institutions, such as hospitals. Institutional and community lands display a variety of characteristics ranging from institutions in open grounds to long-established complexes of buildings. They often provide ancillary and incidental activities for the local community such as use of part of the site for recreational purposes or the use of rooms for local meetings."*

Where there is an existing institutional and / or community use, any development for "*open for consideration"* uses on part of the landholding, shall be required to demonstrate to the planning authority:

- How the proposal is in accordance with and assists in securing the aims of the zoning objective.

- How it secures the retention of the main institutional and community uses on the lands, including space for any necessary expansion of such uses.

- How it secures the retention of existing functional open space, *e.g*. school playing fields.

- The manner in which the nature and scale of the proposal integrates with the surrounding lands.

The objective of the Z15 in the DCDP is primarily to provide for institutional and community uses. Residential development is open for consideration, *i.e.* it may be permitted where An Bord Pleanála is satisfied that the development would be compatible with the overall policies and objectives for the zone, would not have undesirable effects on the permitted uses, and would otherwise be consistent with the proper planning and sustainable development of the area.

The DCDP requires that where there is an intention for any residential development on part of an existing institutional landholding the institution / applicants shall be required to demonstrate how the proposal (i) is in accordance with and assists in securing the aims of the zoning objective; (ii) would secure the retention of the main institutional and community uses on the lands, including space for any necessary expansion of such uses and (iii) would secure the retention of the existing function open space *e.g*. school playing fields. Consideration is also required as to how the nature and scale of the proposal integrates integrate into the surrounding lands.

Figure 3-1: Extract of Zoning Map B: DCDP (Source: DCC: OSI License Number 2016/22/CCMA/DCC)

Under Z15 zoning objective, the proposed residential use is '*open for consideration'*. (Extract from DCDP 2016-2022).

3.4.1.4 *Purpose of Lands Zoned Z15*

The DCDP states:

> "*lands zoned Z15 within the city play an important role in the achievement of a more compact city in that they contribute to the creation of vibrant neighbourhoods and a sustainable well-connected city through the provision of such infrastructure as schools, hospitals and open space. The city also includes nationally important institutions, such as hospitals and educational facilities, which as stated in section 14.1 (zoning principles), it is Council policy to cooperate with, in order to promote the strategic long-term needs of the city and the country.*
> *With any development proposal on these lands, consideration should be given to their potential to contribute to the development of a strategic green network (see also Chapter 10: Green Infrastructure, Open Space and Recreation), and to the delivery of housing in the city."*

It is a policy GI1 to develop a *Green Infrastructure network*. Section 10.5 of the DCDP sets out Policies and Objectives regarding a '***Green Infrastructure'***.

"Green Infrastructure is an interconnected network of green space that conserves natural ecosystem values and functions that also provides associated benefits to the human population. It is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas."

The relevant zoning (Z15) also states:

"In addition, development at the perimeter of the site adjacent to existing residential development shall have regard to the prevailing height of existing residential development and to standards in section 16.10 (standards for residential accommodation) in relation to aspect, natural lighting, sunlight, layout and private open space."

3.4.1.5 *Requirements for Development of Lands Zoned Z15*

Where Z15 lands are to be subject to comprehensive redevelopment, and, where the development proposed does not relate to extensions or enhancements to the existing community and institutional use, the DCDP requires the preparation of a Masterplan.

A Masterplan, which is submitted as a separate document as part of this application, has been prepared under the provisions of Objective Z15 and forms part of this application for development. The Masterplan, which has been prepared on behalf of the Vincentian Order, relates to all of the lands in the original St Paul's College campus that are subject to the Z15 zoning. The DCDP requires a single Masterplan vision for the use of the lands within the area subject to the zoning, irrespective of the current ownership structure.

The Masterplan represents the intentions of the main institutional stakeholder in the lands, working in co-operation with the other landowners within the Z15 zone area and with DCC, to deliver a vision for the integrated and sustainable development of the area, while retaining the main institutional use in an enhanced condition and setting.

Zoning Objective Z15 proposes that the Masterplan meet the following criteria:

- Setting out a clear vision for the Z15 zoned lands.
- It must incorporate landscape features to be retained.
- Identify 25% of the land for open space and / or community facilities.
- Retain the open character of the lands and identify landscape features to be retained.
- The public open space should not be split up, unless the site characteristics dictate it.
- The open space should mainly comprise of soft landscaping and contribute to the strategic green network.

The Masterplan fulfils the above criteria.

3.4.1.6 *Policy in relation to Residential Development*

Chapter 5 (Quality Housing) of the DCDP sets out the policies and objectives for new residential development including apartments. It is the policy of the DCDP to:

> **QH6***: "To encourage and foster the creation of attractive mixed-use sustainable neighbourhoods which contain a variety of housing types and tenures with supporting community facilities, public realm and residential amenities…."*
> **QH7***: "To promote residential development at sustainable urban densities throughout the City in accordance with the core strategy, having regard to the need for high standards of urban design and architecture and to successfully integrate with the character of the surrounding area."*

In respect of apartments, it is the DCC's policy:

> **QH18:** *"To promote the provision of high-quality apartments within sustainable neighbourhoods by achieving suitable levels of amenity within individual apartments, and within each apartment development, and ensuring that suitable social infrastructure and other support facilities are available in the neighbourhood, in accordance with the standards for residential accommodation."*
> ***QH19****: "To promote the optimum quality and supply of apartments for a range of needs and aspirations, including households with children, in attractive, sustainable mixed-income, mixed-use neighbourhoods supported by appropriate social and other infrastructure."*

A Statement of Consistency with the DCDP objectives is submitted with this planning application.

3.4.1.7 *Standards for Residential Accommodation*

Chapter 16 (Development Standards) of the DCDP sets out the various standards for residential development. This is further detailed in the Planning Report and Architects Design Statement, submitted with this application for development.

3.4.2 *Dublin City Parks Strategy*

The Dublin City Parks Strategy presents the wide range of resources and services under the Parks Services portfolio and states current policy and intended actions to seek the strategic vision of a greener and more liveable Dublin. The Parks Strategy provides an overarching framework and strategic direction for parks and landscape development and future management.

The Proposed Development has been designed in accordance with the objectives set out in the Dublin City Parks Strategy. See also the landscape drawings and report for details on landscaping in Chapter 10 (Landscape & Visual Assessment).

3.5 Conclusion

The Proposed Development is consistent with National, Regional and Local Level policy for development in the area.

The *Sustainable Residential Development in Urban Areas* recommend higher densities of residential development in inner suburban infill sites in locations adjacent to public transport networks. The Proposed Development is consistent with this policy.

The Proposed Development is in accordance with policies and objectives of the DCDP.

The Proposed Development will contribute to the development of "*a socially inclusive city of urban neighbourhoods, all connected by an exemplary public transport, cycling and walking system and interwoven with a quality bio-diverse green space network",* in accordance with the Vision for Dublin and as envisaged in the Core Strategy.

4 POPULATION & HUMAN HEALTH

4.1 Introduction

This Chapter of the EIAR considers the potential effects of the Proposed Development on human beings, living, working and visiting in the vicinity of the site of the Proposed Development. The Chapter details the potential direct and indirect effects of the Proposed Development on population and human health. This Chapter was prepared by Janet O'Shea who has a BSc in Environmental Health and is a Chartered Environmentalist. Janet has over 15 years experience working for both public and private sectors.

Human beings are one of the most significant elements of the environment to be considered, therefore any potential impact on the status of humans by a development proposal must be comprehensively addressed. One of the principle concerns in any proposed development is that the local population experiences no reduction in the quality of life as a result of the development on either a permanent or temporary basis. The potential impacts on population and human health can arise from traffic, visual effects, built and natural heritage, air and noise emissions and climate change, all of which are dealt with in the relevant specialist Chapters of this EIAR.

This Chapter also examines the impacts which are not already covered by other Chapters of the EIAR relating to issues such as socio-economic impacts of the Proposed Development focusing on pertinent issues such as residential amenity, economic activity, tourism, and population levels.

The planning application is for the lands to the east of St Paul's College (Secondary School), Sybil Hill Road, Raheny, Dublin 5 on lands which are zoned Z15 in the Dublin City Development Plan (**DCDP**) 2016-2022. The lands in question have not been developed before and previously formed the lands of the Vincentian Order, where St Paul's College is located, adjacent to St Anne's Park, the City's second largest urban park at 110 hectares (**ha**).

The main interactions will be in respect of land use, settlement patterns and social patterns. The effects on economic activity and employment will occur primarily at the Construction Phase but also at the Operational Phase.

4.2 Study Methodology

The assessment of impacts on human beings involves the identification of relevant key populations that may be affected by the Proposed Development. Key populations have been identified as persons residing and engaging in activities near the Site, persons with a stake in the general economy of the local and regional area, and persons enjoying the recreational and cultural amenities of the area.

A desk-based study was undertaken in August and September 2019 to assess information regarding population, age structure, economic activity, employment and unemployment within the vicinity of the Proposed Development.

The scope of the evaluation is based on a review of data available from the Central Statistics Office (**CSO**), legislation, guidance documents, other Environmental Impact Statements (**EISs**), EIARs, consultation with the prescribed bodies and on a consideration of the likelihood for significant impacts arising, having regard to the receiving environment and the nature and extent of the Proposed Development. The aim of this study was to assess the positive and negative impacts of the Proposed Development on the socio-economic environment.

The impact of the Proposed Development on the local population is assessed in this Chapter in relation to:

- Population and Settlement patterns
- Socio Economic impacts
- Landscape and Visual
- Human Health.

The principle sources of information are Census and employment information published by the CSO, the DCDP, the National Planning Framework (**NPF**) and Ordinance Survey Ireland (**OSI**) mapping and aerial photography.

In line with the EPA Draft Guidelines - *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017); seven generalised degrees of impact significance are used to describe impacts: imperceptible, not significant, slight moderate, significant, very significant or profound.

In addition, the following terms are defined when quantifying the quality of effects. See Table 4-1.

Table 4-1: Definition of Quality of Effects

Quality	**Definition**
Positive Effects	A change which improves the quality of the environment
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

In line with the EPA Draft Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts. See Table 4-2.

Table 4-2: Definition of Significance of Effects

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

In line with the EPA Draft Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See Table 4-3.

Table 4-3: Definition of Duration of Effects

Quality	Definition
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.

Quality	Definition
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years
Reversible Effects	Effects that can be undone, for example through remediation or restoration

4.3 Characteristics of the Proposed Development

The site of the Proposed Development is located adjacent to St Paul's College (Secondary School) located at Sybil Hill Road, Raheny, Dublin 5, circa (**c.**) 5km from Dublin City centre and c. 2km from Raheny village and c. 9km from Dublin Airport. Raheny is a northern suburb of Dublin, midway between Dublin City centre and Howth. It is administered by Dublin City Council (**DCC**). Nearby areas include Killester, Clontarf, Artane, Kilbarrack, Coolock and Donaghmede, and the skyline is dominated by Howth Head.

The Proposed Development is in an area that can be characterised as a well-planned and settled mature residential area substantially developed in the 1940s and 1950s in the Raheny and Killester areas.

Raheny is bisected by the Howth Road (R105) and the R809 (coming from North Bull Island, in turn Watermill Road, Main Street, Station Road) and is also accessed from the Malahide Road (R107), the coastal James Larkin Road / Clontarf Road (R807) and the R104 (including the Oscar Traynor Road and Kilbarrack Road).

The area is well serviced with public transport including access to rail, buses as well as established walking and cycling paths. Raheny, Harmonstown and Killester railway stations serve the DART suburban railway system and the Dublin-Belfast main line Raheny is also served by Dublin Bus (routes 29A, 31, 32, 31A and the rare 31d and 32x, and at night, 29N and 31N). There is also a local taxi rank.

The district, which is located in the Clontarf Local Electoral Area (**LEA**), within DCC, is home to two large municipal parks, St Anne's Park and North Bull Island with its c. 5km beach.

Directly across the road from St Paul's College is the Sacred Heart Residence (nursing home), which houses the Provincial House of the Little Sisters of the Poor. This is a substantial nursing home in terms of its size and a 5-storey building that faces onto the road frontage. A primary school (St Brigid's Boys National School), accessed from the Howth Road, occupies the northern part of that site.

The Proposed Development comprises of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level the Proposed Development will accommodate car parking spaces, bicycle parking, storage, services and plant areas.

Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded access to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road.

The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian river crossing in St Anne's Park with integral surface water discharge to the Naniken River.

4.4 The Existing Receiving Environment (Baseline Situation)

The location of the Proposed Development in on a greenfield site, adjacent to St Paul's College (Secondary School) and St Anne's Park.

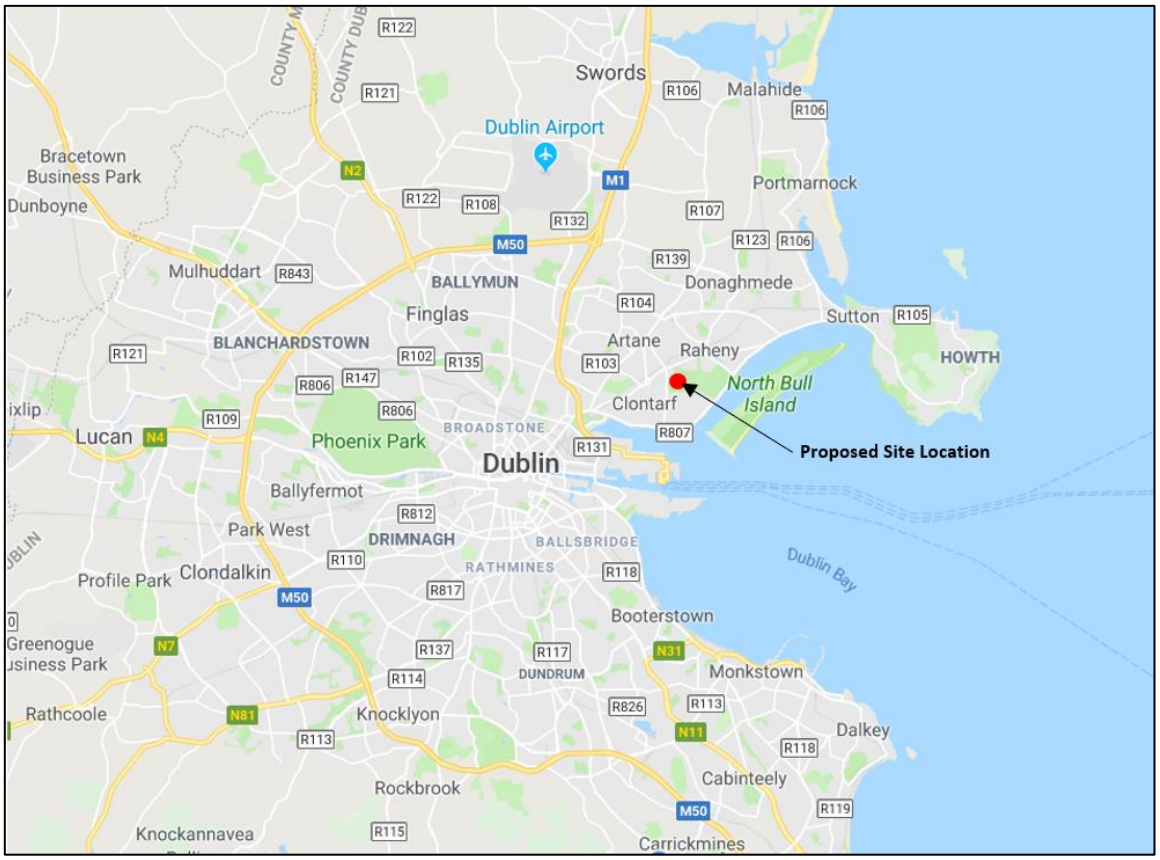

Figure 4-1: Proposed Development Location

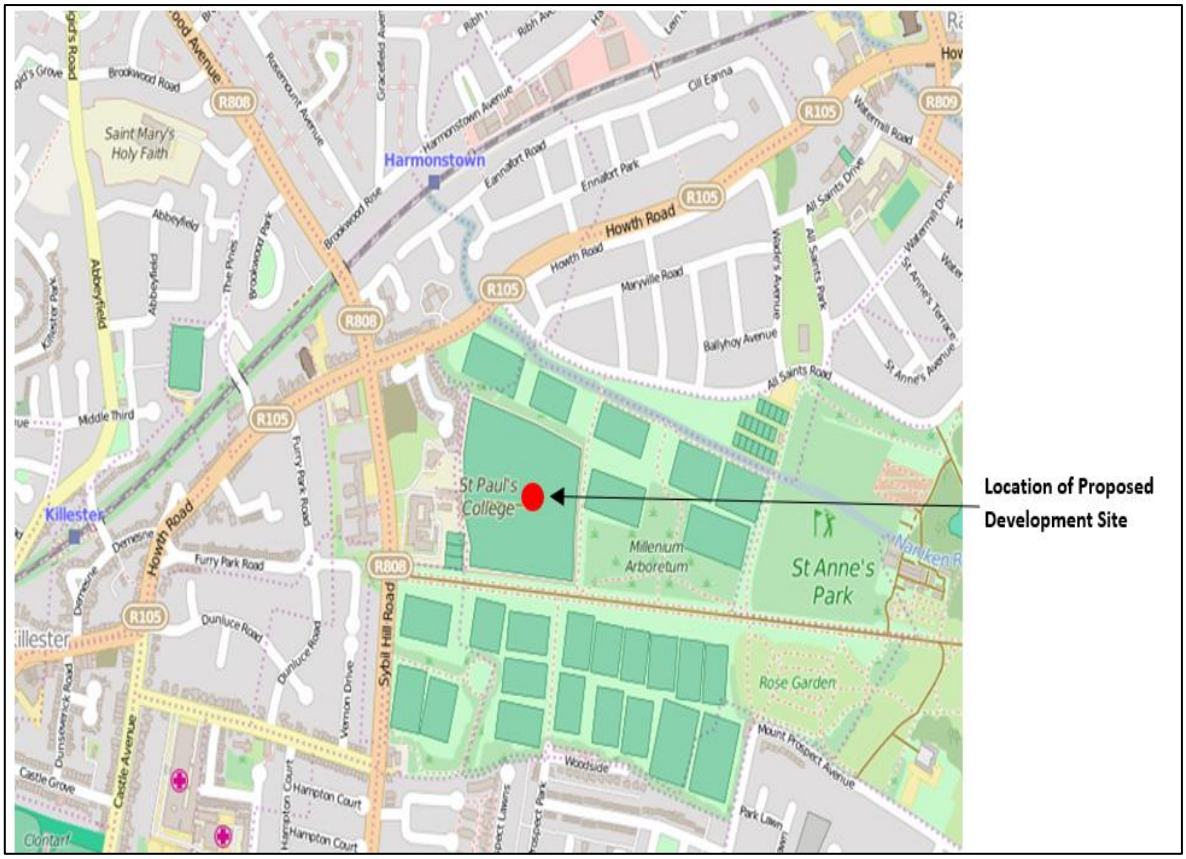

Figure 4-2: Proposed Development Location

4.4.1 *Population & Settlement Patterns*

4.4.1.1 *Population & Demographic Analysis*

In terms of the County, Region and the State, population, structure and change is strongly influenced by migration and emigration rates rather than by birth and death rates. The mid to late 1980s in Ireland was a period of heavy population outflow, mainly due to the poor economic and employment situation in the country at that time. The most recent population estimates (April 2017) published by the CSO indicate that the combination of a net inward migration and high birth rates have resulted in the largest annual population increase since 2008. Population projections for Ireland up to 2046 anticipate a population of c. 5 million under the most pessimistic scenario and over 6.7 million under the most optimistic scenario. Population projections for Northern Ireland up to 2034 anticipate a population of c. 2 million.

The Greater Dublin Area (**GDA**) which includes the DCC area, showed a significant population growth between 2002 and 2011 which is in excess of population growth at National levels. Significant population pressures have been exerted on certain parts of the GDA particularly those areas which are within close commuting distance of Dublin.

In the case of the GDA, population levels specified in the *Greater Dublin Regional Planning Guidelines 2010-2022* are projected to be in excess of two million by the year 2022. DCC's area has experienced significant population growth over the last twenty years, with the

population increasing from 481,854 in 1996 to 554,554 in 2016. This equates to an increase of 15%.

According to Census 2016, the total population of Dublin City is 554,554.

- Between 2006 and 2016 the population increased by 48,343 or 9.5%, slightly less compared to an average for the State of 12.3%.
- The main population growth was concentrated in the east of the county and in close proximity to the main urban settlements.
- Relatively speaking, there are high levels of young people and fewer older people in Dublin City.

4.4.1.2 *Population & Age*

The CSO data for 2016 records that there were 554,554 people in living in Dublin City, the council area where the Proposed Development is located. Table 4-4 below shows the breakdown of the population of Dublin City based on their age range group during the 2016 Census against the Dublin City & Suburbs and State average. This table is further broken down into percentages of the population within these age ranges.

Table 4-4: City, City & Suburbs and National Population Categorisation by Age

Age Range	Dublin City		Dublin City & Suburbs		Ireland	
	No. of People	% of People	No. of People	% of People	No. of People	% of People
0-4 years	30,683	5.5	76,662	5.9	331,515	7
5-24 years	125,795	22.7	292,138	22.6	1,251,489	26.3
25-34 years	119,756	21.6	331,026	25.6	659,410	13.8
35-44 years	87,582	15.8	189,061	14.6	746,881	15.7
45-54 years	65,836	11.9	141,965	11.0	626,045	13.1
55-64 years	52,547	9.5	114,914	8.9	508,958	10.7
65-74 years	38,011	6.9	82,382	6.4	373,508	7.8
75 years and over	34,344	6.2	65,004	5.0	264,059	5.5
Total	**554,554**		**1,293,152**		**4,761,865**	

The Proposed Development is located within the Clontarf LEA. This LEA is made up of 16 no. electoral divisions: Beaumont D, Beaumont E, Beaumont F, Clontarf East A, Clontarf East B, Clontarf East C, Clontarf East D, Clontarf East E, Clontarf West A, Clontarf West B, Clontarf West C, Clontarf West D, Clontarf West E, Drumcondra South A, Grace Park and Harmonstown B. A map of this area is detailed in Figure 4-3 below.

As the electoral divisions are small areas, a representative sample of population from one electoral division would not be a representative sample of the age demography of the area. An analysis of the CSO Census Statistics for 2011 and 2016 for the Clontarf LEA was completed and is shown in Table 4-5 below. This table breaks down the age profile of the area and details the percentages of population in each age bracket. Table 4-5 also shows data from 2011 as a comparison of population fluctuation in the area.

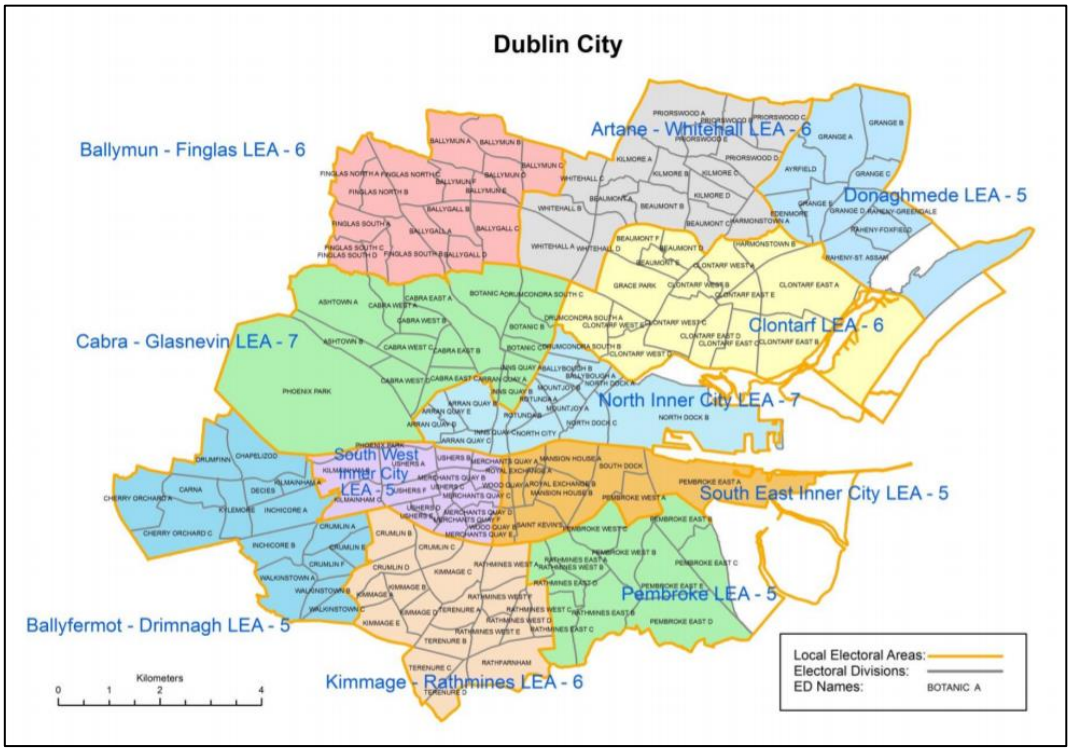

Figure 4-3: Local Electoral Boundary (Source Local Electoral Area Boundary Committee No.2)

Table 4-5: Age Profile of the Clontarf Local Electoral Area

	0-4 years		5-12 years		13-18 years		19-24 years		25-44 years		45-64 years		65-69 years		70 years +	
	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
Beaumont D	74	99	195	120	207	162	212	219	495	538	751	611	99	188	116	198
Beaumont E	117	128	140	167	112	95	179	156	505	524	455	417	168	128	325	436
Beaumont F	195	194	305	306	253	239	269	357	980	1,003	861	831	162	216	412	444
Clontarf East A	202	209	332	360	233	235	189	231	812	802	819	922	114	134	600	545
Clontarf East B	431	496	603	661	515	482	466	511	1,919	1,984	1,777	1,841	273	333	775	799
Clontarf East C	165	163	324	294	229	236	211	227	759	736	845	856	141	180	439	491
Clontarf East D	156	134	226	279	195	176	189	203	652	643	722	797	116	120	417	414
Clontarf East E	110	110	163	192	106	141	113	104	399	419	434	462	64	86	286	277
Clontarf West A	219	207	363	346	198	278	256	209	978	1,022	886	1,086	85	120	451	390
Clontarf West B	149	141	181	193	125	132	174	144	729	748	582	635	114	132	262	286
Clontarf West C	213	183	214	281	157	176	215	236	1,404	1,481	782	843	110	136	271	323
Clontarf West D	126	151	107	158	75	89	196	167	879	988	411	478	59	67	213	199

	0-4 years		5-12 years		13-18 years		19-24 years		25-44 years		45-64 years		65-69 years		70 years +	
	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
Clontarf West E	157	163	184	220	155	147	162	149	655	766	564	588	76	91	371	344
Drumcondra South A	255	253	289	294	232	212	486	537	1,865	2,135	960	1,542	132	247	352	402
Grace Park	263	276	466	471	454	393	549	526	1,512	1,622	1,542	1,454	247	342	637	722
Harmonstown B	151	192	276	263	184	222	221	190	754	784	656	742	64	79	378	286
Total No. of Persons	**2,983**	**3,099**	**4,368**	**4,605**	**3,430**	**3,415**	**4,087**	**4,166**	**15,297**	**16,195**	**13,047**	**14,105**	**2,024**	**2,599**	**6,305**	**6,556**
Total Percentage	**5.8**	**5.7**	**8.5**	**8.4**	**6.7**	**6.2**	**7.9**	**7.6**	**29.7**	**29.6**	**25.3**	**25.8**	**3.9**	**4.7**	**12.2**	**12.0**

As evident from Table 4-5 the largest portion of the population range in Clontarf LEA is between 25 to 44 years (29.6% in total according to the 2016 Census). 12% of the population in the Clontarf LEA are over 70 years of age. Children ranging from 0-4 years in the Clontarf LEA comprise 5.7%, slightly lower than the State average of 7%. Young people ranging from 5-24 years make up 22.2% of the population of Clontarf LEA, again, slightly lower than the national average of 26.3%.

Table 4-5 above shows that the age range of population has remained almost the same for the Clontarf LEA for all ages between 2011 and 2016, with a slight increase of population (0.8%) for people aged in the 65-69 years range.

4.4.2 *Socio Economic*

4.4.2.1 *Economic Activity & Employment*

The labour force is defined by the number of people above the legal working age that are available to work. The labour force participation rate is the number of people who are employed and unemployed but looking for a job divided by the total working-age population.

In 2016, there were 2,304,037 people in the labour force in Ireland. The number of people in the labour force is calculated by sum totalling the number all persons who are employed or actively seeking employment. Table 4-6 below shows the percentage of the total population aged 15+ who were in the labour force during the 2016 Census. This figure is further broken down into the percentages that were at work or unemployed. It also shows the percentage of the total population aged 15+ who were not in the labour force, i.e. those who were students, retired, unable to work or performing home duties.

Table 4-6: Economic Status of the Population Aged 15+ in 2016 (Source: CSO)

	Status	Ireland		Dublin City		Clontarf LEA	
% of population aged 15+ who are in the labour force		**No. of People**	**% of People**	**No. of People**	**% of People**	**No. of People**	**% of People**
% of which are:	Persons at work	2,006,641	53	265,293	56	25,720	56
	Unemployed looking for first regular job	31,434	1	4,686	1	279	0.6
	Unemployed having lost or given up previous job	265,962	7	34,514	7	1,889	4
% of which are:	Student or pupil	427,128	11	53,067	11	5,223	11
	Looking after home/family	305,556	8	29,111	6	2,875	6
	Retired	545,407	15	63,637	14	8,144	19

	Status	Ireland		Dublin City		Clontarf LEA	
% of population aged 15+ who are in the labour force		No. of People	% of People	No. of People	% of People	No. of People	% of People
	Unable to work due to permanent sickness or disability	158,348	4	18,665	4	1,392	3
	Others not in labour force	14,837	0	2368	1	175	0.4

When assessing the percentage of people in the labour force, it is noted that 56% of both the population in Dublin City area and the Clontarf LEA are in the labour force. This reflects the high number of people of a working profile living within the area. This figure is comparable to overall State average of 53%.

The most recent publication of monthly unemployment statistics was issued by the CSO in August 2019 for the reference month of July 2019. The monthly unemployment release contains a series of monthly unemployment rates and volumes. These series are based primarily on the Labour Force Survey and are compiled in accordance with agreed international practice. These statistics are the definitive measure of monthly unemployment. The Live Register is used to provide a monthly series of the numbers of people (with some exceptions) registering for Jobseekers Benefit or Jobseekers Allowance or for various other statutory entitlements at local offices of the Department of Social Protection. The most recent information available from the CSO records 50,464 people on the Live Register in the Dublin Area in July 2019. CSO records a total of 2,495 people on the Live Register in the Kilbarrack Area Welfare Office in July 2019. The Kilbarrack Area Welfare Office is the nearest Welfare Office to the Proposed Development.

As with employment, the number of people in the labour force is also influenced by changes in the size of the working age population (demographic effect). Up to the start of 2008 this demographic effect had been adding at least 30,000 to the labour force, nationally, on an annual basis, primarily driven by net inward migration. With the decline in inward migration the positive demographic effect started to fall in the second half of 2007 and continued to decline throughout 2008 and 2009 before becoming negative in Q3 2009. The negative demographic effect continued for each quarter until Q1 2014. The demographic effect has been positive since Q2 2014 and in Q1 2019 a positive demographic effect contributed an increase of 36,000 to the overall change in the labour force.

Tables 4-7 and 4-8 below show the level of education and the area of study of the Clontarf LEA population at the time of the 2016 Census.

Table 4-7: Level of Education in the Clontarf LEA (Source CSO)

Level of Education in Clontarf LEA	Total No. of People	Total Percentage
No formal education	358	0.9
Primary education	3285	8.6
Lower secondary	4064	10.6
Upper secondary	6259	16.4
Technical or vocational qualification	2441	6.4
Advanced certificate/Completed apprenticeship	1421	3.7
Higher certificate	1641	4.3
Ordinary bachelor's degree or national diploma	3211	8.4
Honours bachelor's degree, professional qualification or both	6361	16.7
Postgraduate diploma or degree	6605	17.3
Doctorate (Ph.D.) or higher	751	2.0
Not stated	1779	4.7

Table 4-8: Areas of Study in the Clontarf LEA (Source CSO)

Area of Study (Clontarf LEA)	Total No. of People	Total Percentage
Education and teacher training	1995	5.2
Arts	1335	3.5
Humanities	1304	3.4
Social sciences, business and law	8870	23.2
Science, mathematics and computing	2676	7.0
Engineering, manufacturing and construction	2798	7.3

Area of Study (Clontarf LEA)	Total No. of People	Total Percentage
Agriculture and veterinary	160	0.4
Health and welfare	2778	7.3
Services	1243	3.3
Other subjects	29	0.1
Not stated	14988	39.3

4.4.2.2 *Travel & Commuting*

The Clontarf LEA is made up of 16 no. electoral divisions.

In 2016 there were 17,758 students commuting to school or college from the Clontarf LEA and 25,240 people commuting to work from the area. Tables 4-9 and 4-10 below show the means of transport used.

Table 4-9 shows that the majority of students travel to school or college on foot (40.2%) with car passengers (20.7%), bus, minibus, coach (17.6%) and bicycle (11.3%) being the next popular means of transport to school and college from the Clontarf LEA.

Table 4-9: Commuting Methods to School and College from Clontarf LEA

Means of Transport	No. of People (Clontarf LEA)	Percentage of People
On foot - School or college	7,146	40.2
Bicycle - School or college	2,003	11.3
Bus, minibus or coach - School or college	3,125	17.6
Train, DART or LUAS - School or college	812	4.6
Motorcycle or scooter - School or college	13	0.1
Car driver - School or college	500	2.8
Car passenger - School or college	3,683	20.7
Van - School or college	9	0.1
Other (incl. lorry) - School or college	2	0.0

Work mainly at or from home - School or college	17	0.1
Not stated - School or college	448	2.5
Total - School or college	**17,758**	

Table 4-10 shows that the majority of people travel to work by car (41.7% as a driver; 2% as a passenger). The other main modes of transport are on foot (10.1%), bus, minibus or coach (16.6%) and by bicycle (10.9%).

Table 4-10: Commuting to Work from Clontarf LEA

Means of Transport	Total Clontarf LEA	Percentage of People
On foot – Work	2,554	10.1
Bicycle – Work	2,755	10.9
Bus, minibus or coach – Work	4,192	16.6
Train, DART or LUAS – Work	2,419	9.6
Motorcycle or scooter – Work	203	0.8
Car driver – Work	10,519	41.7
Car passenger – Work	498	2.0
Van – Work	618	2.4
Other (incl. lorry) – Work	47	0.2
Work mainly at or from home – Work	706	2.8
Not stated – Work	729	2.9
Total – Work	**25,240**	

Table 4-11: Commuting Times for Clontarf LEA

Commute	Under 15 Mins	¼ hour – under ½ hour	½ hour – under ¾ hour	¾ hour – under 1 hour	1 hour – under 1 ½ hours	1 ½ hours and over	Not stated	Total
Total Commuter Numbers (for those working outside of the home)	6,961	11,114	9,276	3,394	2,186	445	1,787	35,163
Percentage of Commuters (for those working outside of the home)	19.8	31.6	26.4	9.6	6.2	1.3	5.1	100%

Table 4-11 shows that 35,193 people are commuting to work, school or college from the Clontarf LEA. According to the 2016 Census data published by the CSO, the most likely length of time it takes people to commute from this area was between 15 minutes and 30 minutes. Table 4.11 shows that 51.5% of the population travel a distance of between 0 minutes and 30 minutes, with a further 26.4% travelling between 30 minutes and 45 minutes. The Proposed Development is an important residential base for young people and families within the City environs.

4.4.2.3 *Community & Amenities*

The Proposed Development is located 5km north-west of Dublin City centre, which is a highly developed and concentrated area of residential, community and leisure receptors. Dublin City has a range of community facilities including parks / open spaces, sports / recreational, playgrounds, youth centres and libraries.

The most notable amenities in the direct vicinity of the Proposed Development is St Anne's Park. The Park is the second largest municipal park in Dublin. As well as extensive walks and green areas, the park contains numerous sporting facilities, including extensive GAA and soccer playing fields, tennis courts and golf courses all of which are detailed in Figure 4-4 below. The Park also contains non-sport amenities. Bisected by the Naniken[4] Stream, the Park features an artificial pond and a number of follies, a large rose garden, a fine collection of trees with walks, a playground, cafe and recreational areas. The Park also hosts markets on certain weekends.

[4] It should be noted that the terms Naniken River and Naniken Stream are interchangeable and for the purpose of this planning application and all supporting reports and documentation both names refer to the same waterbody.

Once the Proposed Development is completed, 25% of the Site is proposed as public open space, to the south of the Site.

The Proposed Development is located c. 1.5km from North Bull Island. This island contains the amenity of Dollymount Strand (beach) as well as two golf courses (St Anne's Golf Club and the Royal Dublin Golf Club). The island is also famous for its wildlife, the lagoon and mudflats between the island and the seafront promenade is a popular location for birdwatching.

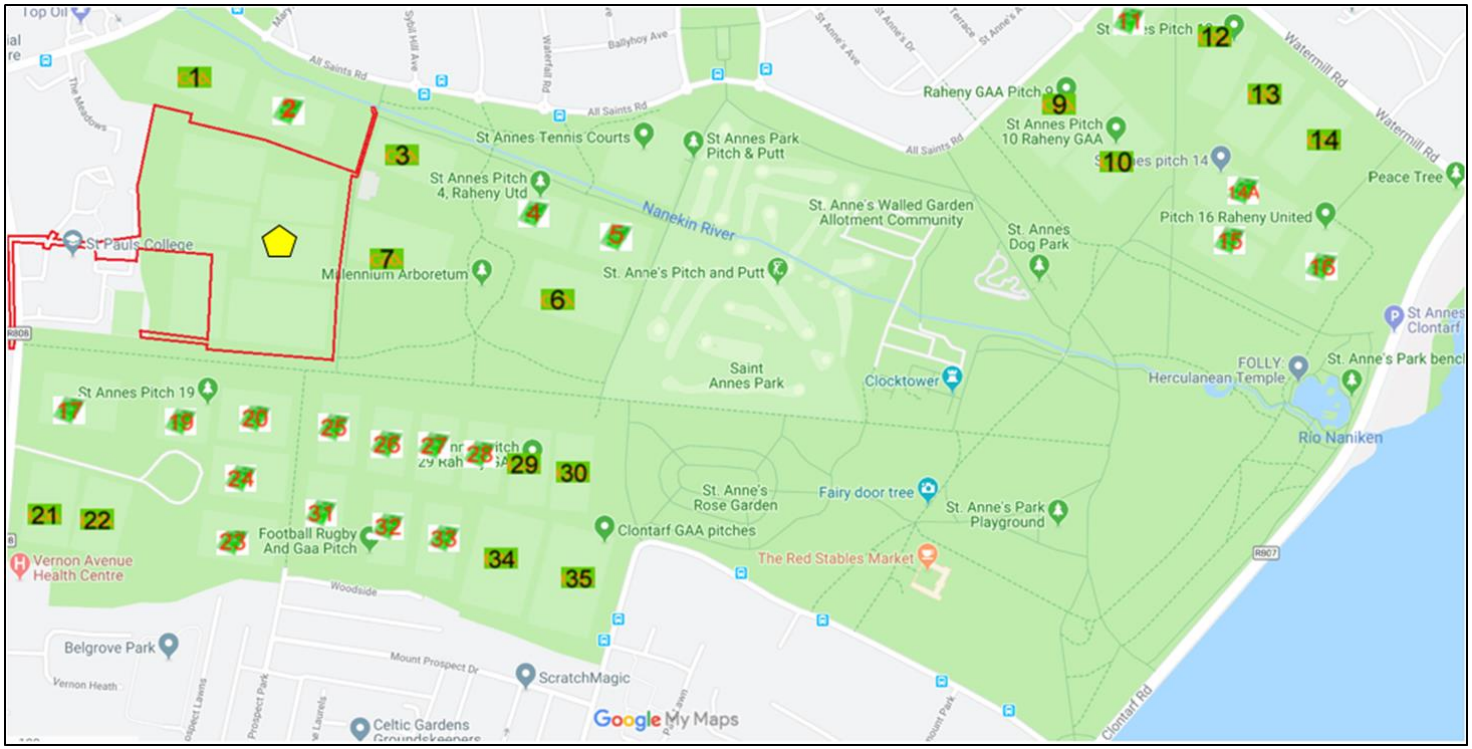

Figure 4-4: St Anne's Park Sport Facilities (the site boundary delineated in black)

1 GAA Pitch 1	14A Soccer Pitch 14A	20 Soccer Pitch 20	27 Soccer Pitch 27	21 GAA Pitch 21	35 GAA Pitch 35
2 Soccer Pitch 2	15 Soccer Pitch 15	24 Soccer Pitch 24	28 Soccer Pitch 28	22 GAA Pitch 22	9 GAA Pitch 9
3 GAA Pitch 3	16 Soccer itch 16	23 Soccer Pitch 23	31 Soccer Pitch 31	7 GAA Pitch 7	10 GAA Pitch 10
4 Soccer Pitch 4	17 Soccer Pitch 17	25 Soccer Pitch 25	32 Soccer Pitch 32	6 GAA Pitch 6	12 GAA Pitch 12
5 Soccer Pitch 5	19 Soccer Pitch 19	26 Soccer Pitch 26	33 Soccer Pitch 33	29 GAA Pitch 29	13 GAA Pitch 13
11 Soccer Pitch 11				30 GAA Pitch 30	14 GAA Pitch 14
				34 GAA Pitch 34	

The Proposed Development is in close proximity to the seafront, with a promenade running continuously from Alfie Byrne Road (R834) in Fairview, to Sutton Cross along the landward side of North Bull Island. The seafront is highly popular with runners, walkers, and cyclists.

Raheny has a strong network of community groups and clubs, which are voluntary groups. These local community groups include the Raheny Heritage Society, Tidy Village Group, Raheny Drama and Variety Group, Raheny Toastmasters, Raheny St John Ambulance Division, Raheny Order of Malta Unit, Raheny Community First Responders and some church-related groups, such as the local conference of the Society of St Vincent de Paul.

With a strong sense of community in the nearby Clontarf area, there is a wide variety of community groups that are extremely active including Foroige Youth Club, Clontarf Hockey Club, Coast Road Runners, Clontarf Parish Tennis Club, St. Paul's Karate Club, Clontarf Junior Swimming Club, Metropolitan School of Dance and various Baby Toddler Playgroups,

The St Anne's Residents' Association (**SARA**), operates a community hall on All Saints' Drive, while the Grange Woodbine Association has hall facilities on Station Road. Clontarf Residents' Association is located in Clontarf East.

Raheny and Clontarf has various girl guides and scout organisations including Raheny Scout Group and Raheny Guides, (also known as Buion An Leanbh Prague of the Catholic Guides of Ireland).

Clontarf has a longstanding Clontarf Scout Troop which was established in 1931. Clontarf also has two Boys' Brigade companies, and a Girls' Brigade companyattached to Clontarf & Scots Presbyterian Church.

The community library based in Raheny assists and facilitates several other groups in the area including conversation exchange group (where people can practice language skills with native speakers through conversation), creative writers' group, adult book club, film club, GIY (Grow it Yourself) Group, knitting circle and a Whist group. Children's activities include a children's book club, children's creative writing group and a toddler group.

The library also provides a range of useful facilities to the local residents. The nearby Marino Library also offers these services.

4.4.3 *Landscape and Visual*

The Site comprises open relatively flat rough grassland field located to the north and east of the sportsground at St Paul's College. While the area appears relatively flat, there is a slight fall of around 4m from north-west to south-east The western boundary of the Site is enclosed in part by the sports grounds / floodlit pitch of St Paul's College, and in part by the eastern rear boundary wall of Sybil Hill House and in part by the rear boundary wall at 'The Meadows' residential estate.

While St Anne's Park lies to the north, east and south of the Site, it is physically and visually separated from St Anne's Park by boundary fencing and dense tree planting. To the north and east the boundary fence is backed by a belt of semi-mature planting located within St Anne's Park. The planting is dense and effectively screens out views between the Site and the Park.

The southern boundary with St Anne's Park runs contiguous with part of the distinctive Holm Oak and Pine tree-lined Avenue. While views are focused and aligned along the Avenue and its enclosure of mature trees, passing glimpsed views of the Site are available under, and occasionally between, the canopies of the evergreen trees.

The boundary between St Paul's College and Sybil Hill House is partly defined by a semi-mature line of cherry trees. A 'Ha-Ha' style feature in the lawn defines a more distinct boundary in the landscape, as do groups of mature trees to the south and west of Sybil Hill House.

'Ardilaun Court' recently completed residential development, lies to the immediate north of Sybil Hill House and to the west of 'The Meadows' residential estate.

As noted, the Site of the Proposed Development comprises an open relatively flat rough grassland field. In the north-west of the Site a stand of 20 no. mature trees form a prominent feature to the east / rear of 'The Meadows' residential estate. The Arboricultural Assessment Report, which accompanies this planning application indicates that the trees are predominantly sycamore and pine, with some horse chestnut and lime. The majority of the trees are in poor condition and 7 no. are recommended for removal, due to their very poor condition.

The significant regional amenity and conservation area of St Anne's Park encircles the site to the immediate north, east and south. The Park includes a distinctive tree-lined Avenue located directly south of the Site, as well as a variety of open spaces enclosed by mature tree belts and laid out to sports pitches. Some of the pitches are floodlit and a new all-weather facility has been installed to the north of the Park. A Millennium Arboretum plantation is located immediately east of the site and north of the Avenue. The central core of the Park, including the Rose Garden, the Red Stables and the playground are all located c. 500m to the east of the Site.

Residential estates, including at All Saints' Road, Howth Road, Furry Park, Vernon, and Mount Pleasant lie to the immediate north, west and south of St Anne's Park / Sybil Hill Road. The prominent multi-storey nursing home / Convent of the Little Sisters of the Poor is located immediately west of Sybil Hill Road.

4.4.4 *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.

Health is an essential resource for everyday life, a public good, and an asset for health and human development. A healthy population is a major asset for society and improving the health and wellbeing of the nation is a priority for the Government. The Healthy Ireland Framework 2013-2025 is a collective response to the risks that threaten Ireland's future health and wellbeing.

Table 4-12: Health Status of the Clontarf LEA

Health Status of Clontarf LEA	Very good	Good	Fair	Bad	Very bad	Not stated
Total Number of People	33,651	14,123	4,375	724	164	1,391
Total Percentage of People	61.8	25.9	8.0	1.3	0.3	2.6

Table 4-12 above shows that most people in the Clontarf LEA (87.7%) have self-identified themselves in the 2016 Census as having 'very good health' or 'good health'.

4.5 Potential Impacts of the Proposed Development

4.5.1 *Population & Settlement Patterns*

4.5.1.1 *Population and Demographic*

There will be no impact on the demographic profile during the Construction Phase.

During the Operational Phase of the Proposed Development, the demographic profile will change with additional people moving into the locality. The Proposed Development will have a positive effect in terms of maintaining a sustainable age profile, slight in terms of significant and permanent in duration.

4.5.1.2 *Population and Age*

The changing demographic profile during the Operational Phase of the Proposed Development is likely to ensure a balanced age profile within the local area. The Proposed Development will have a positive effect in terms of changing age profile, permanent in duration and imperceptible in significance.

4.5.2 *Socio Economic*

4.5.2.1 *Economic Activity & Employment*

During the Construction Phase, the Proposed Development will have a short-term positive effect in terms generating economic activity. It is anticipated that up to 300 no. construction personnel will be employed either directly or indirectly during the Construction Phase which is anticipated to extend over a period of approximately 48 months

During the Operational Phase, the Proposed Development will have a slight positive long-term impact. The Proposed Development will result in the creation of 24 no. permanent crèche staff members, 1-2 no. permanent apartment building management jobs and other associated jobs such as gardening and window cleaning, with spin-off economic activity created for local retail and service providers.

4.5.2.2 *Travel and Commuting*

During the Construction Phase there will be some traffic impacts on the receiving environment by virtue of the works related traffic. Measures to address these impacts are detailed in the Construction Environmental Management Plan (CEMP) and they will be slight and short-term.

During the Operational Phase of the Proposed Development there are likely to be some impacts on the receiving environment, though it is anticipated that these will be not significant in an existing suburban environment. It will provide additional people to sustain the public transport network. The impact due to the increase in number and potentially travelling and commuting will be not significant, with a neutral long-term effect. Detailed information on the Traffic impact of the proposed development is included in Chapter 12 Material Assets: Traffic, Waste and Utilities.

4.5.2.3 *Community and Amenities*

All of the local amenities referenced in Section 4.4.2.3 above will remain in place during the Construction and Operational Phase of the Proposed Development. Furthermore, the potential viability of these amenities going forward will be strengthened from the increased population of the area. Therefore, the effects on community and amenities is deemed to be slightly positive or neutral in the long-term.

4.5.3 *Landscape and Visual*

Impacts on the visual amenity of the surrounding area are fully addressed in Chapter 10 Landscape and Visual of this EIAR.

During the Construction Phase, general construction, disturbance and site development has the potential to result significant temporary and short-term negative landscape and visual impact on sensitive properties of Sybil Hill House, 'The Meadows' residential estate and St Paul's College.

The Proposed Development is well-screened by mature plantings within St Anne's Park and overlooked by a limited number of properties (St Paul's College, Sybil Hill House and 'The Meadows' residential estate) Therefore, during the Operational Phase, the landscape or visual impacts arising from the Proposed Development will be not significant.

In landscape and visual terms the Site is noticeably enclosed by the mature trees and woodlands of St Anne's Park and as such there is limited potential for cumulative landscape or visual impacts with other planned developments.

4.5.4 *Human Health*

4.5.4.1 *Construction Phase Impacts*

The Proposed Development is likely to give rise to a short-term direct negative impact on the surrounding settlements during the Construction Phase. This will be a short-term significant effect on a localised scale and is further discussed in Chapter 8 (Air Quality) Chapter 9 (Noise and Vibration) and Chapter 10 (Landscape and Visual Amenity) of this EIAR.

The Construction Phase will result in an element of noise, mobility of heavy vehicles, dust and the arrival and departure of construction workers into the area. This impact will be negative, short-term, significant and localised.

4.5.4.2 *Operational Phase Impacts*

The changes in the area will have a positive impact in terms of changing the age profile and increasing the longevity of local schools that have been adjusting to an aging demographic profile over the last few decades. The Proposed Development will create a modern living environment adjacent to St Anne's Park and close to a wide range of amenities within easy commuting distance of the City Centre providing locally positive health benefits to its residents.

4.5.5 *Potential Cumulative Impacts*

4.5.5.1 *Other Residential Development*

The potential cumulative impacts of the Proposed Development on population and human health have been considered in conjunction with the ongoing changes in the surrounding area, in particular the construction and eventual occupation of the permitted residential development located on Sybil Hill Road, to the west of the application Proposed Development (The 'Ardilaun Court' development).

The cumulative impact of the Proposed Development will be an increase in the population. Assuming an occupancy rate of 2 no. persons per unit, the cumulative increase in population will be 1,314 no. people. The 'Ardilaun Court' development when operational will add an additional 150 no. persons, again assuming occupancy rate of 2 no. persons per unit.

This cumulative impact will be not significant, given that the Proposed Development is deemed to have a not significant long-term impact and the size of the 'Ardilaun Court' development is small in nature, but will have a long-term, positive effect, having regard to the strategic location in close proximity to high quality public transport, and the high demand for new housing in the metropolitan area.

With regard to human health, the cumulative impact of the Proposed Development in conjunction with the 'Ardilaun Court' development will include the provision of a high quality and sizeable new neighbourhood which will include the provision of a large quantum of green space (including areas for active and passive recreation). The overall cumulative impact of the Proposed Development will therefore be insignificant, with a long-term, positive effect with regards to human health, as residents will benefit from a high quality, visually attractive living environment, with ample opportunity for active and passive recreation and strong links and pedestrian permeability, with a direct link to high quality, high frequency public transport nodes.

4.5.5.2 *Biodiversity*

Light Bellied Brent Geese are one of the Species of Conservation Interest (**SCI**) assessed in the Biodiversity Chapter of this EIAR and the NIS submitted as part of this application the following is noted in relation to the impacts on human health; A recent empirical scientific /

medical study on the potential for disease transfer by Light Bellied Brent Geese in Dublin Bay[5] has concluded that these birds could pose a threat to human health, as explained:

> *'Wild birds are increasingly being studied as vectors for the transmission of resistant bacteria and the resistance genes they harbour. The East Canadian High Arctic (ECHA) light-bellied Brent goose (Branta bernicla hrota) undertakes one of the longest migrations of any Palaearctic goose species, migrating annually from their breeding grounds in the high Canadian Arctic to Ireland in winter. Their preferred food is the intertidal marine grass (Zostera spp), but this resource becomes exhausted in mid to late winter and the birds switch to feeding on terrestrial grasses. In many parts of their range this brings them into close contact with humans as in urban areas these terrestrial grasses tend to be found in public parks and sports grounds. In this study we aimed to investigate the prevalence of clinically relevant antimicrobial resistant Gram-negative enteric bacteria carried among this population of Brent geese during their winter staging on the east coast of Ireland… Perhaps, the greatest zoonotic potential the birds sampled in this research present may be through their use of amenity grasslands. Faecal shedding of resistant bacteria and the persistence of such organisms in the environment may pose a health threat to humans. A study by Benson identified 60 inland sites used by light-bellied Brent geese as winter feeding grounds in Dublin, these include playing pitches, public parks, golf clubs and municipal green spaces in densely populated areas. The large amount of faeces resulting from congregating flocks on amenity grassland could present a possible health risk.'*

The research paper concluded:

> *'To our knowledge this is the first record of AMR (Anti-microbial Resistant) bacteria isolated from long distance migratory ECHA light-bellied Brent geese. This indicates that this species may act as reservoirs and potential disseminators of resistance genes into remote natural ecosystems across their migratory range. This population of geese frequently forage (and defecate) on public amenity areas during the winter months presenting a potential human health risk.'*

With the increase of goose flocks on both sides of the Atlantic (non-migratory geese in the eastern USA/Canada states), the potential for human health risk due to the evercloser cohabitation between geese and humans in urban settings has become a focus of studies. Other international studies have found that geese flocks in urban areas foraging on parks and playing fields pose a particular threat to young children who have immature immune systems. Routes of transfer can be through contact, by hand, soiled clothes, by air and via cuts and abrasions. Geese are therefore, moved off parklands used by the public, such as Boston Common, in the interests of public safety and amenity.

Dublin Bay is polluted with discharges from the Ringsend Wastewater Treatment Plant (**WWTP**) recorded in 2019 in a shallow bay that is not well scoured by wind and wave action. Migratory birds roosting there become vehicles for transfer of pathogens onto open spaces

[5] Insights into antimicrobial resistance among long distance migratory East Canadian High Arctic light-bellied Brent geese (Branta bernicla hrota); Austin Agnew et al; Irish Veterinary Journal, 2016.

that surround the Bay, in their digestion, on their plumage and on their feet and also by any infections that they may be carrying.

The new information indicates that it is hazardous to human health and particularly to children's health to have natural grass open space in new residential areas within the foraging range of large flocks of Brent Geese and other migratory species roosting within the Dublin Bay Special Protection Area (**SPA**).

Extensive areas of public parkland with a management regime suitable for controlled and safe foraging for migratory birds exist in adjoining parklands.

4.5.6 *''Do-Nothing'' Impact*

A do-nothing scenario would result in the site remaining undeveloped. If the Proposed Development were not to proceed there would be no immediate impact on the existing population, or economic activity for residents living in the area. However, due to the size of the site of the Proposed Development it is considered that the housing targets for the settlement set out in the DCDP could not be achieved.

If the lands were to remain undeveloped, this would be an under-utilisation of zoned and serviceable urban lands from a sustainable planning and development perspective, particularly considering the location of the lands. A failure to deliver the Proposed Development would result in a growing need for additional residential units within the Dublin Metropolitan Area not being met, with implications for use of greenfield lands more remote from the City centre and from established services in the transport, education, social and commercial sectors.

4.6 Avoidance, Remedial & Mitigation Measures

4.6.1 *Construction Phase*

During the Construction Phase a number of mitigating measures should be considered.

- Maintain a Construction Environment Management Plan (**CEMP**) in effect for duration of works;
- Restrict working hours from 07:00 to 18:00; Monday to Friday and from 08:00 to 14;00 on Saturdays. No general works are envisaged to be carried out on Sundays. Should there be a need to work Sundays/Bank Holidays, a written request will be made to DCC for permission to do so. This may be required for tower crane erection and removal. Any conditions from DCC relating to out of hours working will be followed including any required notifications to relevant parties.
- Maintain a Traffic Management Plan (**TMP**) in effect for duration of works;
- Schedule arrivals and departures of vehicles to the Site, where practical, so that they do not coincide with times when children are entering and leaving the nearby schools;
- Where practical restrict Heavy Goods Vehicles (**HGVs**) to outside the period where school children are entering or leaving the schools and their environs;

- The CEMP will be agreed with the Planning Authority upon receipt of planning permission. The construction of the Proposed Development shall adhere to the relevant provisions of this Plan; and

- As part of the CEMP, maintain a Dust and Noise abatement plan in operation.

4.6.2 *Operational Phase*

No likely significant impacts have been identified for population, or land use, accordingly no mitigation measures are required for the Operational Phase.

The Proposed Development has been designed to avoid significant impacts in relation to local amenities and recreational facilities by:

- Incorporating the provision of a crèche within the design proposal;
- Not obstructing the extensive leisure and amenity facilities within the layout of St Anne's Park which includes multiple sport pitches; and
- The provision of c. 1.6ha area of public open space to be offered for taking-in-charge to DCC.

Accordingly, no further mitigation measures are required.

4.6.3 '*Worst-Case' Scenario*

The worst-case scenario where mitigation measures fail for the Proposed Development, it is considered that localised nuisances such as noise or dust may arise. Traffic impacts and delays may also be caused during the Construction Phase. This is considered highly unlikely and indeterminable.

4.6.3.1 *Impact Categorisation*

An Impact Categorisation Summary is presented in Table 4-13 below.

Table 4-13: Impact Categorisation Summary

Nature of Impact	Impact Level	Significance Criteria	Mitigation
Construction noise, dust and movement of heavy construction vehicles and additional traffic due to construction workers	The impact will be on the local schools, some residents and the nursing home.	This will be only significant at specific times of the day and year. Moderate impact. Short term, negative effect.	CEMP in place.
Additional people in the area both for the Construction Phase and Operational Phase	Increase in the movement of people around the times of	Slight to moderate. Can be positive for local economic activity.	CEMP in place.

Nature of Impact	Impact Level	Significance Criteria	Mitigation
	school opening and peak traffic times		
Pressure on existing community facilities	With the changing demographic profile this influx of people during the Operational Phase of the Proposed Development, it is likely community facilities remain sustainable rather than add additional pressure on them.	Positive effect on most community facilities.	N/A

4.7 Residual Impacts

The Proposed Development will bring an increase in population to the area. This population will support existing schools, shops, public transport and the local community. Additional facilities such as the crèche will be provided as part of the Proposed Development. It is considered that there will be a moderate impact on population and human health, but with an overall long-term, positive effect. No long-term, negative environmental effects are envisaged.

4.8 Monitoring

It is considered that monitoring measures are not required.

A full traffic assessment has been completed as part of Chapter 12 (Material Assets) and a Noise Impact Assessment as part of Chapter 9 (Noise and Vibration). Please refer to these specific Chapters for any proposed monitoring.

4.8.1 *Construction Phase*

Monitoring is proposed for the Construction Phase in accordance with the CEMP submitted with the planning application.

4.8.2 *Operational Phase*

No additional monitoring is proposed for the Operational Phase other than that proposed in other Chapters of this EIAR.

4.9 Reinstatement

It is not considered that reinstatement works are required.

4.9.1 *Construction Phase*

It is not considered that reinstatement works are required during the Construction Phase.

4.9.2 *Operational Phase*

It is not considered that reinstatement works are required during the Operational Phase.

4.10 Interactions

As noted above, there are numerous inter-related environmental topics described in detail throughout this EIAR which are of relevance to human health. During the Construction Phase noise, air, traffic and consumption of materials will be the key environmental factors that will have an impact on population and human health.

During the Operational Phase it is anticipated that water and traffic will be the key environmental factors impacting upon population and human health during the Operational Phase as a new suburban landscape will be created.The increase in population will result in increased traffic and increased demands on water supply increased requirements for wastewater treatment. These are addressed in the appropriate sections of this EIAR.

4.10.1 *Chapter 5 Biodiversity*

It is predicted that the Proposed Development will have a beneficial interaction with biodiversity, with a positive effect arising from the Proposed Development public open space area.

4.10.2 *Chapter 8 Air Quality*

The interaction with air, during both the Construction and Operational Phases, has the potential to cause health and dust nuisance issues, in addition to pedestrian discomfort. However, the mitigation measures that will be put in place, at the Proposed Development Site will ensure that the impacts and their effects comply with all ambient air quality legislative limits and therefore the predicted impact is not significant with a neutral effect on human health.

4.10.3 *Chapter 9 Noise & Vibration*

The interaction with Noise & Vibration show that the increased noise levels during the Construction Phase will have a temporary short-term negative effect but are not predicted to have any long-term, negative effect upon the local population. Construction Phase noise will be audible at a low level above the ambient noise. The impact due to the increased traffic associated with the Operational Phase is predicted to have an insignificant impact on the surrounding noise environment. The overall Operational Phase noise and vibration impact is determined to be neutral, long-term and not significant.

During the Construction Phase involving site clearance and building construction works, the assessment has determined that the construction noise criteria can be complied with at the nearest sensitive properties. There is potential for elevated levels of noise within St Paul's College (Secondary School) during demolition works of the pre-fab building within the grounds.

A schedule of noise mitigation measures including co-ordination of working hours in agreement with the School, noise limits and screening will all be employed to ensure any noise and vibration impacts during the Construction Phase will not exceed the recommended limit values.

During the Operational Phase the outward noise impact to the surrounding environment will be limited to any additional traffic on surrounding roads. The impact assessment has concluded that additional traffic from the Proposed Development during the Construction Phase will a moderate impact, with a short-term, slight effect. The Operational Phase noise and vibration impact is not significant with a neutral effect.

4.10.4 *Chapter 12 Materials Assets*

The proposed pedestrian links between the Proposed Development and St Anne's Park will have a significant impact with a long-term positive effect, regarding reduced walking and cycling travel times to public transport services and improved permeability and connectivity to amenities in St Anne's Park.

4.11 Difficulties Encountered in Compiling

No difficulties were encountered when compiling this Chapter.

4.12 References

- Central Statistics Office www.cso.ie
- Dublin City Development Plan (DCDP) 2016–2022
- Local Electoral Area Boundary Committee No. 2 Report 2018, Ordnance Survey Ireland
- Healthy Ireland Framework 2013-2025
- National Planning Framework, Project Ireland 2040 http://npf.ie/
- Ordinance Survey Ireland (OSI) mapping https://www.osi.ie/

5 BIODIVERSITY

5.1 Introduction

This Chapter describes the ecology of the site of the Proposed Development and its zone of influence, with emphasis on habitats, flora and fauna and outlines the methodology of assessment. The Proposed Development located in the northern suburbs of Dublin City, c. 5km from the city centre, in an established residential area. The site of the Proposed Development is located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School) and Sybil Hill House (a protected structure), in Raheny, Dublin 5. The R808 Sybil Hill Road runs north-south connecting the R105 Howth Road (north of the Proposed Development) with the R807 Clontarf Road (to the south).

It provides an assessment of the impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation or considered to be of particular conservation importance, and proposes measures for the mitigation of these impacts, where appropriate.

The Chapter has been completed having regard to the *Guidelines for Ecological Impact Assessment in the UK and Ireland*, by the Chartered Institute of Ecology and Environmental Management (**CIEEM**, 2018), and the National Roads Authority's (**NRA**) *Ecological Assessment Guidelines* (NRA, 2009) together with the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

5.1.1 *Quality Assurance and Competence*

All surveying and reporting have been carried out by qualified and experienced ecologists and environmental consultants. Donnacha Woods, Project Ecologist with Enviroguide, undertook the on-site surveys and desktop research for this report. Donnacha has a M.Sc. (Biodiversity and Conservation) from Trinity College, and over 6 years' experience as an ecologist and is an Associate member of CIEEM. He has worked on a wide range of conservation, research and ecological monitoring projects across several different countries.

Muriel Ennis, Principal Environmental Consultant, has a M.Sc. in Ecosystem Conservation and Landscape Management and over 10 years' experience as an Environmental / Ecology Consultant. She has worked on a range of projects from Strategic Flood Studies to residential developments.

5.2 Study Methodology

This section details the steps and methodology employed to undertake the ecological impact assessment of the Proposed Development.

5.2.1 *Desk study*

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the site's natural environment. The desk study, completed in July 2019, relied on the following sources:

- Information on species records[6] and distributions, obtained from the National Biodiversity Data Centre (**NBDC**) at *maps.biodiversityireland.ie*;
- Information on waterbodies, catchment areas and hydrological connections obtained from the Environmental Protection Agency (**EPA**) at *gis.epa.ie*;
- Information on bedrock, groundwater, aquifers and their statuses, obtained from Geological Survey Ireland (**GSI**) at *www.gsi.ie*;
- Information on the network designated conservation sites, site boundaries, qualifying interests and conservation objectives, obtained from the National Parks and Wildlife Service (**NPWS**) at *www.npws.ie*;
- Satellite imagery and mapping obtained from various sources and dates including Google, Digital Globe, Bing and Ordinance Survey Ireland;
- Information on the existence of permitted development, or developments awaiting decision, in the vicinity of the Proposed Development from Dublin City Council, available at *www.dublincity.ie*; Fingal County Council www.fingalcoco.ie and An Bord Pleanála www.pleanala.ie
- Information on the extent, nature and location of the Proposed Development, provided by the applicant and/or their design team;
- Information on the construction methods to be followed as part of the Proposed Development, taken from the Construction Environment Management Plan (**CEMP**) submitted with this application;
- Information on the potential for flood events at the site of the Proposed Development, informed by the Flood Risk Assessment submitted with this application;
- Information on the use of *ex-situ*[7] inland feeding sites in Dublin by Light-bellied Brent Geese for the seasons 2012/13, 2013/14, 2014/15 2015/16 and 2017/taken from data provided in Scott Cawley Ltd. (2017a);
- Information on the use of *ex-situ* inland feeding sites in Dublin by Light-bellied Brent Geese taken from data provided in Benson (2009);
- Information on the use of *ex-situ* inland feeding sites in Dublin by Light-bellied Brent Geese taken from data provided by Crekav Trading Ltd. for wintering bird surveys completed by Scott Cawley Ltd. in 2015/16 and 2016/17 in respect of a previous Strategic Housing Development application at the site of the Proposed Development;
- Information on the usage of St Paul's by Light-bellied Brent Geese, Curlew, Black-headed Gull, Black-tailed Godwit and Oystercatcher taken from data provided by Crekav Trading Ltd. for wintering bird surveys completed by Scott Cawley Ltd. in 2015/16 and 2016/17 in respect of a previous Strategic Housing Development application at the site of the Proposed Development;

[6] The proposed development site lies within the 10km grid square O23, the 2km grid square O23D and the 1km grid square O2037. Records from the last 30 years from available datasets are given in the relevant sections of this report.

[7] The term 'ex-situ' refers to sites that are used by species of Conservation Interest for a particular Natura 2000 site but is located outside the boundary of that site.

- Information on the usage of four *ex-situ* inland feeding sites (DCC Brent Field, Sean Moore Park, Irishtown Stadium and Irishtown Park) during the 2014/15 winter season taken from data provided in Mayes (2015);
- The applicable 1% international population estimate figures for relevant SCI species taken from Wetlands International (2012);
- The applicable 1% national population estimate figures for relevant Species of Conservation Interest (**SCI**) species taken from Burke *et al.* (2018); and
- Data on the usage of coastal sites in Dublin by Light-bellied Brent Geese from the Irish Wetland Bird Survey (**I-WeBS**), a scheme that is funded by the National Parks and Wildlife Service of the Department of Culture, Heritage & the Gaeltacht and that is co-ordinated by BirdWatch Ireland.

A comprehensive list of all the specific documents and information sources consulted in the completion of this Chapter is provided in Section 5.15.

5.2.2 *Field Surveys*

A comprehensive suite of ecological surveys has been carried out at the site of the Proposed Development between 2015 and 2019.

Surveys for 2018 and 2019 were undertaken by Enviroguide Consulting (**EG**), the authors of this report. Surveys carried out from 2015 to 2017 were undertaken by Scott Cawley (**SC**) Ltd. in respect to a previous strategic housing development application at the Site (Planning Reference: 300559-18).

5.2.2.1 *Habitat Surveying and Mapping*

Three 3 (no.) habitat surveys were conducted at the site of the Proposed Development on the 18th May 2015, 6th July 2017 and 14th May 2019.

Habitats were categorised according to the Heritage Council's '*A Guide to Habitats in Ireland'* (Fossitt, 2000) to level 3. The habitat mapping exercise had regard to the *'Best Practice Guidance for Habitat Survey and Mapping*' (Smith *et al.*, 2010) published by the Heritage Council. Aerial photography was used together with GPS to accurately enable field navigation. Habitat categories, characteristic plant species and other ecological features and resources were recorded on field sheets.

5.2.2.2 *Bat Surveys*

A comprehensive suite of bat surveys has been completed as part of this assessment, as detailed in the following sections.

5.2.2.2.1 *Roost Inspection Surveys*

Three 3 (no.) bat roost inspection surveys were carried out on the 30th September 2015, 6th July 2017 and 16th May 2019. Survey methodology followed the best-practice techniques outlined in the Bat Conservation Trusts "*Bat Surveys for Professional Ecologists*" (3rd edition, 2016) guidelines. The buildings within the site of the Proposed Development, including the existing pre-fab building scheduled for demolition as part of the Proposed Development, were

systematically inspected both externally and internally for any signs of roosting bats. This included searches for live/dead specimens, droppings, urine splashes and fur-oil stains.

Mature trees located within the site of the Proposed Development were also inspected from ground-level for their suitability to support roosting bats.

5.2.2.2.2 *Activity Surveys*

A total of eight 8 (no.) bat activity surveys have been carried out at the site of the Proposed Development by SC and EG between 2015 and 2019. The dates and timing (dusk/dawn) of these surveys are outlined below.

- 16th May 2019 (*dusk*) (EG);
- 15th May 2019 (*dusk*) (EG);
- 6th June 2017 (*dusk*) (SC);
- 24th May 2017 (*dusk*) (SC);
- 25th June 2016 (*dawn*) (SC);
- 24th June 2016 (*dusk*) (SC);
- 26th May 2015 (*dawn*) (SC); and
- 25th May 2015 (*dusk*) (SC).

Survey methodology followed the best-practice techniques outlined in the Bat Conservation Trusts "*Bat Surveys for Professional Ecologists*" Good Practice Guidelines (3rd edition, 2016) guidelines. Post-sunset (dusk) activity surveys were commenced approximately 15 minutes before sunset and lasted until approximately 1.5 – 2 hours after sunset. Pre-dawn surveys were commenced approximately 1.5 – 2 hours before sunrise and lasted until approximately 15 minutes after sunrise.

5.2.2.2.3 *Emergence Survey*

A bat emergence survey was carried out at the existing pre-fab building structure to be demolished as part of the Proposed Development on 16th May 2019. The survey began approximately 15 minutes before sunset and lasted until approximately 1.5 hours after sunset. A *SSF Bat2* heterodyne bat detector was used to detect any bats emerging from the structure during the survey. The details of all records (frequency, time, location) were recorded on field sheets and 1:250 field map.

5.2.2.3 ***Breeding Bird Surveys***

Breeding Bird Surveys were undertaken on three 3 (no.) days between March and May 2019. The survey methodology follows the British Trust for Ornithology's (**BTO**) *Common Bird Census* (**CBS**) technique (Bibby *et al.*, 1992). A pre-determined transect is walked and all bird species encountered are recorded on field sheets, along with the corresponding breeding evidence code (see Appendix 5-3), location (on 1:500 field maps), behaviour and numbers.

Breeding bird surveys for previous seasons were undertaken on 25th June 2016, 28th June 2017 and 30th May 2017.

5.2.2.4 *Wintering Bird Surveys*

A comprehensive suite of wintering bird surveys (**WBS**) has been undertaken in relation to the Proposed Development between 2015 and 2019. Surveys carried out for the 2015/16 and 2016/17 winter seasons were completed by SC, in respect of a previous planning application at the site of the Proposed Development. Surveys for the 2018/19 winter season were undertaken by EG, the authors of this report. The methodology for these surveys is set out in detail in the NIS submitted as a separate document with this planning application.

Surveys were carried out during a series of visits at the Site during each survey season with shorebird and wildfowl species recorded in relation to their location (on 1:500 field maps), behaviour and numbers.

5.2.2.5 *Mammal Surveys*

Three 3 (no.) walkover mammal surveys were undertaken at the site of the Proposed Development on the 7th March 2019, 12th March 2019 and 14th May 2019. In addition, any signs of mammal presence were recorded, where relevant, during other ecological surveys undertaken at the site of the Proposed Development between 2015 and 2019.

The site of the Proposed Development was searched for tracks and signs of mammals. The habitat types recorded throughout the survey area were used to assist in identifying the fauna considered likely to utilise the area. During these surveys, the Site was searched for tracks and signs of mammals as per Bang and Dahlstrom (2001).

5.2.2.6 *Other Fauna*

One 1 (no.) day-time amphibian survey was undertaken at the site of the Proposed Development and immediate surrounding area on 7th March 2019.

During all surveys at the site of the Proposed Development, other species of fauna were noted, and these are included in the report where applicable.

5.2.3 *Assessment*

The value of the ecological resources, the habitats and species present or potentially present, was determined using the ecological evaluation guidance given in the National Roads Authority's (**NRA**) Ecological Assessment Guidelines (NRA, 2009). This evaluation scheme, with values ranging from locally important to internationally important, seeks to provide value ratings for habitats and species present that are considered ecological receptors of impacts that may ensue from a proposal. The NRA Guidelines (2009) define key ecological receptors (**KERs**) as those ecological features which are evaluated as Locally Important (higher value) or higher, that are likely to be impacted significantly by the Proposed Development. Internationally important receptors would include Special Areas of Conservation (**SAC**) or Special Protected Areas (**SPA**) while those of national importance would include Natural Heritage Areas (**NHA**).

This evaluation scheme has been adapted here to assess the value of habitats and fauna within the site of the Proposed Development. The value of habitats is assessed based on the condition, size, rarity, conservation and legal status. The value of fauna is assessed on its

biodiversity value, legal status and conservation status. Biodiversity value is based on its national distribution, abundance or rarity, and associated trends.

Using the evaluation criteria as described above, some of the habitats and species identified as being present were assessed. Any of those selected that were evaluated as being of Local Importance (higher value) and higher in this study were selected as KERs and then the impact significance on each of these receptors was assessed.

5.2.3.1 *Value of Ecological Resources*

The ecological features identified within the site of the Proposed Development and wider area are evaluated based on their value. These values are detailed in Table 5-1 below and are taken from the Guidelines for Assessment of Ecological Impacts of National Road Schemes published by the National Roads Authority (NRA), now Transport Infrastructure Ireland (**TII**).

Table 5-1: Description of values for ecological resources based on geographic hierarchy of importance (NRA, 2009b)

Importance	Criteria
International Importance	- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. - Proposed Special Protection Area (pSPA). - Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). - Features essential to maintaining the coherence of the Natura 2000 Network - Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. - Resident or regularly occurring populations (assessed to be important at the national level) of the following: o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive - Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). - World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). - Biosphere Reserve (UNESCO Man & The Biosphere Programme) - Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). - Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). - Biogenetic Reserve under the Council of Europe. - European Diploma Site under the Council of Europe. - Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance	- Site designated or proposed as a Natural Heritage Area (NHA). - Statutory Nature Reserve. - Refuge for Fauna and Flora protected under the Wildlife Acts. - National Park. - Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.

Importance	Criteria
	- Resident or regularly occurring populations (assessed to be important at the national level) of the following: o Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Sites containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive
County Importance	- Area of Special Amenity. - Area subject to a Tree Preservation Order. - Area of High Amenity, or equivalent, designated under the County Development Plan. - Resident or regularly occurring populations (assessed to be important at the County level) of the following: o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; o Species protected under the Wildlife Acts; and/or o Species listed on the relevant Red Data list. o Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. - County important populations of species; or viable areas of semi-natural habitats; or natural heritage features identified in the National or Local BAP; if this has been prepared. - Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. - Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value)	- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; - Resident or regularly occurring populations (assessed to be important at the Local level) of the following: o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; o Species protected under the Wildlife Acts; and/or o o Species listed on the relevant Red Data list. o Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; - Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value)	- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; - Sites or features containing non-native species that is of some importance in maintaining habitat links.

5.2.3.2 *Impact Assessment Criteria*

Once the value of the identified ecological receptors was determined, the next step was to assess the potential effect or impact of the Proposed Development on the identified KERs. This was carried out with regard to the criteria outlined in various impact assessment guidelines (NRA, 2009; CIEEM, 2018) that set down a number of parameters such as quality, magnitude, extent and duration that should be considered when determining which elements of the proposal could constitute impact or sources of impacts. Once impacts are defined, their significance was categorised using the Draft EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017).

Identification of a risk does not constitute a prediction that it will occur, or that it will create or cause significant impact. However, identification of the risk does mean that there is a possibility of ecological or environmental damage occurring, with the level and significance of the impact depending upon the nature and exposure to the risk and the characteristics of the ecological receptor.

5.2.3.2.1 *Criteria used to Define Quality of Effects*

In line with the Draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the quality of effects. See table 5-2, below.

Table 5-2: Definition of Quality of Effects

Quality	Definition
Positive Effects	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral 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 nuisance).

5.2.3.2.2 *Criteria used to Define Significance of Effects*

In line with the Draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts. See table 5-3 below.

Table 5-3: Definition of Significance of Effects

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Significance of Effects	Definition
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics

5.2.3.2.3 *Criteria Used to Define Duration of Effects*

In line with the Draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See table 5-4 below.

Table 5-4: Definition of Duration of Effects

Quality	Definition
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
Reversible Effects	Effects that can be undone, for example through remediation or restoration

5.3 Existing Receiving Environment (Baseline Situation)

5.3.1 *Site Overview*

The site of the Proposed Development is located to the east of St Paul's College (Secondary School) and is accessed via the R808 Sybil Hill Road, Raheny, Dublin 5. St Anne's Park borders the site to the north, east and south. The Site is bordered to the west by St Paul's College, Sybil Hill House (a protected structure) and some residential dwellings. The 4-storey Convent building / grounds of the Little Sisters of the Poor is located to the immediate west of Sybil Hill Road.

Dublin 5 and the wider local area are located within the *Dublin* groundwater body. The overall status (2010 -2015) of this waterbody is recorded as *Good*. The groundwater rock units underlying the area are classified as *Dinantian Upper Impure Limestones* and the sub-soil at

the site is classified as both *man-made* and *Limestone till (Carboniferous)*. The site of the Proposed Development is located on a *locally important* aquifer with groundwater vulnerability in the area listed as *Low*.

The site of the Proposed Development is located within the Mayne River sub-catchment (*Mayne_SC_010*) and the Santry sub-basin (*Santry_020)*. The Naniken Stream[8] (*EPA code: 09N04*) flows c. 100m to the north of the site of the Proposed Development, within St Anne's Park. The Naniken Stream flows easterly for *c*. 1.7km from where it exits the culvert under the Clontarf Road (R807), to where it enters the south lagoon at North Bull Island.

5.3.2 *Designated Sites*

5.3.2.1 *Site of International Importance*

Table 5-5 below presents details of the key ecological features of the Natura 2000 sites within 15km of the Proposed Development. Designated sites outside of this 15km radius were not assessed further, as they are either located a considerable physical distance inland, separated by a substantial marine buffer, and/or located within different surface water catchment zones to the Proposed Development.

Table 5-5: Natura 2000 sites located within 15km of the Site of the Proposed Development

Site Code	Site Name	Qualifying Interests	Distance to Site
Special Areas of Conservation (SAC)			
000206	North Dublin Bay SAC	- [1140] Tidal Mudflats and Sandflats - [1210] Annual Vegetation of Drift Lines - [1310] Salicornia Mud - [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows - [2110] Embryonic Shifting Dunes - [2120] Marram Dunes (White Dunes) - [2130] Fixed Dunes (Grey Dunes)* - [2190] Humid Dune Slacks - [1395] Petalwort (*Petalophyllum ralfsii*)	c.1.1km
000210	South Dublin Bay SAC	- [1140] Tidal Mudflats and Sandflats - [1210] Annual vegetation of drift lines - [1310] Salicornia and other annuals colonising mud and sand - [2110] Embryonic shifting dunes	3.51km
000199	Baldoyle Bay SAC	- [1140] Tidal Mudflats and Sandflats not covered by water at low tide. - [1310] *Salicornia* Mud	4.62km

[8] It should be noted that the terms Naniken River and Naniken Stream are interchangeable and for the purpose of this planning application and all supporting reports and documentation both names refer to the same waterbody.

Site Code	Site Name	Qualifying Interests	Distance to Site
		- [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows	
000202	Howth Head SAC	- [1230] Vegetated Sea Cliffs - [4030] Dry Heath	5.92km
003000	Rockabill to Dalkey Island SAC	- [1170] Reefs [1351] Harbour Porpoise (*Phocoena phocoena*)	6.57km
000205	Malahide Estuary SAC	- [1140] Tidal Mudflats and Sandflats - [1310] *Salicornia* Mud - [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows - [2120] Marram Dunes (White Dunes) - [2130] Fixed Dunes (Grey Dunes)*	7.78km
002193	Ireland's Eye SAC	- [1220] Perennial Vegetation of Stony Banks - [1230] Vegetated Sea Cliffs	8.54km
000208	Rogerstown Estuary SAC	- [1130] Estuaries - [1140] Tidal Mudflats and Sandflats - [1310] *Salicornia* Mud - [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows - [2120] Marram Dunes (White Dunes) - [2130] Fixed Dunes (Grey Dunes)*	13.48km
Special Protection Areas (SPA)			
004006	North Bull Island SPA	- [A046] Light-bellied Brent Goose (*Branta bernicla hrota*) [wintering] - [A048] Shelduck (*Tadorna tadorna*) [wintering] - [A052] Teal (*Anas crecca*) [wintering] - [A054] Pintail (*Anas acuta*) [wintering] - [A056] Shoveler (*Anas clypeata*) [wintering] - [A130] Oystercatcher (*Haematopus ostralegus*) [wintering] - [A140] Golden Plover (*Pluvialis apricaria*) [wintering] - [A141] Grey Plover (*Pluvialis squatarola*) [wintering] - [A143] Knot (Calidris canutus) [wintering] - [A144] Sanderling (*Calidris alba*) [wintering] - [A149] Dunlin (*Calidris alpina*) [wintering] - [A156] Black-tailed Godwit (*Limosa limosa*) [wintering] - [A157] Bar-tailed Godwit (*Limosa lapponica*) [wintering] - [A160] Curlew (*Numenius arquata*) [wintering] - [A162] Redshank (*Tringa totanus*) [wintering] - [A169] Turnstone (*Arenaria interpres*) [wintering] - [A179] Black-headed Gull (*Chroicocephalus ridibundus*) [wintering] - [A999] Wetland and Waterbirds	c.1.1km
004024	South Dublin Bay and River Tolka Estuary SPA	- [A046] Light-bellied Brent Goose (*Branta bernicla hrota*) [wintering]	1.36km

Site Code	Site Name	Qualifying Interests	Distance to Site
		- [A130] Oystercatcher (*Haematopus ostralegus*) [wintering] - [A137] Ringed Plover (*Charadrius hiaticula*) [wintering] - [A141] Grey Plover (*Pluvialis squatarola*) [wintering] - [A143] Knot (*Calidris canutus*) [wintering] - [A144] Sanderling (*Calidris alba*) [wintering] - [A149] Dunlin (*Calidris alpina*) [wintering] - [A157] Bar-tailed Godwit (*Limosa lapponica*) [wintering] - [A162] Redshank (*Tringa totanus*) [wintering] - [A179] Black-headed Gull (*Chroicocephalus ridibundus*) [wintering] - [A192] Roseate Tern (*Sterna dougallii*) [passage] - [A193] Common Tern (*Sterna hirundo*) [breeding] [passage] - [A194] Arctic Tern (*Sterna paradisaea*) [breeding [passage] - [A999] Wetland and Waterbirds	
004016	Baldoyle Bay SPA	- [A046] Light-bellied Brent Goose (*Branta bernicla hrota*) [wintering] - [A048] Shelduck (*Tadorna tadorna*) [wintering] - [A137] Ringed Plover (*Charadrius hiaticula*) [wintering] - [A140] Golden Plover (*Pluvialis apricaria*) [wintering] - [A141] Grey Plover (*Pluvialis squatarola*) [wintering] - [A157] Bar-tailed Godwit (*Limosa lapponica*) [wintering] - [A999] Wetland and Waterbirds	4.75km
004117	Ireland's Eye SPA	- [A017] Cormorant (*Phalacrocorax carbo*) [breeding] - [A184] Herring Gull (*Larus argentatus*) [breeding] - [A188] Kittiwake (*Rissa tridactyla*) [breeding] - [A199] Guillemot (*Uria aalge*) [breeding] - [A200] Razorbill (*Alca torda*) [breeding]	8.37km
004025	Malahide Estuary SPA	- [A005] Great Crested Grebe (*Podiceps cristatus*) [wintering] - [A046] Light-bellied Brent Goose (*Branta bernicla hrota*) [wintering] - [A048] Shelduck (*Tadorna tadorna*) [wintering] - [A054] Pintail (*Anas acuta*) [wintering] - [A067] Goldeneye (*Bucephala clangula*) [wintering] - [A069] Red-breasted Merganser (*Mergus serrator*) [wintering] - [A130] Oystercatcher (*Haematopus ostralegus*) [wintering] - [A140] Golden Plover (*Pluvialis apricaria*) [wintering] - [A141] Grey Plover (*Pluvialis squatarola*) [wintering] - [A143] Knot (*Calidris canutus*) [wintering] - [A149] Dunlin (*Calidris alpina*) [wintering] - [A156] Black-tailed Godwit (*Limosa limosa*) [wintering] - [A157] Bar-tailed Godwit (*Limosa lapponica*) [wintering] - [A162] Redshank (*Tringa totanus*) [wintering] - [A999] Wetland and Waterbirds	8.76km

Site Code	Site Name	Qualifying Interests	Distance to Site
004113	Howth Head Coast SPA	- [A188] Kittiwake (*Rissa tridactyla*) [breeding]	8.82km
004172	Dalkey Islands SPA	- [A192] Roseate Tern (*Sterna dougallii*) [passage] [breeding] - [A193] Common Tern (*Sterna hirundo*) [passage] [breeding] - [A194] Arctic Tern (*Sterna paradisaea*) [passage] [breeding]	12.02km
004015	Rogerstown Estuary SPA	- [A043] Greylag Goose (*Anser anser*) [wintering] - [A046] Light-bellied Brent Goose (*Branta bernicla hrota*) [wintering] - [A048] Shelduck (*Tadorna tadorna*) [wintering] [breeding] - [A056] Shoveler (*Anas clypeata*) [wintering] - [A130] Oystercatcher (*Haematopus ostralegus*) [wintering] - [A137] Ringed Plover (*Charadrius hiaticula*) [wintering] - [A141] Grey Plover (*Pluvialis squatarola*) [wintering] - [A143] Knot (*Calidris canutus*) [wintering] - [A149] Dunlin (*Calidris alpina*) [wintering] - [A156] Black-tailed Godwit (*Limosa limosa*) [wintering] [passage] - [A162] Redshank (*Tringa totanus*) [wintering] - [A999] Wetland and Waterbirds	13.70km

5.3.2.2 *Sites of National Importance*

The basic designation for wildlife and habitats in Ireland is the Natural Heritage Area (**NHA**). These sites are comprised of 75 no. raised bogs and a further 73 no. blanket bogs. There are an additional 630 no. sites listed as proposed Natural Heritage Areas (**pNHA**). These are sites that were initially published on a non-statutory basis in 1995 but have yet to be statutorily proposed or designated. However, they do have certain levels of protection such as in the County Development Plans.

Table 5-6 below details the NHAs and pNHA within 5km of the site of the Proposed Development and summarises their qualifying interests, where available. There are six (6) no. pNHA within 5km of the site of the Proposed Development.

Table 5-6: Natural heritage areas and proposed natural heritage areas within 5km of the Site of the Proposed Development

Site Code	Site Name	Qualifying Interests	Distance to Site
Natural Heritage Areas (NHA)			
There are no NHAs within 5km of the Proposed Development.			
Proposed Natural Heritage Areas (pNHA)			
000206	North Dublin Bay	*There are no formal qualifying interests listed for proposed Natura Heritage Areas (pNHA). A general site synopsis is available for most sites on the NPWS website (NPWS, 2019).*	1.14km
000201	Dolphins, Dublin Docks		3.35km
000210	South Dublin Bay		3.52km
002103	Royal Canal		3.77km
000178	Santry Demesne		4.41km
000199	Baldoyle Bay		4.71km

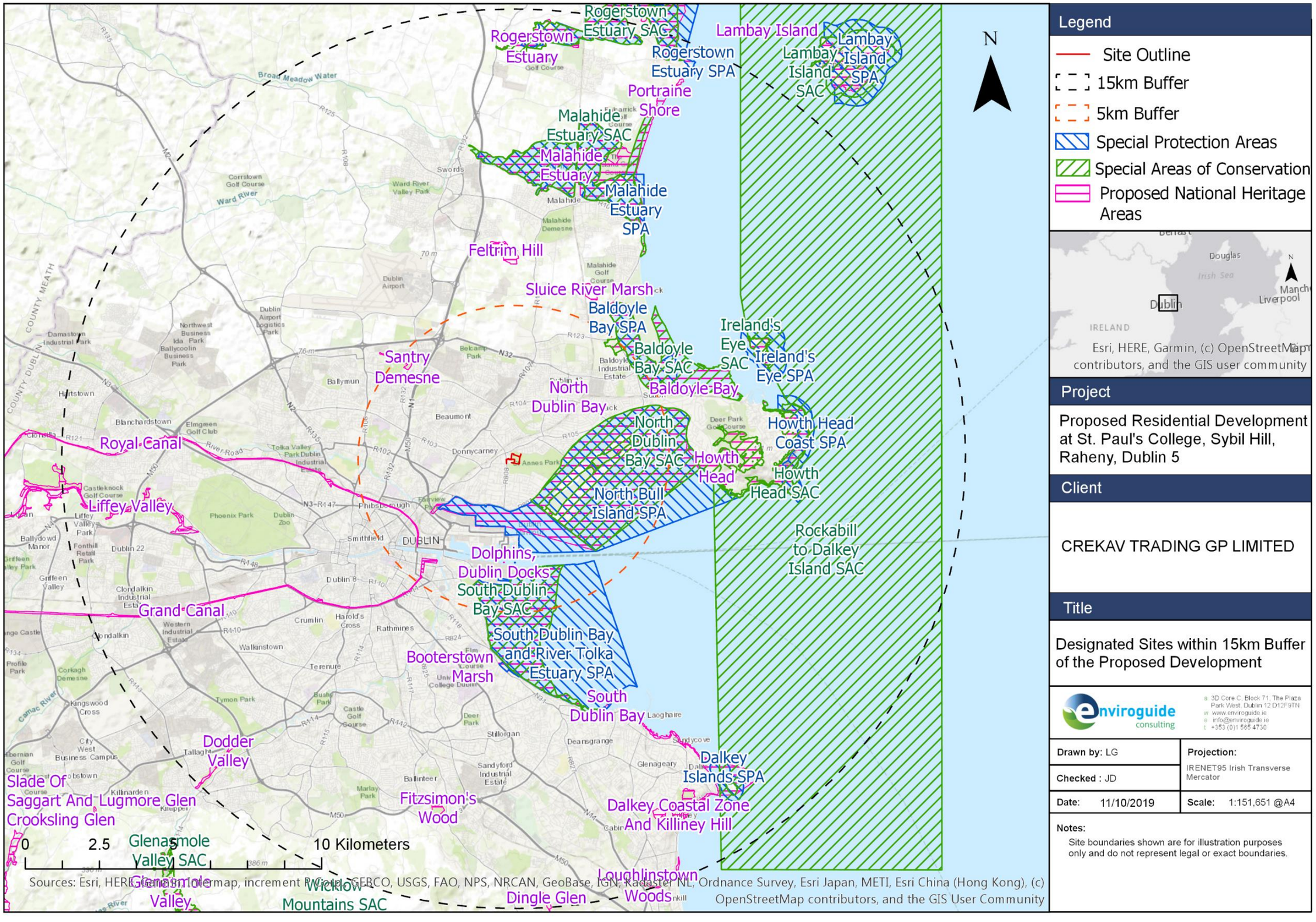

Figure 5-1. Protected sites within 15km of the Proposed Development.

5.3.3 *Habitats*

The habitats within the site of the Proposed Development were coded and categorised to level 3 according to Fossitt (2000). The following habitats were identified within the site of the Proposed Development and the immediate surrounding area:

- Amenity Grassland (Improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Buildings and Artificial Surfaces (BL3);
- Scattered Trees and Parkland (WD5);
- Scrub (WS1);
- Treelines (WL2);
- (Mixed) Broadleaved Woodland (WD1);
- Drainage Ditch (FW4);
- Stone Walls and Other Stonework (BL1); and
- Spoil and Bare Ground (ED2).

See Figure 5-2 below for the habitat map.

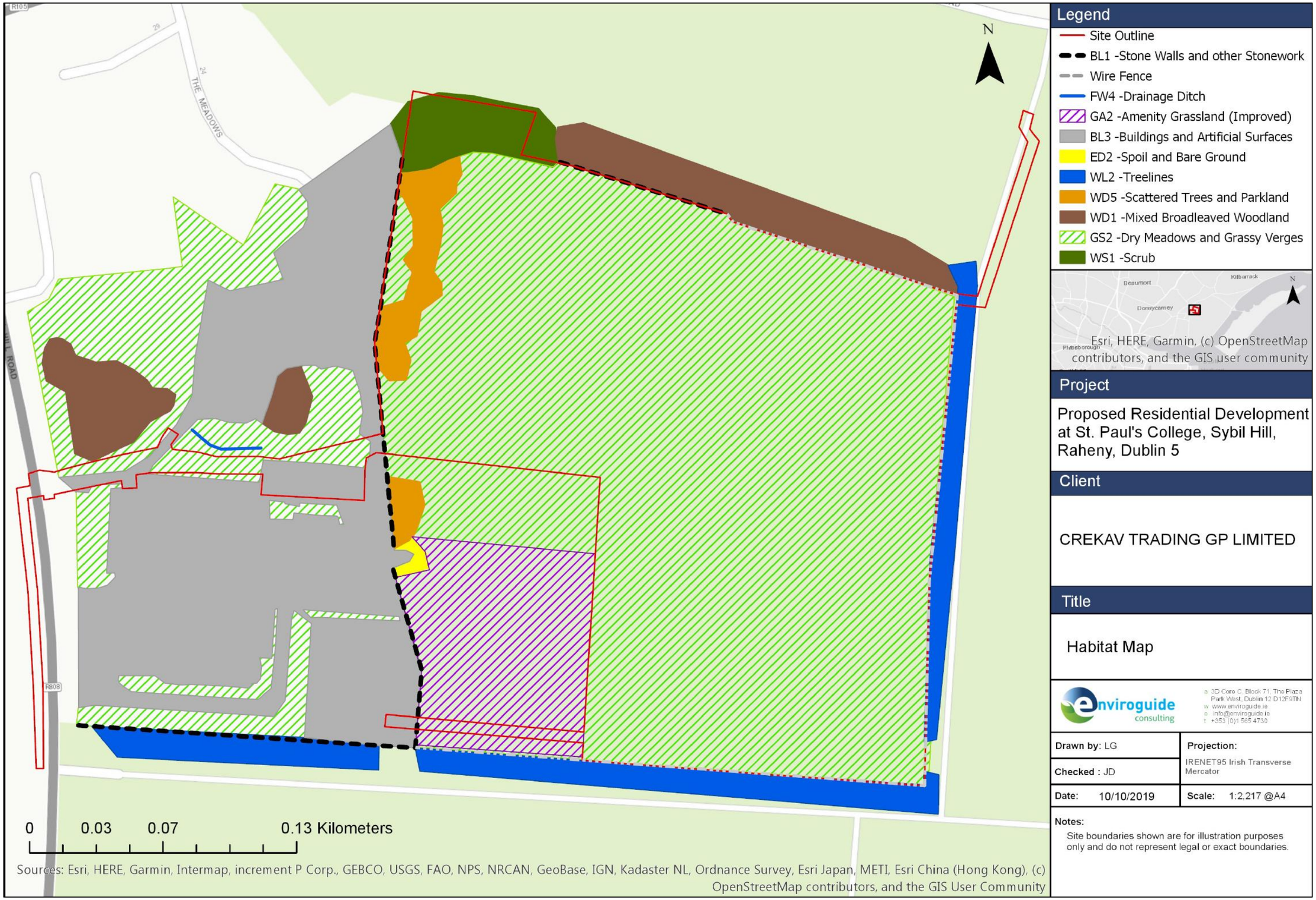

Figure 5-2. Habitat map

5.3.3.1 *Amenity Grassland (Improved) (GA2)*

Amenity Grassland (Improved) habitat covers the managed area of the playing pitch utilised by St Paul's College, this area is subject to regular mowing.

5.3.3.2 *Dry meadows and grassy verges (GS2)*

The unmanaged section of the Site, which was formerly playing pitches but has not been mowed since August 2018 is classified as *Dry Meadows and Grassy Verges* (GS2). The main grasses found here include Yorkshire fog *Holcus lanatus*, cock's foot *Dactylis glomerata*, creeping bent *Agrostis stolonifera* and perennial ryegrass *Lolium perrene*. The main herbaceous component is formed by creeping buttercup *Ranunculus repens*, meadow buttercup *Ranunculus acris*, nettle *Urtica dioica*, dandelion *Taraxacum officinale*, daisy *Bellis perennis*, ribwort plantain *Plantago lanceolata*, broad-leaved dock *Rumex obtusifolius* and white clover *Trifolium repens*. In the shadier areas along the boundary and under trees - rape *Brassica napus*, garlic mustard *Alliaria petiolata*, cow parsley *Anthriscus sylvestris*, prickly sowthistle *Sonchus asper*, cleavers *Galium aparine* and field forget-me-not *Myosotis arvensis* are common.

5.3.3.3 *Buildings and Artificial Surfaces (BL3)*

Buildings and Artificial Surfaces habitat covers the existing site structures and areas of hardstanding. There is little to no vegetation present in these areas.

5.3.3.4 *Scattered Trees and Parkland (WD5)*

There are numerous parcels of *scattered trees and parkland* habitat within the site of the Proposed Development and surrounding area. The section of this habitat within the site of the Proposed Development is along the north-western boundary of the area of grassland. There are also areas north of St Paul's College, within the grounds of the Vincentian Community Residence. Common trees recorded within this habitat include horse chestnut *Aesculus hippocastanum*, sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, cherry *Prunus cerasifera* and rowan *Sorbus aucuparia*.

5.3.3.5 *Scrub (WS1)*

There is an area of dense scrub located in the north-west corner of the main grassland section of the site. This scrub is dominated by bramble *Rubus fruticosus* agg. with nettle *Urtica dioica* and ivy *Hedera helix* also abundant. There is some garlic mustard *Alliaria petiolata*, cleavers *Galium aparine* and silverweed *Potentilla anserina* on the scrub margins.

5.3.3.6 *Treelines (WL2)*

Treelines comprising mature tress form the eastern and southern boundaries of the site of the Proposed Development. There are numerous other mature treelines present within St Anne's Park and the surrounding area. The dominant species recorded here was holm oak *Quercus ilex*, with other species including ash *Fraxinus excelsior*, bramble *Rubus fruticosus* agg., elder *Sambucus nigra*, Austrian pine *Pinus nigra* and Monterey pine *Pinus radiata*. Ivy *Hedera helix* is the dominant ground cover in these areas.

5.3.3.7 *Mixed Broadleaved Woodland (WD1)*

A strip of mixed broadleaved woodland forms the northern boundary of the site of the Proposed Development. There are additional parcels located within the grounds of the Vincentian Community Residence. Species recorded included sycamore *Acer pseudoplatanus*, hawthorn *Crataegus monogyna*, ash *Fraxinus excelsior*, elder *Sambucus nigra*, silver birch *Betula pendula* and lime *Tilia x europaea*. The understory is dominated by ivy *Hedera helix* with hybrid bluebell *Hyacinthoides x massartiana*, cleavers *Galium aparine*, nettle *Urtica dioica* and hogweed *Heracleum sphondylium* also recorded. Some cherry laurel *Prunus laurocerasus* was recorded within the area of woodland adjacent to the R808 Sybil Hill Road.

5.3.3.8 *Drainage Ditch (FW4)*

There is a short drainage ditch within the grounds of Sybil Hill House. This ditch was slightly wet underfoot but with no actual standing water present. Species present within the ditch included silverweed *Potentilla anserina* , creeping cinquefoil *Potentilla reptans,* meadow buttercup *Ranunculus acris*, germander speedwell *Veronica chamaedrys*, daisy *Bellis perennis* and dandelion *Taraxacum officinale agg*. A second longer drainage ditch is present adjacent to the northern boundary of the site of the Proposed Development. This ditch is *c.* 0.5-1.0m in width and was wet in parts during the site visits although it dried out along the eastern reaches. This ditch contained a significant amount of discarded and dumped refuse.

5.3.3.9 *Stone Walls and Other Stonework (BL1)*

An old brick wall is present beyond the northern boundary of the site of the Proposed Development. While there is little or no vegetation on the surface of the wall itself, there are a number of species present at the base including black medick *Medicago lupulina*, common ramping-fumitory *Fumaria muralis*, scarlet pimpernel *Anagallis arvensis*, common vetch *Vicia sativa ssp.* and winter heliotrope *Petasites fragrans*.

5.3.3.10 *Spoil and Bare Ground (ED2)*

There is a small area consistent with this habitat at the entrance to the school pitch where trampling has resulted in little to no vegetation being present.

5.3.3.11 *Habitat Evaluation*

Habitats have been evaluated below in Table 5-7 for their conservation importance, based on the NRA evaluation scheme (NRA, 2009b). Those selected as KERs are those which are evaluated to be of at least Local Importance (higher value). The impacts of the Proposed Development on these receptors are assessed in Section 5.5 of this report. The summary in Table 5-7 below indicates the evaluation rating assigned to each habitat. The rationale behind these evaluations is also provided.

Table 5-7: Evaluation of habitats recorded within the Site of the Proposed Development

Species	Evaluation	Rationale	Key Ecological Receptor (KER)
Amenity Grassland (improved) (GA2)	Local Importance (lower value)	Managed habitat of little to no conservation value.	No
Dry meadows and grassy verges	Local Importance (lower value)	Mangaged habitat that has become more species diverse due to not being cut regularly.	No
Buildings and Artificial Surfaces (BL3)	Local Importance (lower value)	Man-made habitat with little to no vegetation present.	No
Scattered Trees and Parkland (WD5)	Local Importance (lower value)	Small area of non-native species with potential to support roosting bats.	No
Scrub (WS1)	Local Importance (lower value)	Marginal semi-natural habitat containing mostly native species, links amenity grassland to northern scrub and mixed broadleaf woodland.	No
Treelines (WL2)	Local Importance (higher value)	Running along eastern and southern boundary of site, mostly non-native, linking up hedgerow habitat and treeline to the east. Potential to support roosting bats.	**Yes**
(Mixed) Broadleaved Woodland (WD1)	Local Importance (higher value)	Makes up a band along northern boundary and two smaller stands east of site. Forms part of wildlife corridor system running north and east through St Anne's park. Potential to support roosting bats.	**Yes**
Drainage Ditch (FW4)	Local Importance (lower value)	Consisted of a short-isolated ditch containing no standing water to east of site, and a longer ditch along northern boundary containing significant amount of dumped refuse.	No
Stone Walls and Other Stonework (BL1)	Local Importance (lower value)	Little or no vegetation growing on surface of the structure but provides shelter and habitat to some floral species growing at its base.	No
Spoil and Bare Ground (ED2)	Local Importance (lower value)	Area of trampled ground with little or no vegetation supported.	No

5.3.4 *Species and Species Groups*

5.3.4.1 *Flora*

5.3.4.1.1 *Rare and Protected Flora*

Species records from the NBDC online database for the applicable 10km, 2km and 1km grid squares were studied for the presence of rare or protected flora species. Table 5-8 below presents details of the rare and protected flora species found within the Ordnance Survey of Ireland (**OSI**) 10km square O23. No rare or protected flora were identified within the site of the Proposed Development during surveys.

Table 5-8: Records of Rare or Protected Flora for the Surrounding 10KM (O23) Grid Square, from the NBDC

Name	Species Group	Date of last record	Database	Designation
Cernuous Thread-moss (*Bryum uliginosum*)	Moss	03/10/2008	Bryophytes of Ireland	Flora Protection Order (Schedule B); Endangered
Many-seasoned Thread-moss (*Bryum intermedium*)	Moss	14/09/2007	Bryophytes of Ireland	Flora Protection Order (Schedule B); Endangered
Warne's Thread-moss (*Bryum warneum*)	Moss	14/09/2007	Bryophytes of Ireland	Flora Protection Order (Schedule B); Endangered
Lesser Centaury (*Centaurium pulchellum*)	Flowering plant	31/12/2010	BSBI tetrad data for Ireland	Endangered
Little-robin (*Geranium purpureum*)	Flowering plant	24/05/2014	Ireland's BioBlitz	Endangered
Wild Clary (*Salvia verbenaca*)	Flowering plant	24/08/2017	Online Atlas of Vascular Plants 2012-2020	Vulnerable

5.3.4.1.2 *Invasive Species*

There are records for 20 no. species of flora considered to be invasive within the 10km (O23), 2km (O23D) and 1km (O2037) grid squares within which the site of the Proposed Development is located. Details of these records are listed in Table 5-9 below.

The site of the Proposed Development contains a number of planted non-native species. None of these species are listed under the *European Communities (Birds and Natural Habitats) Regulations 2011*. Winter Heliotrope (*Parasites fragrans*) was found at the base of the wall running outsie the northern boundary of the site and is considered a medium risk invasive species on the Invasive Species Ireland '*Amber List'.* Holm oak *Quercus ilex* found among the tree line (WL2) is also list on the Invasive Species Ireland '*Amber List'*.

Table 5-9: Records of Invasive Species of Flowering Plant for the Surrounding 1KM (O2037), 2KM (O23D) & 10KM (O23) Grid Squares from the NBDC

Species	Grid square	Date of last record	Source	Designations
American Skunk-cabbage (*Lysichiton americanus*)	**O23**	24/05/2014	Ireland's BioBlitz	- Medium Impact Invasive Species - Regulation S.I. 477
Brazilian Giant-rhubarb (*Gunnera manicata*)	**O23**	23/05/2014	Ireland's BioBlitz	- Medium Impact Invasive Species - Regulation S.I. 477
Butterfly-bush (*Buddleja davidii*)	**O23** **O23D**	26/08/2016 08/06/2013	Online Atlas of Vascular Plants	- Medium Impact Invasive Species

Species	Grid square	Date of last record	Source	Designations
			2012-2020; Local BioBlitz Challenge 2013	
Canadian Waterweed (*Elodea canadensis*)	**O23**	24/05/2014	Ireland's BioBlitz	- High Impact Invasive Species - Regulation S.I. 477
Cherry Laurel (*Prunus laurocerasus*)	**O23** **O23D**	08/06/2013	Local BioBlitz Challenge 2013	- High Impact Invasive Species
Common Cord-grass (*Spartina anglica*)	**O23**	16/08/2018	Online Atlas of Vascular Plants 2012-2020	- High Impact Invasive Species - Regulation S.I. 477
Holm Oak (*Quercus ilex*)	**O23** **O23D**	08/06/2013	Local BioBlitz Challenge 2013	- Medium Impact Invasive Species
Giant Hogweed (*Heracleum mantegazzianum*)	**O23**	31/12/2017	National Invasive Species Database	- High Impact Invasive Species - Regulation S.I. 477
Himalayan Honeysuckle (*Leycesteria formosa*)	**O23** **O23D** **O2037**	08/06/2013	Local BioBlitz Challenge 2013	- Medium Impact Invasive Species
Japanese Knotweed (*Fallopia japonica*)	**O23** **O23D**	14/08/2017 08/06/2013	National Invasive Species Database; Local BioBlitz Challenge 2013	- High Impact Invasive Species - Regulation S.I. 477
Japanese Rose (*Rosa rugosa*)	**O23** **O23D** **O2037**	24/09/2018	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species
Narrow-leaved Ragwort (*Senecio inaequidens*)	**O23**	24/08/2017	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species
Rhododendron (*Rhododendron ponticum*)	**O23**	18/11/2018	Online Atlas of Vascular Plants 2012-2020	- High Impact Invasive Species - Regulation S.I. 477
Salmonberry (*Rubus spectabilis*)	**O23**	24/05/2014	Ireland's BioBlitz	- Medium Impact Invasive Species - Regulation S.I. 477
Sea-buckthorn (*Hippophae rhamnoides*)	**O23**	26/09/2018	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species - Regulation S.I. 477
Spanish Bluebell (*Hyacinthoides hispanica*)	**O23**	17/05/2018	Online Atlas of Vascular Plants 2012-2020	- Regulation S.I. 477
Sycamore (*Acer pseudoplatanus)*	**O23** **O23D** **O2037**	26/08/2016	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species
Three-cornered Garlic (*Allium triquetrum*)	**O23** **O23D**	28/01/2018 03/05/2015	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species - Regulation S.I. 477
Traveller's-joy (*Clematis vitalba*)	**O23**	09/06/2018	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species

Species	Grid square	Date of last record	Source	Designations
Turkey Oak (*Quercus cerris*)	**O23 O23D**	08/06/2013	Local BioBlitz Challenge 2013	- Medium Impact Invasive Species

5.3.5 *Mammals (excl. bats)*

Species records from the NBDC online database for the applicable 10km, 2km and 1km grid squares were studied for the presence of rare or protected mammal species. Table 5-10 presents details of the rare and protected mammal species found within the 10km square O23, 2km square (023D) and 1km Square (02037).

Table 5-10: Records of Terrestrial Mammals for the Surrounding 1KM (O2037), 2KM (O23D) & 10KM (O23) Grid Squares from the NBDC

Species	Grid square	Date of last record	Source	Designation
NATIVE				
Badger (*Meles meles*)	**O23 O23D**	17/09/2017 19/09/2014	Mammals of Ireland 2016-2025; Atlas of Mammals in Ireland 2010-2015	- Wildlife (Amendment) Act 2000 - Bern Convention Appendix III
Hedgehog (*Erinaceus europaeus*)	**O23 O23D**	02/10/2016 07/06/2012	Mammals of Ireland 2016-2025; Atlas of Mammals in Ireland 2010-2015	- Wildlife (Amendment) Act 2000 - Bern Convention Appendix III
Irish (mountain) Hare (*Lepus timidus hibernicus*)	**O23**	01/06/2012	Atlas of Mammals in Ireland 2010-2015	- Bern Convention Appendix III
Irish Stoat (*Mustela erminea* subsp. *hibernica*)	**O23**	28/11/2017	Mammals of Ireland 2016-2025	- Wildlife (Amendment) Act 2000 - Bern Convention Appendix III
Otter (*Lutra lutra*)	**O23**	05/05/1980	Otter Survey of Ireland 1982	- EU Habitats Directive – Annex II & IV - Wildlife (Amendment) Act 2000 - Bern Convention Appendix III
Pine Marten (*Martes martes*)	**O23**	04/06/2013	Atlas of Mammals in Ireland 2010-2015	- EU Habitats Directive - Annex V - Wildlife (Amendment) Act 2000 - Bern Convention Appendix III
Pygmy Shrew (*Sorex minutus*)	**O23 O23D**	08/11/2015 08/11/2015	Atlas of Mammals in Ireland 2010-2015; Atlas of Mammals in Ireland 2010-2015	- Wildlife (Amendment) Act 2000
Red Fox (*Vulpes vulpes*)	**O23 O23D O2037**	29/03/2017 23/09/2015 12/08/2015	Mammals of Ireland 2016-2025; Atlas of Mammals in Ireland 2010-2015	- n/a
Red Squirrel (*Sciurus vulgaris*)	**O23 O23D**	28/09/2017 31/12/2007	Mammals of Ireland 2016-2025; The Irish Squirrel Survey 2007; Atlas of	- Wildlife (Amendment) Act 2000

Species	Grid square	Date of last record	Source	Designation
			Mammals in Ireland 2010-2015	
Wood Mouse (*Apodemus sylvaticus*)	**O23** **O23D**	08/11/2015 08/11/2015	Atlas of Mammals in Ireland 2010-2015; Atlas of Mammals in Ireland 2010-2015	- n/a
NON-NATIVE				
Brown Rat (*Rattus norvegicus*)	**O23** **O23D**	15/11/2015 14/09/2015	Atlas of Mammals in Ireland 2010-2015; Atlas of Mammals in Ireland 2010-2015	- High Impact Invasive Species - Regulation S.I. 477 (Ireland)
Eastern Grey Squirrel (*Sciurus carolinensis*)	**O23** **O23D** **O2037**	07/10/2017 01/07/2017 12/08/2015	Mammals of Ireland 2016-2025; Mammals of Ireland 2016-2025; Atlas of Mammals in Ireland 2010-2015	- High Impact Invasive Species - Regulation S.I. 477 (Ireland)
European Rabbit (*Oryctolagus cuniculus*)	**O23**	23/06/2015	Atlas of Mammals in Ireland 2010-2015	- Medium Impact Invasive Species
House Mouse (*Mus musculus*)	**O23**	28/11/2015	Atlas of Mammals in Ireland 2010-2015	- High Impact Invasive Species
Feral Ferret (*Mustela furo*)	**O23**	31/08/2005	National Feral Ferret (*Mustela putoris furo*) Database	- High Impact Invasive Species

No rare or protected mammal species were directly recorded during site surveys undertaken between 2015 and 2019.

No evidence of badger activity was found during surveys at the site of the Proposed Development undertaken between 2015 and 2017. However, numerous *snuffle holes* (small pits made by badger snouts) were recorded during the mammal survey on the 7th March 2019, adjacent to the area of scrub located in the north-west of the site of the Proposed Development. There were also multiple well used *mammal runs* noted throughout the perimeter of the site of the Proposed Development, and various trails into the undergrowth and under fences into the strip of woodland adjacent to the pitches in St Anne's Park. No badger hair or tracks were recorded at the entrances into the scrub at the north-west of the site of the Proposed Development, nor in other areas of the Site. This would indicate that there is no active badger sett within this area of scrub, however signs demonstrate that badgers do visit the Site on occasions.

A singe red fox was observed during the mammal survey on the 12th March 2019 entering the area of scrub in the north-west of the site of the Proposed Development (While red fox is protected under the Wildlife Acts 1976-2012 -the Act, it is only afforded a basic level of protection under animal cruelty law (in comparison for example with Badger who are afford full protection under the Wildlife Act and are also list in Appendix III of the Bern Convention). In addition, two (2) no. foxes were heard in this area during the bat activity survey on the 16th May 2019. There is therefore potential for a fox earth to be present in this area of scrub. Grey

squirrel (another species only afforded a basic level of protection under the Act) was noted among the treelines bordering the site of the Proposed Development on several occasions during site surveys, however no sightings or evidence of red squirrel were recorded during site visits throughout 2015-2019. (Red squirrel is afforded a higher level of protection under the Act and is listed in the Bern Convention Appendix III as a species requiring protection.

5.3.6 *Bats*

In view of their sensitive status across Europe, all species of bat have been listed on Annex IV of the EC 'Habitats and Species Directive'. One other species, the Lesser Horseshoe bat is given further protection and listed on Annex II of this Directive. However, this species is only found in the west of Ireland. All bat species are protected under the Wildlife Act 1976 to 2012 (the **Wildlife Acts**) which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species; however, the Wildlife Acts permit limited exemptions for certain kinds of development.

Table 5-11: Records of Bats for the Surrounding, 2KM (O23D) & 10KM (O23) Grid Squares from the NBDC

Species	Grid square	Date of last record	Source	Designation
Brown Long-eared Bat (*Plecotus auritus*)	**O23**	23/05/2014	Ireland's BioBlitz	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000
Leisler's Bat (*Nyctalus leisleri*)	**O23** **O23D**	07/06/2013 07/06/2013	Local BioBlitz Challenge 2013; Local BioBlitz Challenge 2013	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000
Common Pipistrelle (*Pipistrellus pipistrellus*)	**O23** **O23D**	23/05/2014 07/06/2013	Ireland's BioBlitz; Local BioBlitz Challenge 2013	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	**O23** **O23D**	23/05/2014 07/06/2013	Ireland's BioBlitz; Local BioBlitz Challenge 2013	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000

The following species have been recorded within the site of the Proposed Development and immediate surrounding area during activity surveys undertaken between 2015 and 2019:

- Common Pipistrelle (*Pipistrellus pipistrellus*);
- Soprano Pipistrelle (*Pipistrellus pygmaeus*);
- Nathusius's Pipistrelle (*Pipistrellus nathusii*);
- Leisler's Bat (*Nyctalus leisleri*);
- Brown Long-eared Bat (*Plecotus auritus*); and
- Natterer's Bat (*Myotis nattereri*).

5.3.6.1 *Roost Inspection Surveys*

No evidence of roosting bats (e.g. live/dead specimens, droppings, urine splashes and fur-oil stains) were found at the building (prefab classroom) located within the site of the Proposed Development during the roost inspection surveys undertaken between 2015 and 2019.

Some trees located within the site of the Proposed Development were identified as having features with the potential to support roosting bats (e.g. splits, knots, flaking bark and cracked branches).

5.3.6.2 *Emergence Survey*

No bats were recorded emerging from the existing prefab classroom during the emergence survey carried out on 16th May 2019.

5.3.7 *Breeding Birds*

Breeding Bird Surveys were undertaken on three (3) no. days between March and May 2019. A total of 30 no. species [one (1) no. red-listed (Herring Gull flyover only), nine (9) no. amber-listed (Goldcrest, Greenfinch, House Martin, Mistle Thrush, Robin, Starling, Sparrowhawk, Swift, Swallow) and 24 no. green-listed] was recorded on three (3) no. survey days between March and May 2019. While many species were holding territory (males in song), and birds with nesting material/food were recorded, no nests were located on the site of the Proposed Development.

A total of 17 no. species (three (3) no. amber-listed & 14 no. green-listed) were recorded during the breeding bird surveys in 2017 and a total of 12 no. species (one (1) no. red-listed, one (1) no. amber-listed and ten (10) no. green-listed) were recorded during the survey undertaken in 2016.

No nests were identified in the existing pre-fab building within the Proposed Development during surveys undertaken between 2015 and 2017.

5.3.8 *Wintering Birds*

A total of five (5) no. Special Conservation Interest (**SCI**) species were recorded at the site of the Proposed Development over the three years of WBS between 2015-2019; Light-bellied Brent Goose *Branta bernicla hrota*, Curlew *Numenius arquata*, Oystercatcher *Haemantopus ostralegus*, Black-tailed Godwit *Limosa limosa*, Black-headed Gull *Chroicocephalus ridibundus.*

5.3.9 *Amphibians*

The common frog (*Rana temporaria*) is listed under Annex V of the Habitats Directive and is further protected in Ireland under Wildlife (Amendment) Act 2000.

The amphibian survey carried out in March 2019 recorded no common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*) or their spawn / eggs within the site of the Proposed Development or along the drainage ditch which runs outside the northern boundary of the site of the Proposed Development. No features considered suitable for breeding amphibians were

identified within the site of the Proposed Development (e.g. ponds, puddles, drainage ditches or other water features).

5.3.10 *Fauna Evaluation*

Fauna that have been observed in the site of the Proposed Development, or for which records exist in the wider area, have been evaluated below in Table 5-12 for their conservation importance. This evaluation follows the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009b). The rationale behind these evaluations is also provided.

Table 5-12: Evaluation of Fauna Recorded within the Surrounding Area.

Species	Evaluation	Rationale	Key Ecological Receptor (KER)
Badger (*Meles meles*)	National Importance	No setts or tracks were identified during surveys and the surrounding area does not offer high value habitat.	No
Hedgehog (*Erinaceus europaeus*	National Importance	Suitable habitat within Proposed Development site and species likely to utilise surrounding area.	**Yes**
Irish (mountain) Hare (*Lepus timidus hibernicus*)	National Importance	No suitable habitat present within Proposed Development site.	No
Irish Stoat (*Mustela erminea* subsp. *hibernica*)	National Importance	No suitable habitat present within Proposed Development site.	No
Otter (*Lutra lutra*)	International Importance	No watercourses or habitat of value for otter within the project site.	No
Pine Marten (*Martes martes*)	National Importance	No woodland or other habitat of value within the project site.	No
Pygmy Shrew (*Sorex minutus*	National Importance	No suitable habitat present within Proposed Development site.	No
Red Fox (*Vulpes vulpes*)	Local Importance	Fox is known to use the site and the site has the potential for a fox earth to be present in this area of scrub to the north-west of the site	**No**
Red Squirrel (*Sciurus vulgaris*)	National Importance	No feeding signs or sights of red squirrel has been recorded during any site visit. It is unlikely to support feeding red squirrels.	No
Wood Mouse (*Apodemus sylvaticus*)	Local Importance	The scrub, treelines and grassland has the potential to support Woodmouse. This species is considered widespread and not in any danger and it is not protected by any legislation	No
Bat assemblage	International Importance	Potential for bat roosts in mature trees within Proposed Development site.	**Yes**
Bird assemblage (Red listed)	National Importance	One red-listed species recorded (Herring Gull) during site surveys.	**Yes**
Bird assemblage (Amber listed)	National Importance	Both amber-listed species likely to be nesting within Proposed Development site	**Yes**

Species	Evaluation	Rationale	Key Ecological Receptor (KER)
Bird assemblage (Green listed)	County Importance	Numerous green-listed species likely to be nesting within Proposed Development site.	**Yes**

5.4 Characteristic of Proposed Development

The Proposed Development comprises the construction of a residential development to accommodate apartments and resident amenity spaces, located on lands east of St Paul's College, Sybil Hill Road, Raheny, Dublin 5. The redline boundary for the Proposed Development is c. 6.7 hectares (**ha**) and the Site (development site) is c. 6.4ha.

As a general overview, the Proposed Development comprises:

a) Nine (9) no. residential apartment blocks, ranging in height from 5 storeys to 9 storeys, accommodating 657 no. apartments consisting of:
   (i) 224 no. 1 bed units
   (ii) 378 no. 2 bed units
   (iii) 55 no. 3 bed units
b) Tenant amenity spaces
c) A crèche
d) Public open space provided to the south of the residential development
e) Balconies and terraces to be provided on all elevations at all levels for each residential apartment block
f) 465 no. basement car parking spaces
g) 34 no. surface visitor / crèche drop-off car parking spaces
h) 1646 no. bicycle parking spaces
i) Refuse storage, services, plant areas
j) All associated site development works necessary to facilitate the Proposed Development, which includes widening and realignment of the existing vehicular access onto Sybil Hill Road, to facilitate the construction of an access road with footpaths and on-road cycle tracks
k) A proposed pedestrian crossing on Sybil Hill Road.

5.5 Potential Impact of the Proposed Development

5.5.1 *Construction Phase*

Designated Sites

The closest Natura 2000 site to the Proposed Development is North Dublin Bay SAC and North Bull Island SPA, both located c. 1.1km to the east. The AA Screening Report (Enviroguide 2019) has concluded that, on the basis of objective information, the possibility cannot be ruled out that the Proposed Development will not have a significant effect on any of the Natura 2000 sites listed below:

- North Dublin Bay SAC [000206]

- South Dublin Bay SAC [000210]
- North Bull Island SPA [004006]
- South Dublin Bay and River Tolka Estuary SPA [004024]
- Baldoyle Bay SPA [004016]
- Malahide Estuary SPA [004025]
- Rogerstown Estuary SPA [004015]

A Natura Impact Statement (**NIS**) has been produced and accompanies this planning applications, the NIS concludes the following:

Wintering Bird Surveys - Conclusions

A comprehensive suite of WBS were undertaken in relation to the Proposed Development between 2015 and 2019.

Light-bellied Brent Goose

The conclusions of the WBS clearly demonstrates that individual Light-bellied Brent Geese are not site loyal to any one inland feeding site during the winter. This implies that Light-bellied Brent Geese recorded foraging at St Paul's are not significantly loyal to this site and are utilising St Paul's on an ad-hoc basis as part of a wider network.

It is therefore determined, based on the best and most recent scientific information available to the authors of this report, and including the analysis of such information as contained in this NIS, that the loss of ex-situ inland feeding habitat at St Paul's as a result of the Proposed Development will not adversely impact on the conservation objective attributes of Light-bellied Brent Geese of "Distribution" and "Population Trend".

Other Special Conservation Interest Species

The conclusions of the WBS find that, while an existing foraging resource for other SCI species (i.e. Curlew, Oystercatcher, Black-tailed Godwit and Black-headed Gull) will be lost as a result of the Proposed Development, the results of the WBS at the site have demonstrated that this site is not considered to be of High or Major Importance for any of these species.

It is therefore considered, based on both the numbers and frequency of occurrence of SCI species recorded at the Proposed Development site over the course of three wintering bird seasons (2015/16, 2016/17 & 2018/19), that the loss of ex-situ habitat will not impact on the conservation objective attributes of "Distribution" and "Population Trend" of any of the SCI species recorded at the Proposed Development site.

Construction-related Surface Water Discharge – Conclusions

A potential for impact on South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, North Dublin Bay SAC and North Bull Island SPA was identified due to the possibility of discharge/run-off of surface waters containing sediment, silt, oils and/or other pollutants during the Construction Phase of the Proposed Development into the Naniken Stream, which flows into North Bull Island's South Lagoon.

Construction-Related Surface Water Discharges

*Specific and detailed mitigation measures have been proposed to address the potential adverse effects that may arise from construction-related surface water discharges from the Proposed Development and a Construction Environmental Management Plan (**CEMP**) has been prepared and will be implemented by the contractor during the construction of the Proposed Development.*

It is the professional opinion of the authors and design team that the mitigation measures out-lined in the NIS, when implemented, will ensure that no adverse effects on the Natura 2000 sites will arise during the Construction Phase of the Proposed Development or as a consequence of run-off of sediment/silt or contaminated waters into the Naniken Stream during the Construction Phase of the Proposed Development.

Habitats

There will be no loss of habitats such as Treelines (WL2), as a consequence of the Proposed Development. Retained trees located within these habitat types, as well as the habitat type of (Mixed) Broadleaf Woodland (WD1), may be susceptible to indirect damage, during the Construction Phase of the Proposed Development, resulting in the degradation of these habitat types. In the absence of mitigation measures, this may result in loss of a locally important habitat, giving rise to a slight but permanent effect.

There will be a loss of other habitat types, such as Amenity Grassland (Improved) (GA2), Buildings and Artificial Surfaces (BL3), Scattered Trees and Parkland (WD5), Scrub (WS1), Drainage Ditch (FW4), Stone Walls and Other Stonework (BL1) and Spoil and Bare Ground (ED2). This will result in a slight loss of habitats of local importance, negative in effect and of slight significance, permanent in duration.

Bats

The construction of the Proposed Development will require the removal of vegetation during site clearance works in addition to a number of trees (WD5) located within the Site that were identified as having potential to support roosting bats. Although these trees were not confirmed as potential bat roosts during any of the bat activity surveys undertaken in 2015, 2016, 2017 and 2019, they still may be utilised by roosting bats on other occasions. Vegetation across the Site was also considered suitable for bats to forage and commute along. The removal of these trees and other vegetation would result in a negative, slight and permanent duration effect on bat species.

Temporary lighting required during the Construction Phase could illuminate previously unlit feeding areas along the woodland and treeline, or potential tree roosts making them unsuitable for bats. Although Leisler's bats and pipistrelle species previously recorded onsite may tolerate

some lighting of feeding areas, other species are potentially adversely affected by strong lighting. Therefore, while the potential impact is significant at the local level, it will have a temporary effect.

Birds

All birds are protected under the Wildlife Acts. If vegetation clearance is carried out during the breeding bird season (i.e. from the 1st March to the 31st August), there is the potential for significant impacts with negative effects to local breeding bird populations. Outside of the breeding season, while the loss of potential nesting habitat may result in a significant impact, the negative effect arising from the impact will be short-term in nature at a local level.

Noise, vibration and increased human presence associated with the Construction Phase of the Proposed Development could theoretically result in a disturbance impact to local breeding bird populations during the bird breeding season and has the potential to result in reduced breeding success of birds in green spaces adjacent to the construction zone. Due to the proximity of the Proposed Development to St Anne's Park, which is used by people on a frequent basis, and that the surrounding lands to the north-west are urban in nature, birds on the site of the Proposed Development are likely to be habituated to a degree to human related disturbance. The impact of construction related activity on local breeding bird populations in vicinity of the Proposed Development will be slight.

During the surveys undertaken in 2015, 2016, 2017 and 2019 no nests were identified in any of the buildings located within the study area. These included the existing prefab building that is proposed for demolition, located to the north-east of the main St Paul's College building.

Wintering birds recorded at the site related to ex-situ feeding from the Natura 2000 sites listed above and are addressed in detail in the NIS submitted as part of this planning application. The five (5) no. SCI from the relevant Natura 2000 sites are evaluated based on scientific information detailed in the NIS and it is concluded that the Proposed Development will not adversely affect the integrity of Natura 2000 sites either alone or in combination with other plans and projects, taking into account the conservation objectives of Natura 2000 sites.

The species that were recorded in winter only related to the Natura 2000 sites and are addressed in the NIS. There are no wintering species other than these that are directly related to the St Paul's sites and therefore no impact on wintering species is anticipated.

5.5.2 *Operational Phase*

Potential Impacts on Designated Sites

The closest Natura 2000 site to the site of the Proposed Development is North Dublin Bay SAC and North Bull Island SPA, both located approximately 1.1 km to the east (as the crow flies). The AA Screening Report has concluded that, on the basis of objective information, the possibility cannot be ruled out that the Proposed Development will not have a significant effect on any of the Natura 2000 sites listed below:

- North Dublin Bay SAC [000206]
- South Dublin Bay SAC [000210]

- North Bull Island SPA [004006]
- South Dublin Bay and River Tolka Estuary SPA [004024]
- Baldoyle Bay SPA [004016]
- Malahide Estuary SPA [004025]
- Rogerstown Estuary SPA [004015]

A NIS has been produced and accompanies this planning application and concludes that the loss of the ex-situ feeding site for Species of Conservation Interest of the relevant Natura 2000 sites will not impact on these species and that the mitigation measures out-lined in the NIS, when implemented, will ensure that no adverse effects on the Natura 2000 sites will arise during the Construction Phase of the Proposed Development or as a consequence of run-off of sediment/silt or contaminated waters into the Naniken Stream during the Construction Phase of the Proposed Development.

Habitats

Given the nature of the surrounding area, which is predominately suburban in nature, and the retention of boundary habitats the Proposed Development operation is likely to have an imperceptible impact. Furthermore, the inclusion of c. 1.6 ha of semi-private open space within the proposed Development will have a positive effect.

Bats

During the surveys undertaken in 2015, 2016, 2017 and 2019, there was evidence of bat activity (i.e. foraging and commuting) recorded across the site of the Proposed Development.

During the surveys, brightly lit areas around St Paul's College grounds and Sybil Hill Road were generally avoided by bats and most bats recorded were located along the boundaries of the open space in close proximity to St Anne's Park. The presence of artificial lighting due to the Proposed Development in these areas is likely to result in some localised impact to bats commuting through or feeding within the site of the Proposed Development. Lighting during the operation of the Proposed Development will have an impact on commuting and feed bats along tree lines and vegetation across the site, an effect that is permanent in nature. In the absence of mitigation, impact to bats as a result of operational lighting is considered to be a significant impact at a local scale and permanent in duration.

It is likely that bats will be able to still pass through the area albeit via different dark corridors to those currently used. A Site Lighting Analysis Report prepared by OCSC (2019) for the Proposed Development is submitted as a separate document to this EIAR. This Site Lighting Analysis Report models the predicted lighting levels generated by the Proposed Development.

In order to positively enhance the potential bat roosting habitat on site, it is proposed that up to three (3) no. bat boxes (2 F Schwegler General Purpose woodcrete – mixture of concrete and wood or equivalent) be erected on mature trees located within or (if possible) directly adjacent to the Site. The boxes proposed are long-lasting and durable.

Birds

Notwithstanding the issue of the potential for wintering birds to use the site of the Proposed Development (see "*Designated Sites"* sections above), bird species likely to be breeding on the site (*i.e.* blackbird, chaffinch, song thrush, wood pigeon and wren) are relatively common species found in suburban areas, parks and in residential gardens. Therefore, the impact is imperceptible effect on the local breeding bird populations. No wintering species that are specific to the Site was recorded and therefore there will be no impact on wintering species directly related to the Site.

5.6 Potential Cumulative Impacts

In the Dublin City Development Plan 2016-2022 (**DCDP**) the site of the Proposed Development is zoned as "*Zone Z15 Community and Institutional Resource Lands (*Institutional and Community *, Community, Green Infrastructure and Health)*", while the surrounding area to the north-east and west is zoned as "*Zone Z1: Sustainable Residential Neighbourhoods*".

St Anne's Park to the north-west, east and south is zoned as "*Zone Z9: Amenity/Open Space Lands/Green Network*".

Existing or proposed projects or plans impacting on the same KERs have the potential to lead to impacts of a higher level of significance when assessed cumulatively. This applies to potential impacts on bats as a consequence of the combined loss of suitable roosting, commuting and/or foraging habitat in the locality and potential impacts on birds as a consequence of the combined loss of suitable nesting bird habitat in the locality.

The Proposed Development is not likely to result in any significant impacts when assessed in isolation in relation to these receptors as the amount of proposed vegetation clearance is minimal. Given that it is unlikely that there would be wide-scale vegetation clearance in the surrounding locality (*i.e*. the surrounding area is predominantly made of residential houses and gardens and St Anne's Park) significant cumulative impacts are unlikely.

With regards to the *potential* cumulative impact on wintering birds as a result of the Proposed Development, acting in-combination with other plans or projects, the NIS (Enviroguide 2019) concludes that the Proposed Development in combination with other sites will not have any impact on the qualifying interests (*i.e*. wintering birds) for the following reasons:

- *The number of sites with planning permission granted or pending which will or could result in loss of grassland is 6 no. (7 no. including the Proposed Development) and the birds are using just over 50% (i.e. ca. 70 sites) of the available network in any given winter. This means that the combined loss of all of these sites is not significant in respect of the overall network.*
- *It has already been determined that there is additional population capacity within the ex-situ network of approximately 22%. This means that even with the loss of these sites there is adequate growth potential for the goose population within the network.*
- *It has been demonstrated that the birds visit ex-situ sites on a fluid basis so that the effect of the loss of any individual site will result in the birds relocating to another site without duress.*

- *Only 2 no. of the 5 no. sites had peak counts of national importance during the study period namely Red Arches Pitches and St. Patricks College with Red Arches having a peak of International Importance (max of 580 in 2016/2017).*

Refer to the NIS (Enviroguide 2019) accompanying this planning application for full details of this assessment.

5.7 "Do Nothing Impact"

In the case where St Paul's lands are not developed, there would be no resulting additional impacts on the Biodiversity (Flora and Fauna) at the site of the Proposed Development. The habitat would remain as Dry Meadows and Grassy Verges (GS2) or could be converted to amenity grassland (GA2).

5.8 Avoidance, Remedial & Mitigation Measures

5.8.1 *Construction Phase*

5.8.1.1 *Fauna*

The removal of trees and shrubs will be completed outside the main bird nesting season where possible, *i.e*. 1st March to 31st August.

Prior to the demolition of any site structure, and / or the felling of any mature trees within the Site, it is required that a roost inspection survey is carried out at the appropriate time of year by a suitably qualified ecologist in order to determine the presence of any potential roosts.

Any felling of mature trees with bat roost potential within the Site will be done during the autumn months. The branches should then be left *in-situ* for at least 24 hours in order to allow for the movement of wildlife from the tree prior to mulching or removal.

Lighting proposals for the Site will adhere to the advice provided in *'Bats and lighting – Guidance for Planners, engineers, architects and developers'* (Bat Conservation Ireland 2010) and '*Bats and Lighting in the UK*. Bats and the Built Environment Series' (Bat Conservation Trust, 2008).

A suitably qualified bat ecologist or Ecological Clerk of Works shall make adjustments to directional construction lighting, for example ensuring the fitting of cowls, shields or louvres and to ensure after installation minimum light spill onto vegetated areas. All luminaires shall be energy efficient LED source fittings with sharp cut off optics, which when positioned correctly will ensure minimum light spill onto vegetation.

As a precautionary measure, it is required that the relevant potential bat roost trees, located within the western section of the subject lands, are section-felled under the supervision of an experienced ecologist. If bats are present, all works must cease, and NPWS contacted in order to obtain the required derogation licence.

5.8.1.2 *Habitats*

There is a potential impact on identified habitats and associated fauna, as a result of surface water run-off containing silt, oil or other pollutants into the drainage ditch adjacent to the Proposed Development, with a potential connection with the Naniken Stream (100m north of the Proposed Development) which eventually flows into North Bull Island's south lagoon. The likelihood of any potential impact can be dramatically reduced following the implementation of suitable mitigation measures, as outlined in the surface water section below.

The CEMP will be implemented by the appointed Contractor that details the suitable precautions to be followed in relation to any potential pollution of watercourses from construction activities. The storage of materials, containers, stockpiles and waste, however temporary, must follow best practice at all times and be stored at designated areas away from watercourses.

The *Engineering Services Report* (**ESR**) submitted with this planning application, details the comprehensive Sustainable Drainage System (**SuDS**) that is to be incorporated into the Proposed Development. Similarly, the *Arboriculture Method Statement* completed by Independent Tree Surveys, details the tree protection measures that will be implemented in order to protect trees that are to be retained as part of the Proposed Development.

Any trees, adjacent to or within the development boundary, which are to be retained, shall be afforded adequate protection during the Construction Phase as follows:

- All trees along the boundary of the Proposed Development that are to be retained, both within and adjacent to the development boundary (where the root protection area of the tree extends into the development boundary), will be fenced off at the outset of works and for the duration of construction to avoid damage to the trunk, branches or root systems of the trees. All work in relation to trees will be carried out in accordance with BS:5837 (*British Standard for trees in relation to construction* updated in 2012.)
- Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it. It will still be necessary to ensure that the area within the Root Protection Area (RPA) is not used for vehicle parking or the storage of materials (including oils and chemicals); and
- A qualified arborist shall assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Development boundary but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist.

See the Arboriculture Report submitted separately for more information on tree protection measures that will be employed on site prior to works commencing.

5.8.1.3 *Surface Water*

The following mitigation measures have been proposed to ensure that no potential adverse effects will arise from construction-related surface water discharges from the Proposed Development.

The appointed Contractor will be required to implement the following specific mitigation measures, all of which are set out in the CEMP submitted as a separate document, for release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters control:

- Specific measures to prevent the release of sediment over baseline conditions to the Naniken River (and subsequently the Tolka Estuary) and Dublin Bay during the construction work, which will be implemented as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. This is particularly important when undertaking any works/upgrading to the surface and foul water drainage networks at the site of the Proposed Development.
- Provision of exclusion zones and barriers such as silt fences between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the Naniken River and/or existing drainage systems and hence the downstream receiving water environment.
- Silt traps shall not be constructed immediately adjacent to the Naniken River, i.e. a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in-combination as appropriate to remove suspended matter from discharges.
- Provision of temporary construction surface drainage and sediment control measures to be in place before the construction of the pipeline and/or earthworks commence.
- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the Site.
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to the Naniken Stream and/or surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to the Naniken Stream or existing surface water drainage systems. Concrete washout areas will be located remote from the Naniken Stream or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses.
- Any fuels of chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area to prevent any seepage of into the Naniken Stream, local surface water network or groundwater, and care and attention taken during refuelling and maintenance operations.
- Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams.
- All containment and treatment facilities are regularly inspected and maintained.
- All mobile fuel bowsers shall carry a spill kit and operatives must have spill response training.
- All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked.
- Implementation of response measures to potential pollution incidents.
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures in the event of accidental fuel spillages.

- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- Water supplies shall be recycled for use in the wheel wash. All waters shall be drained through appropriate filter material prior to discharge from the construction sites.
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase.
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).

5.8.2 *Operational Phase*

5.8.2.1 *Bats*

The presence of buildings and artificial lighting in those areas proposed for development where bats were recorded, are likely to result in significant impact to bats commuting through or feeding around the periphery of the site of the Proposed Development.

The following recommendations have been incorporated into the lighting design (developed by OCSC) of the Proposed Development in relation to the public lighting design:

- The use of LED directional lighting (using shields/cowls, masking and louvres) to restrict light to those public areas where it is needed with a light level of 3 lux or less at ground level;
- Restricted column heights of lamp posts to less than 8m (i.e. 6m in height) and angle light is emitted at (i.e. no greater than 70°) to reduce the amount of light spillage;
- Narrow spectrum lighting should be used wherever possible with a low UV component (UV filters can be used to reduce the UV component emitted by lights); and
- Consider the use of automatic sensor systems and timer-controlled system to minimise light pollution.

5.9 Mitigation Measures – 'Do Nothing' Scenario

In the case where St Paul's lands are not developed, there would be no resulting additional impacts on the Biodiversity (Flora and Fauna) at the site of the Proposed Development. The habitat would remain as Dry Meadows and Grassy Verges (GS2) or could be converted to amenity grassland (GA2). As this scenario would result in no impacts, no mitigation measures are required.

5.10 Residual Impacts

Residual impacts are impacts that remain once mitigation measures have been implemented or impacts that cannot be mitigated. Table 5-13 below provides a summary of the impact assessment for the identified KERs and details the nature of the impacts identified, mitigation proposed and the classification of any residual impacts.

Provided all mitigation measures are implemented in full and remain effective throughout the lifetime of the facility, no significant negative residual impacts on the local ecology or on any designated nature conservation sites, are expected from the Proposed Development.

Table 5-13: Summary of Potential Impacts on KER(s), Mitigation Proposed and Residual Impacts

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation Summary	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Designated Sites								
• **North Dublin Bay SAC [000206]** • **South Dublin Bay SAC [000210]** • **North Bull Island SPA [004006]** • **South Dublin Bay and River Tolka Estuary SPA [004024]** • **Baldoyle Bay SPA [004016]** • **Malahide Estuary SPA [004025]** • **Rogerstown Estuary SPA [004015]**	International Importance	Surface water run-off containing silt / pollutants into drainage ditch adjacent to site during Construction Phase, which has potential link to KERs through Naniken Stream nearby.	Negative	n/a	Short-term	Slight	Incorporation of comprehensive drainage system throughout Construction Phase. Incorporation of comprehensive sustainable drainage system (SuDS) during the Operational Phase.	**Negligible**
Habitats								

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation Summary	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Treelines (WL2)	Local importance (higher value)	Loss and/or damage to some sections of habitat during Construction Phase.	Negative	n/a	Permanent	Not significant	Majority of Treelines and mature trees to be retained. Tree protection measures to be adhered to during Construction Phase.	**Negligible**
(Mixed) Broadleaf Woodland (WD1)	Local importance (higher value)	Loss and/or damage to some sections of habitat during Construction Phase.	Negative	n/a	Permanent	Not significant	Majority of Treelines and mature trees to be retained. Tree protection measures to be adhered to during Construction Phase.	**Negligible**
Mammals								
Hedgehog	National Importance	Loss and/or damage to some sections of potential habitat during Construction Phase. Disturbance due to noise generated during Construction Phase.	Negative	n/a	Permanent Short-term	Slight	Foxes have the ability to relocate to abundant suitable habitat in adjacent St Anne's Park	**Slight Negative**
Fox	Local Importance	Loss and/or damage to some sections of potential habitat during Construction Phase. Disturbance due to noise generated during Construction Phase.	Negative	n/a	Permanent Short-term	Slight	Foxes have the ability to relocate to abundant suitable habitat in adjacent St Anne's Park	**Negligible**
Bat Assemblages	National importance	Loss and/or damage to some sections of potential roosting and	Negative	n/a	Permanent	Significant	Majority of mature trees to be retained.	**Slight Negative**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation Summary	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
		commuting habitat during Construction Phase. Increased lighting as a result of the Proposed Development.			Temporary		Bat sensitive lighting used during Operational Phase. 3 bat boxes to be installed.	
Birds								
Bird Assemblages (Red listed)	National importance	Loss and/or damage to some sections of potential nesting habitat during Construction Phase. Disturbance due to noise generated during Construction Phase.	Negative	n/a	Permanent Short-term	Slight	Majority of hedgerows and mature trees to be retained. No removal of vegetation during nesting season.	**Slight negative**
Bird Assemblages (Amber listed)	National importance							
Bird assemblage (Green listed)	County importance							

5.11 Monitoring

5.11.1 *Construction Phase*

As a precautionary measure, it is recommended that the relevant potential bat roost trees, located within the western section of the subject lands, are section-felled under the supervision of an experienced ecologist. If bats are present, all works must cease, and NPWS contacted in order to obtain a derogation licence. The CEMP submitted with this planning application provides for a Project Environmental Consultant who will supervise or appoint a suitably qualified person to supervise any work that has potential to involve risk to the environment.

5.11.2 *Operational Phase*

It is proposed to have ongoing monitoring during the Operational Phase to assess the effectiveness of the bat boxes in relation to the suitability of their location, and use. The ongoing physical condition will also be monitored.

5.12 Reinstatement

Provided the Landscape Plan, as outlined in Chapter 10, is implemented, it is considered that reinstatement works are not required.

5.12.1 *Construction Phase*

It is considered that reinstatement works are not required during the Construction Phase.

5.12.2 *Operational Phase*

It is considered that reinstatement works are not required during the Operational Phase.

5.13 Interactions

The interactions identified are between hydrology and water and biodiversity with respect to the potential impact of water pollution on protected areas. This is addressed in the NIS.

5.14 Difficulties Encountered in Compiling

An extensive search of available datasets for records of rare and protected species within proximity of the Proposed Development has been undertaken as part of this assessment. However, the records from these datasets do not constitute a complete species list. The absence of species from these datasets does not necessarily confirm an absence of species in the area.

Due to the large network of sites surveyed as part of the 2018/19, 2016/17 & 2015/16 wintering bird surveys, and the respective time spent at each site, the results contained in this report only represent a snapshot of the usage of *ex-situ* inland feeding sites by wintering birds. The

absence of birds from survey data does not therefore confirm an absence of birds from the applicable *ex-situ* inland feeding site.

Goose droppings at each site were recorded on an *ad-hoc* basis during the 2018/19 surveys and, as such, the absence of dropping records cannot therefore be considered conclusive evidence for no Light-bellied Brent Goose activity at such sites during the 2018/19 season.

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6 LAND, SOILS & GEOLOGY

6.1 Introduction and Research Methodology

This Chapter provides an assessment of the likely significant impacts of the Proposed Development on land, soils and geology (subsoil and bedrock).

Assessments have been undertaken by O'Connor Sutton Cronin & Associates Limited (**OCSC**), Multidisciplinary Consulting Engineers, of the likely significant environmental effects / impacts on the geological environment associated with the Proposed Development east of St Paul's College, Sybil Hill Road, Raheny, Dublin 5.

This Chapter provides;

- A description of the Proposed Development (particularly in connection with Land and Soils).
- The baseline soils, and geology environments for the Site.
- A statement of the likely significant impacts associated with both the Construction and Operational Phases of the Proposed Development.
- A 'do-nothing' scenario has also been considered.
- Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, reinstatement or remedial measures and recommendations for monitoring are included where appropriate.
- Predicted residual effects are also described.

Assessments for the Site are detailed in this Chapter with relevant technical information included in:

- Appendix 6-1 Site Investigation Report, Ground Investigations Ireland; and
- Appendix 6-1 Environmental Analysis Data and Assessment.

6.1.1 *Guidelines*

The assessment has been carried out in accordance with, but not limited to the following guidelines:

- Environmental Protection Agency (**EPA**) *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (August 2017) (EPA Guidelines);
- EPA *Draft Advice Notes for preparing Environmental Impact Statements (September 2015*);

- EPA *Guidelines on Information to be contained in Environmental Impact Statements (2002);*
- EPA *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (2003);

- Institute of Geologists of Ireland (**IGI**) *Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements by the Institute of Geologists of Ireland* (2013) (IGI Guidelines);

- IGI *Geology in Environmental Impact Statements, A Guide* (2002);

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

- Construction Industry Research and Information Association (**CIRIA**) *Control of Water Pollution from Construction Sites* (2001); and

- CIRIA *Environmental Handbook for Building and Civil Engineering Projects* (2000).

6.1.2 *Approach*

Ahmed Thamer Ahmed is an Environmental Engineer. Ahmed has obtained a Bachelor of Engineering (Civil) and Master of Engineering (Environmental) degrees, with specialisation in geo-environmental engineering; and has five years' experience in ground/contaminated land investigations in Ireland.

Eleanor Burke is an Environmental Scientist. Eleanor is a Principal Consultant and Environmental Division Manager with OCSC. She obtained a Bachelor of Science in Environmental Science and a Masters of Science in Environmental Science and has over 17years' experience. Both authors have been involved in numerous greenfield and brownfield development projects in Dublin and surrounding areas.

The assessment followed a phased approach as outlined in Chapter 4.4 of the EPA Draft *Advice Note for Preparing Environmental Impact Statements* (EPA, 2015) and the IGI Guidelines (IGI, 2013). A Conceptual Site Model (**CSM**) was developed in order to identify any likely Source-Pathway-Receptor (**SPR**) linkages relating to the site of the Proposed Development. The phases of assessment are outlined below.

- **Phase 1:** Initial Assessment

- **Phase 2:** Direct and Indirect Site Investigations and Studies, Refinement of the Conceptual Site Model and Detailed Assessment and Impact Determination

- **Phase 3:** Mitigation, Residual and Final Impact Assessment

- **Phase 4:** Completion of the EIAR Chapter.

Phase 1: Initial Assessment

An initial assessment and impact determination was carried out which; defined the project in terms of location, type and scale; established the baseline conditions for the Site including identifying the type of soil / geological environment; and established the activities associated with the Proposed Development.

These objectives were achieved by way of a geological desk study and baseline data collection. A list of sources for the desk study together with relevant legislation are included in Section 6.8.

Additional information has been compiled through consultation and feedback from stakeholders.

Sources including the EPA and Geological Survey Ireland (**GSI**) were utilised to establish the baseline conditions for the Site and all available information was compiled into a preliminary CSM. The CSM is based on the accepted SPR model for assessing environmental impacts. The CSM went through iterative reviews and was updated with Site specific data obtained through site investigations and studies.

Phase 2: Direct and Indirect Site Investigations and Studies, Refinement of the Conceptual Site Model and Detailed Assessment and Impact Determination

Direct and Indirect Site Investigations and Studies

A site investigation was carried out at the Site during September and October 2015 and a supplementary site investigation was carried out in February 2018. The work was undertaken, scoped and specified by an Environmental Geologist in OCSC in line with the IGI Guidelines (IGI, 2013). Works were carried out by Ground Investigations Ireland Ltd. (**GII**), a site investigation contractor appointed directly by the applicant, Crekav Trading GP Limited, and consisted of the following work:

- Drilling of 14 no. boreholes by cable-tool methods;
- Logging and sampling borehole arisings;
- Analysis of a selection of samples for geotechnical and chemical properties;
- Installation of 9 no. groundwater monitoring wells;
- Measurement of groundwater levels;
- Assessment of the soil chemistry results with respect to potentially hazardous properties (HazWasteOnline Assessment); and
- Assessment of the soil chemistry results with respect to the potential risk properties associated with landfilling of the material (Waste Acceptance Criteria assessment).

The site investigation is attached in Appendix 6-1. The laboratory analysis was carried out by Jones Environmental (now Element), a United Kingdom Accreditation Service-accredited laboratory employed directly by OCSC to undertake the analysis, and an assessment of the results was carried out by OCSC. These items are included in Appendix 6-1. These reports take into account the site of the Proposed Development and the proposed Sports Hall and playing pitches provided for in a separate application to An Bord Pleanála (reference number 301482-18).

Refinement of the Conceptual Site Model

Throughout the detailed site investigations and studies undertaken by OCSC the CSM was continually updated, tested and refined with new site-specific information. The outcome of this refinement is presented in this Chapter and the associated figures and technical reports.

Detailed Assessment and Impact Determination

A Detailed Assessment and Impact Determination undertaken by OCSC was carried out which incorporates the full range of site investigations and studies, the refined CSM and a full assessment of any potential impacts.

The approach adopted is as per the IGI Guidelines (IGI, 2013) and each potential effect of the Proposed Development has been described in terms of Quality, Significance, Extent, Probability and Duration. The classification of impacts/effects in this Chapter follows the definitions provided in the Draft EPA Guidelines (EPA, 2017).

Additional guidance and EIA definitions are contained in the NRA Guidelines (NRA, 2009). These guidelines provide useful matrices outlining how additional assessment criteria based on the Importance of a feature to be protected and the Magnitude of the potential impact. This approach has been adopted where appropriate.

Where the Initial Impact Determination concluded that the level of potential impact was capable of measurable and noticeable consequences it is carried into the next assessment phase.

Phase 3: Mitigation, Residual and Final Impact Assessment

Phase 3 builds on the outcome of the initial assessment and detailed site assessments, by identifying mitigation measures to address the identified impacts, where such impacts were capable of measurable and noticeable consequences. This process also considered how the Proposed Development was amended through the EIAR process to incorporate mitigation measures.

The Proposed Development including all identified mitigation measures (assumed implemented) was then subject to a final impact assessment, to identify any residual impacts.

The Final Impact Assessment presented in this Chapter incorporates the outputs from the Detailed Assessment and Impact Determination, Mitigation Measures and Residual Impact Assessment.

Phase 4: Completion of the EIAR Chapter

The final phase of work was the completion of this EIAR Chapter with associated Figures and Appendices. The format used in this EIAR Chapter follows the EPA Guidelines.

6.1.3 *Assumptions and Limitations*

The description of existing conditions is based on the available desk study and ground investigation information as outlined in Section 6.8. Given that the Site is currently part of the grounds of an operational school and sports pitches, the site investigations could not be completed over the entire Site. Geological conditions have been inferred in areas were investigation was not possible and the geology is considered typical and uniform across the development site. Given the site history (i.e greenfield site) and site activities (playing fields belonging to St Paul's College secondary school) and the results of the site investigations completed on accessible areas, it is not envisaged that any significant contamination exists within the Site. The site investigation reported some made ground across the Site, which appeared to constitute reworked clay rather than imported fill.

6.2 Characteristics of the Proposed Development

The description of the Proposed Development and the consideration of alternatives is detailed in Chapter 2 (Project Description & Description of Alternatives). The site of the Proposed Development is located off Sybil Hill Road, Raheny, Dublin 5, on lands to the east of St Paul's College as illustrated in Figure 6-1 below. The study area for the assessment includes the Site and a 2km radius from the Site.

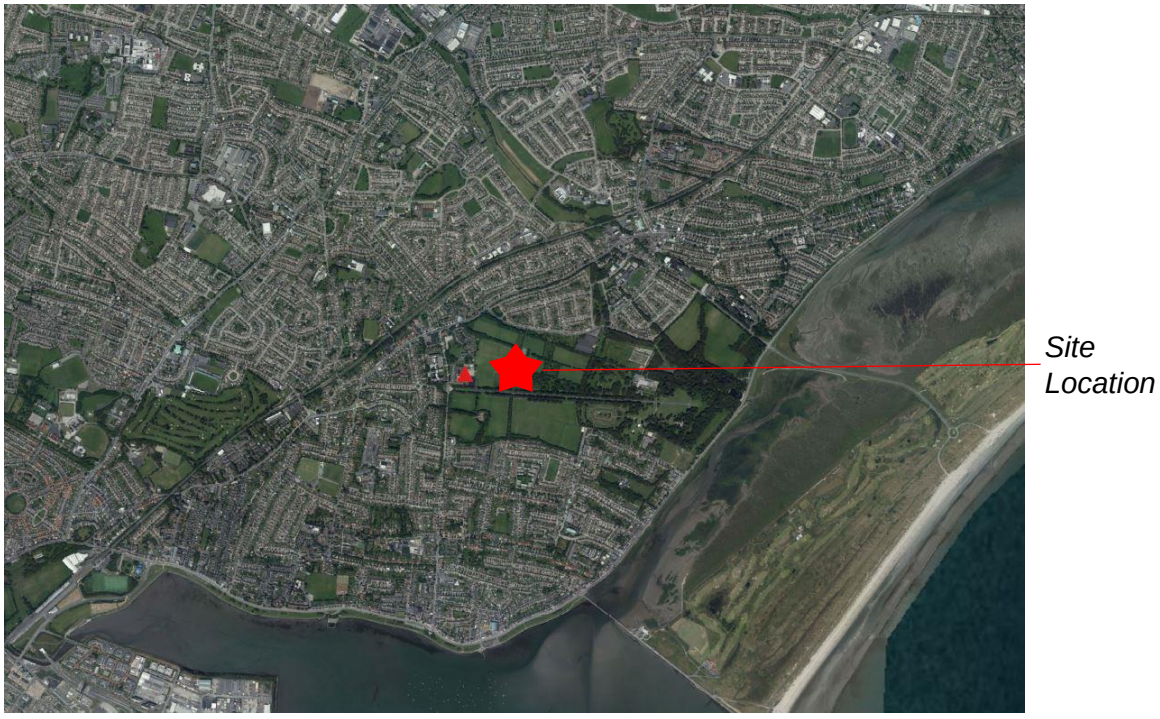

Figure 6-1: Site Location

The Proposed Development comprises the construction of a residential development to accommodate apartments, tenant amenity spaces and a crèche.

The Proposed Development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level the site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive tenant amenity areas, and c. 1.6ha of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of the access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road.

The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the site via St Anne's Park to the Naniken[9] River and the demolition and reconstruction of existing pedestrian river crossing in St Anne's Park with integral surface water discharge to the Naniken River.

There is a number of elements associated with both the Construction and Operational Phases of the Proposed Development which have the potential to impact on the environment with respect to land, soils and geology.

The activities associated with the Proposed Development which have the potential for impact on land, soil and geology are detailed in Table 6-1.

Table 6-1: Site Activities Summary

Phase	Activity	Description
Construction Phase	Discharge to ground	Surface water runoff percolating to ground could result in contamination of the ground in the event of incident rainfall on a spill.
	Storage of hazardous Material	Fuel and chemical storage during Construction Phase.
	Import / Export of Materials	A degree of fill will be required during the works which will include the importation of engineering fill, concrete and aggregate. It is anticipated that c. 8,656m^3 of suitable material will be required for fill during the works. Given the quality of the natural subsoil on site it is anticipated that all the required fill will be generated during site works. All surplus subsoil will be exported for reuse off site where a suitable reuse site can be identified. Soil reuse will be subject to the requirements under the Waste Management Act 1996 (as amended) hereafter referred to as 'Waste Management Act' (e.g. Article 27 or 28). Where material cannot be reused it will

[9] It should be noted that the terms Naniken River and Naniken Stream are interchangeable and for the purpose of this planning application and all supporting reports and documentation both names refer to the same waterbody.

Phase	Activity	Description
		be recovered or disposed of in accordance with the Waste Hierarchy and Waste Management Act. Aggregates will be required for subbase under roads and buildings. All subbase materials must meet the relevant engineering specification. The use of recycled or secondary aggregates should be considered as a replacement for primary aggregates subject to the appropriate consents.
Construction and Operational	Construction of sub-surface structures	Construction of the single storey basement within the superficial deposits to an elevation of c. 20 metres above Ordnance Datum (mOD); this will be founded entirely within the Boulder Clay. Piling or conventional footings will be required and will be within the Boulder Clay.
	Infilling	A degree of fill will be required during the works which will include the importation of concrete and stone. Construction materials which contain recycled/recovered content should be considered as part of the procurement phase.
Operational / unplanned events	Storage of hazardous material	No liquid or fuel oil storage required during the Operational Phase. All heating will be provided by mains natural gas systems.

As outlined in Table 6-1 the Construction Phase holds the highest number of activities which could potentially impact on the geological conditions at the Site. These activities primarily pertain to the excavation and infilling activities required to construct the basement car park and raise site levels. The Operational Phase of the Proposed Development has few activities which would constitute a risk to the soil or geological environment.

6.2.1 *Project Phases / Lifecycle*

The application for the Proposed Development will be submitted to An Bord Pleanála for determination as a Strategic Housing Development in October 2019.

It is anticipated that following a grant of permission, development will commence in Q1 2020 and the Proposed Development will be fully built-out over a 48-month period with completion due by Q4 2024.

6.2.2 *Description of Other Related Projects*

A planning application was lodged with Dublin City Council (**DCC**) on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal.

The recently completed development 'Ardilaun Court' (Reg. Ref. 3383/14) lies to the north of Sybil Hill House and is considered as part of the EIA process. This development consists of 75 no. residential units comprising 7 no. houses and 68 no. apartments.

6.3 Existing Receiving Environment (Baseline Situation)

The existing environment is discussed in terms of superficial and solid geology, and land contamination. This Section and the accompanying Figures can be considered as the geo-environmental CSM of the Site.

6.3.1 *Sourcing Baseline Information*

The region in which the Site is located has been extensively investigated and studied and there is a wealth of geo-environmental data sources available (see Figure 6-2 for Site Investigation Locations). The geology of the Dublin region, including the properties and characteristics of the soil, subsoil and bedrock have been well studied and there are a number of case histories available for subsurface development / structures in the area (Looby & Long, 2007; Long *et al*., 2012).

Site Investigation reports available from the GSI and relevant to the Site include numbers 1069, 56 and 4901. Also relevant are 392, 707, 4688 and 4690 which refer to outcrops in the vicinity of the Site.

Additional sources of information include databases held by GSI, EPA, Ordnance Survey of Ireland (**OS**I) and National Parks and Wildlife Service (**NPWS**).

Consultations were carried out with GSI and Department of Communications, Marine and Natural Resources (**DCMNR**), now Department of Communications, Climate Action and Environment (**DCCAE**), who were consulted in October 2015 regarding areas of geological interest in the area of the Site. The GSI online databases were checked in September 2019 and no changes from the initial consultation response were found.

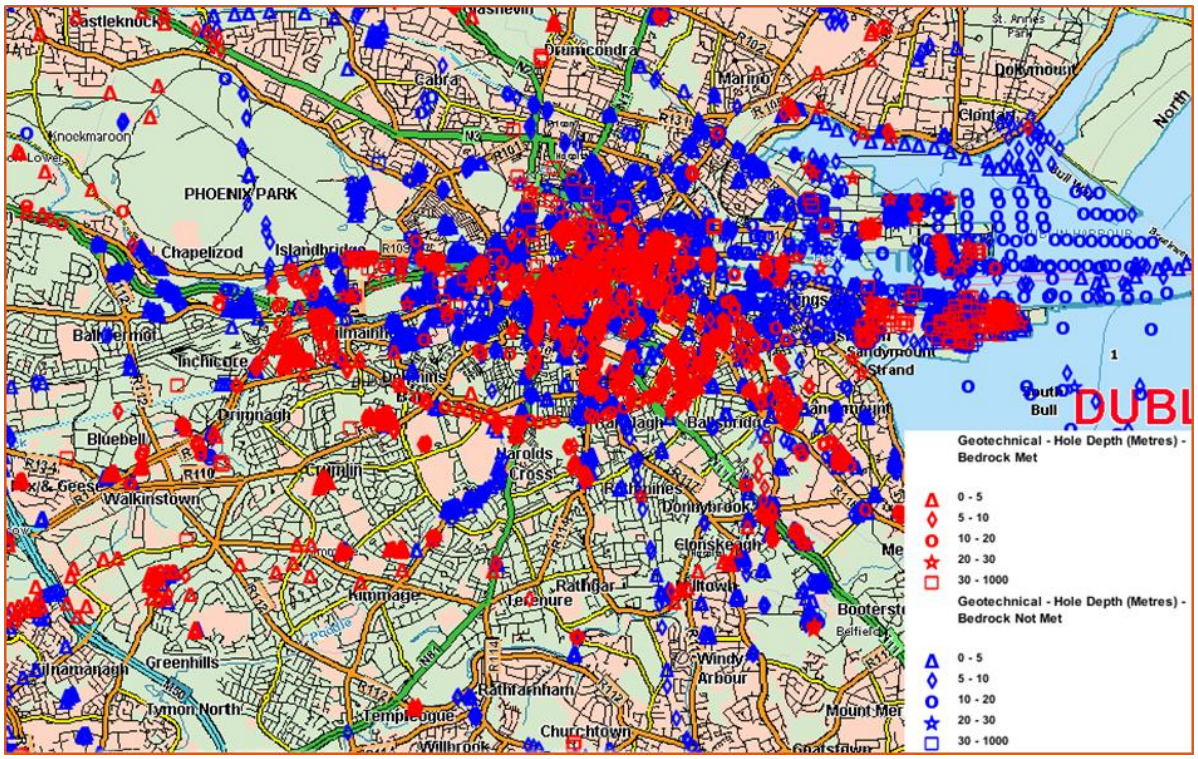

Figure 6-2: Site Investigation Locations, Dublin (GSI Database)

A full list of references is included in Section 6.8.

6.3.2 *Topography and Setting*

The regional topography of Dublin City is generally flat being on a low lying coastal plain, and the flood plain of the River Liffey. The regional highpoints are the Dublin Mountains (elev. 540 metres above Ordnance Datum (**mOD**)) located c. 8km to the south of the City and the hills to the north-west (elev. 230mOD). To the west of the Site the elevation increases gradually to merge with the midlands plain while to the east land within the City falls towards Dublin Bay and the Irish Sea. The topography of the Inner City is dominated by the River Liffey which flows through the middle of the City centre.

A detailed topographical survey has been carried out for the Site and has informed the EIAR and design. The Site topography is generally level at c. 24.5mOD in the north-west to c. 21.5mOD in the south-east corner. The ground level falls gradually away to the east through St Anne's Park (c. 13mOD) and then to the sea at Dollymount (c. 1mOD). Beyond Dollymount is North Bull Island and then Dublin Bay which is c. 1.4km to the south-east of the Site boundary.

The majority of the Site is currently a area of grassland east of St Paul's College.

Figure 6-3: Aerial Image of Site (Bing Maps)

As shown on Figure 6-3 above, the Site is bounded to the south and the east by St Anne's Park which comprises a large area of open green space with mature tree lines and a number of sports pitches. Beyond the northern pitches is the Naniken River which flows eastwards discharging to Dublin Bay at Dollymount. There are 2 no. sports pitches to the east of the Site and a further 2 no. to the north of the Site. There is a residential development ('The Meadows' residential estate) to the west of the Site (from the north-west corner). St Paul's College campus is to the west as is the R808 Sybil Hill Road, the main road.

6.3.3 *Areas of Geological Interest and Historic Land-Use*

The GSI and Department of Communications, Marine and Natural Resources (at the time) were consulted (in 2015) regarding areas of geological interest in the area of the Site. The consultees confirmed that no geological heritage site has been identified in the immediate vicinity of the St Paul's College, including the Site. The closest County Geological Site is located within c. 1.5 km distance and it refers to North Bull Island. The GSI's response was that *"due to the nature of the Proposed Development no impact is anticipated".* The GSI's online database was checked in 2019 and there were no additional sites added in the interim period.

Details of the Site history and previous land use are included in Chapter 11 (Archaeology, Architecture & Cultural Heritage). The assessment of the Site history through the years confirms the Site has primarily been occupied by agricultural fields and later developed as playing fields.

6.3.4 *Regional Soils*

The general lithologica / geological sequence of the overburden within the Dublin area comprises the following units:

Table 6-2: Superficial Deposits in the Dublin Region

Superficial Deposits
Made Ground
Estuarine / alluvial clays and silts
Estuarine / alluvial gravels and sands
Glaciomarine clays, silts and sands
Glacial Till (drift)
Glacial gravels and sands

Made ground, concrete and tarmac covers the majority of central Dublin as a result of development through the years. As the City has developed large parts of the tidal areas along the natural shoreline and along the course of the River Liffey and its tributaries have been reclaimed and modified. The majority of central Dublin has had some anthropogenic influence with made ground covering almost all the central city and stretching out to the suburbs.

The St Paul's College campus and adjoining St Anne's Park have not been subject to significant development and hence made ground is absent on the Teagasc Soils Map. This map is freely available on the GSI and maps the description of topsoil in Ireland. The topsoil at the Site is classified as "*deep well drained material derived from mainly basic parent material (calcareous) – BminDW*". Some poorly drained areas are also mapped to the east of the Site within St Anne's Park.

The subsoil has been mapped by the GSI as consisting of Limestone Till (Carboniferous). This is the dominant subsoil type in the region and is a glacial deposit which is known as Dublin Boulder Clay. This till resulted from glaciations which covered the region during the Pleistocene and Quaternary periods. It is known that the ice thickness in Dublin was c. 1km deep. The grinding action of this ice sheet as it eroded the underlying limestone and shale, together with the loading effect, resulted in the formation of a very dense / hard low-permeability deposit with pockets or lenses of coarse gravel (Long *et al*., 2012). The lenses are generally less than 2m wide and less than 0.5m thick. They are generally self-draining within 24hrs and have poor interconnectivity.

Local withdrawal and recedence of the ice sheet led to the formation of fluvioglacial sediments (gravel and sand lenses) and glaciomarine sediments (stiff / firm laminated clays, silts and sands). The glacial deposits can exhibit significant lateral and vertical variations in grain size distribution over short distances.

The Dublin Boulder Clay has been extensively studied and there are many publications describing its properties. Additionally, there are numerous examples of deep excavations (up to 25m) and constructions within the Dublin Boulder Clay (e.g. Dublin Port Tunnel, Trinity College Library and Leinster House). Data and case history from these sites have shown that the behaviour of the walls in Dublin Boulder Clay are very rigid due to the inherent natural strength and stiffness of the material and the slow dissipation of excavation-induced depressed pore pressure or suctions (Long *et al.,* 2012).

The recent construction of the Dublin Port Tunnel has allowed extensive study of the Dublin Boulder Clay and four distinct formations within the clay have been identified namely;

- the upper brown boulder clay (**UBrBC**);
- the upper black boulder clay (**UBkBC**);
- the lower brown boulder clay (**LBrBC**); and
- the lower black boulder clay (**LBkBC**) (Skipper *at al*., 2005).

The upper two units are the most commonly encountered in excavations and hence are the most important from the point of view of retaining structures and basements.

The boulder clays generally exhibit very low permeability in the order of $1x10^{-7}$ to $1x10^{-9}$ m/s or lower. The glacial boulder clay will tend to act as an aquitard, an impermeable layer overlying the more permeable formations, including the limestone bedrock.

6.3.5 *Regional Geology*

The bedrock of the greater Dublin region consists of Dinantian Upper Impure Limestone which is part of the Lucan Formation. The limestone is colloquially known as Calp and is estimated to be up to 800m thick. The homogeneous sequence has been described as dark grey to black limestone and shale. The homogeneous sequence consists of dark grey massive limestones, shaley limestones and massive mudstones. The average bed thickness is less than 1m, but these normally thin-bedded lithologies can reach thicknesses of 2m or more. The older Malahide Formation, which is described as argillaceous bioclastic limestone, shale and is a

Dinantian Lower Impure Limestone is located to the north of the Site. The local geology mapped by the GSI is illustrated on Figure 6-4 below.

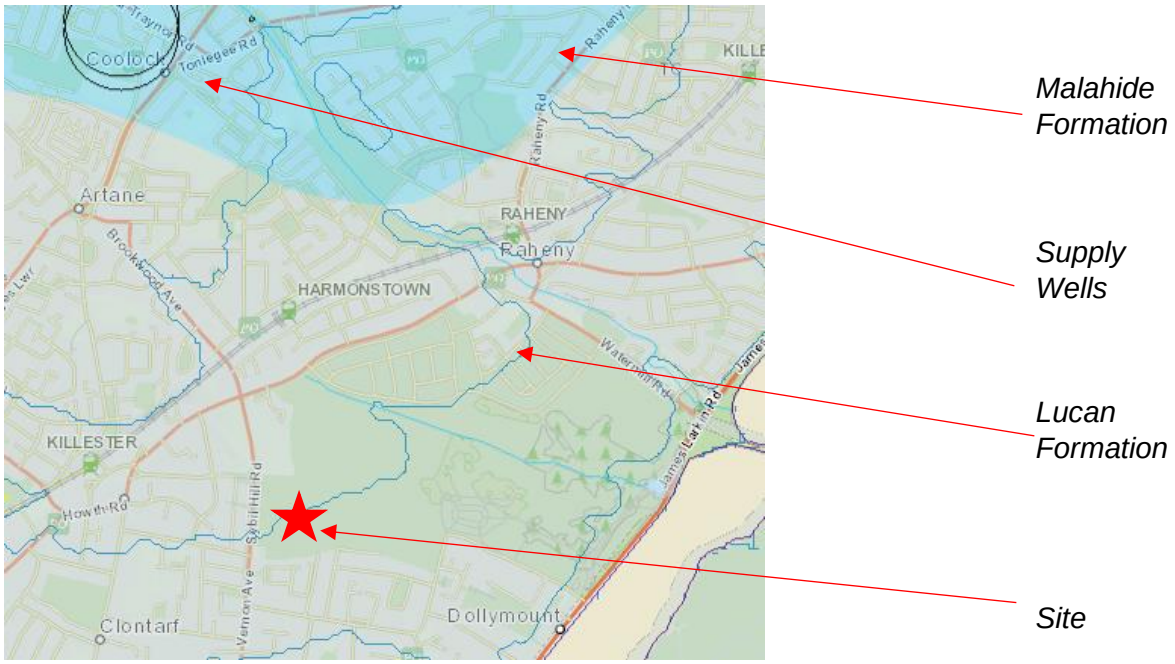

Figure 6-4: Local Bedrock Geology

The Calp is almost completely obscured across central Dublin under the Dublin Boulder Clay. A number of outcrops are recorded to the west of the Site (Collins Avenue West and Abbyfield). There are no faults mapped in the vicinity of the Site.

6.3.6 *Local Soils and Geology*

The site-specific intrusive investigations undertaken by GII have proven the topsoil and subsoil formations. In-situ testing and characterisation of the boulder clay in terms of geotechnical and chemical properties was carried out during the site investigations (see Appendix 6-1). A summary of the soils encountered is detailed in Table 6-3 below.

Table 6-3: Site Soil Summary

Typical Depth Proven (mbgl)	Geological Unit/Strata	Typical information	General Geotechnical Description
0 – 1.5	Made Ground	N=15 to 33	MADE GROUND comprising brown sandy gravelly clay fill. This appeared to be reworked native material and there was no evidence of any waste elements or indications that the material was imported onto the site.
0.8 – 1.2	Dublin Boulder Clay 1 (Upper Brown)	N=15 to 36	Stiff brown sandy gravelly CLAY with occasional cobbles
2.2 – 3.0	Dublin Boulder Clay 2	N=29 to 50 (refusal)	Stiff black sandy gravelly CLAY with occasional cobbles and boulders

Typical Depth Proven (mbgl)	Geological Unit/Strata	Typical information	General Geotechnical Description
	(Upper Black)		

During the site investigations made ground was encountered at an average thickness of c. 1.2m across the Site. This material appeared to be reworked native material (brown Dublin Boulder Clay) and there was no evidence that the material had been imported from off site. No waste elements or discoloured soil was observed. For contamination / environmental risk purposes the Site can be classified as greenfield as opposed to brownfield.

The upper made ground was underlain by Upper Brown Dublin Boulder Clay. This is described as stiff brown sandy gravelly CLAY with occasional cobbles. This was in turn underlain by Upper Black Dublin Boulder Clay which becomes stiffer with depth. In one location (**BH3** for location of BH3 see Site Investigation Report in Appendix 6) there was a stiff grey sandy slightly gravelly CLAY recorded beneath the Black Boulder Clay at 6m below ground level (**BGL**). This displayed similar stiffness to the Black Boulder Clay and is likely to exert similar geotechnical properties.

The strength and stiffness of the Dublin Boulder Clay increased considerably with depth, refer to Table 6-3 above, where the high 'n' values at depth, measured by 'blow counts' indicate the greater difficulty in penetrating the soil at depth. Regarding the excavation of the soil, it is likely that hard digging will be required. Further details on geotechnical properties are included in Appendix 6-1.

Bedrock was not proven in any boreholes and all locations were progressed to a depth of 8mBGL with the exception of BH1 which met refusal at 5.5m (presumed to be a boulder). The GSI's geo-urban County Dublin Rock Head model indicates that rock head in the vicinity of the Site can be expected to be 5-10mBGL. The site investigation in conjunction with investigations to the east in St Anne's Park, indicated that rock head is at least 8mBGL on the Site and may be deeper.

6.3.7 *Soils Contamination Assessment*

An assessment of soil contamination in the context of waste acceptance was carried out in the event that any surplus soil from the Site requires disposal off site during the Construction Phase. Samples were obtained from all boreholes during the site investigation a selection of which were sent to be analysed by the accredited laboratory Jones Environmental for a range of parameters including metals (Waste Acceptance Criterion (**WAC**) type leachate testing and total), Polycyclic aromatic hydrocarbons (**PAHs**), hydrocarbons, Polychlorinated Biphenyls (**PCBs**), and organic carbon.

A hazardous waste assessment was carried out using HazWasteOnline using the laboratory's results. The results of this assessment confirmed that all the material can be categorised as non-hazardous and the relevant information is included in Appendix 6-1.

The results of the WAC testing indicated that any surplus soil which may require excavation and disposal off site generally complies with the Inert Landfill acceptance criteria. Dissolved

Selenium was reported above the inert thresholds in two samples. This is likely to be naturally occurring and can be acceptable at inert facilities such as Integrated Material Solutions who have increased limits for Selenium. Confirmation of acceptance must be obtained from the receiving site / facility operator. Further details on waste management are contained in Construction & Demolition Waste Management Plan (**CDWMP**) which is incorporated into the CEMP and which accompanies the planning application.

Two samples analysed returned positive results of hydrocarbons. The laboratory confirmed this as lubricating oil which can be attributed to the drilling process used during site investigations. The concentrations reported were trace levels which are likely to have come from the shell of the drilling equipment rather than any contamination within the soil.

6.3.8 *Radon*

According to the EPA (now incorporating the Radiological Protection Institute of Ireland (**RPII**) the Raheny area has been classified as a Very Low Radon Area where is it estimated that less than 1% of dwellings will exceed the Reference Level of 200 Bq/m3.

6.3.9 *Summary & Type of Geological Environment*

Based on the regional and site-specific information included within this Chapter and Chapter 7 (Hydrology, Water and Hydrology), the type of Geological Environment as per the IGI Guidelines is **Type A – Passive geological / hydrogeological environment**. A Type A – Passive geological environment is one where there are areas of thick low permeability subsoil, and areas underlain by poor aquifers and recharge areas. Type A environments are considered to be historically stable geological environments;

A summary of the Site geology is outlined thus:

- The Site is essentially a greenfield site with previous site uses being predominantly agriculture / parkland.
- There are no known potential contamination sources on the Site or on adjacent sites.
- The Site is underlain by shallow depth of made ground (c. 1.2m) which is likely to be reworked natural material which originated on site which was reworked to form suitable playing pitch surfaces.
- The subsoil comprises Dublin Boulder Clay (upper brown followed by upper black) which increases with stiffness and strength with depth.
- The boulder clay is relatively impermeable.
- Depth to bedrock is over 8mBGL and bedrock comprises Calp Limestone.

Accordingly, it is not considered that the Site is particularly sensitive from a geological perspective.

6.4 Potential Impact of the Proposed Development

The EPA Guidelines identify the terminology used for the Significance of Effects and have been summarised in Table 6-4 below.

Table 6-4: Description of Effects

Significance	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight 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 impact 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 Effects	An effect which obliterates sensitive characteristics.

6.4.1 *Construction Phase*

In line with EIA guidance, each potential impact for the Proposed Development should be described in terms of its Quality, Significance and Duration. The potential impacts, mitigation measures and resulting residual impacts have been combined in a Detailed Assessment Table presented in Section 6.7 (Table 6-6).

The potential geological impacts during the Construction Phase are presented in detail in Table 6-6 below and are outlined below.

Soil excavation

The primary impact on the geological environment that will occur due to the Proposed Development is soil excavation, as the Proposed Development will require removal of soil for basement construction. This is a certain and definite impact and will happen as a result of the Proposed Development. This is a moderate negative impact, as a result of excavation of boulder clay i.e. change in the natural geological features.

Accidental spills / contaminated runoff

The Proposed Development also creates potential for accidental spills or contaminated run-off during the Construction Phase. It is considered unlikely that any spills would be sufficiently large to impact the geological environment regardless this potential has been assessed.

There is the potential for water (rainfall) to become contaminated with pollutants associated with construction activity. Contaminated water arising from construction sites can pose a significant risk to the geological environment if allowed to percolate into the soil matrix. The potential main contaminants include:

- Cement / concrete (pH) – arising from construction materials;
- Hydrocarbons – accidental spillages from construction plant or onsite storage; and
- Wastewater (nutrient and microbial rich) – arising from poor welfare facilities.

Imported fill and aggregates

The Proposed Development will require imported fill and aggregates to facilitate the construction works. There is a risk that contaminated / unsuitable fill material could be brought to the Site, and then the associated risk it would bring i.e. contaminating the existing uncontaminated material. This is an unlikely impact as only engineering quality material will be brought onto the Site.

Export of material from the Site

Site investigations have established that there is no contamination present on site. Nonetheless material, which is exported from the Site, if not correctly managed or handled could impact negatively on human beings, both at and near the receiving site, as well as water and soil environments. The risk is very unlikely because all material will be removed and either disposed of or recovered in accordance with the Waste Management Act and in that regard deposited at appropriate facilities.

Potential Pollutant Linkages

A critical element of the risk assessment process is the establishment of a CSM for the Site which describes the potential sources of contamination at a site, the migration pathways it may follow and the receptors it could impact. If complete SPR scenarios exist, then there is a potential pollutant linkage that needs to be characterised and assessed (via formal risk assessment). All three elements need to be present for a viable risk to exist (e.g. if a source and receptor exist but no pathway is present then there is no pollutant linkage and hence no risk).

Sources

- There have been no potential contamination sources identified on site currently;
- There will be some small source of potential contamination present on site during the Construction Phase (e.g. machinery oils, fuel, cement etc.);
- Run-off from construction sites can contain minor levels of pollutants (e.g. mineral oils); and

- There will be no significant sources of potential hydrocarbon contamination present on site during the Operational Phase of the Proposed Development (gas fuelled heating is proposed).

Receptors

- The surrounding land, soils and geology constitute a receptor.

Pathways

- Migration of contaminants from surface spills to land, soils, geology, groundwater or surface water constitutes a potential pathway; and
- Migration of contaminated run-off (e.g. during the Construction Phase or Operational Phase) to groundwater, surface water or surrounding geology constitutes a potential pathway.

Potential Pollutant Linkages

An environmental risk is only present when a pathway links a source with a receptor. The potential pollutant linkage CSM for the Proposed Development is summarised in Table 6-5:

Table 6-5: Conceptual Site Model Pollutant Linkages Geology

Source	Pathway	Receptor	Potential Pollutant Linkage (Y/N)	Effective Mitigation
Deleterious materials stored on site during the Construction Phase	Migration of surface spills / contaminated run-off	Surrounding Land / Soils	Y	All materials stored on site will be subject to strict control measures and local containment measures (e.g. bunded tanks and pallets).
Contaminated run-off from construction activities			Y	Generation of contaminated run-off will be reduced through the Construction Management Plan (discussed later in this Chapter under Mitigation) and control measures implemented during the Construction Phase.

The mitigation measures set out in Table 6-5 above are discussed in further detail in later sections.

Effects assessed elsewhere in this EIAR

The impacts of the Proposed Development on soil and geology during the Construction Phase also relate to and interact with other Chapters within the EIAR specifically:

- Chapter 4 (Population & Human Health)

- Chapter 5 (Biodiversity)
- Chapter 7 (Hydrology, Water & Hydrogeology)
- Chapter 8 (Microclimate, Air Quality & Climate)
- Chapter 9 (Noise & Vibration)
- Chapter 11 (Archaeology, Architecture & Cultural Heritage)
- Chapter 12 (Material Assets).

Specific interactions are listed below, further detail is provided in the relevant Specialist Chapter and in Chapter 14 (Interactions).

- There is the potential of sediment-laden runoff to waterbodies. This is discussed further in Chapter 7 (Hydrology, Water & Hydrogeology) in addition to any requirements for dewatering.

- There is a potential for dust from excavations or stockpiles to impact on air quality. This is discussed further in Chapter 8 (Microclimate, Air Quality & Climate).

- Noise and vibration will be generated through the Construction Phase particularly during excavation work. Given that no rock excavation is required it is anticipated that conventional excavation techniques (i.e. hard digging) will suffice. Noise and vibration impacts are considered in detail in Chapter 9 (Noise & Vibration).

- The Construction Phase and any import or export of material to the site (as part of excavation or infilling works) will have implications for traffic in the surrounding road network. These impacts are considered further in Chapter 12 (Material Assets).

- A number of areas of archaeological interest have been identified with the Site. These areas are within areas for development. This is discussed further in Chapter 11 (Archaeology, Architecture & Cultural Heritage).

6.4.2 *Operational Phase*

During the Operational Phase of the Proposed Development there will be very limited to no potential impact on the geological environment. There is no requirement for any fuel oil stores as all heating will the fuelled by mains gas therefore not potential source of contamination from fuel stores.

6.4.3 *'Do-Nothing' Scenario*

In the case where the Proposed Development was not to be developed there would be no resulting additional impacts on the geological environment.

6.5 Mitigation and Monitoring

6.5.1 *Mitigation*

This section describes a range of recommendations and mitigation measures designed to avoid, reduce or offset any potential adverse geological impacts identified.

6.5.1.1 *Construction Phase*

In order to reduce the impacts on the soils, geology and hydrogeological environment a number of mitigation measures will be adopted as part of the Construction Phase. 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 Development;
- Fuel and chemical handling, transport and storage; and
- Control of water during the Construction Phase.

Control of Soil Excavation

Topsoil and subsoil will be excavated to facilitate the formation of basement levels, ramp access, construction of a new sewer and water mains connections, roadways and all other associated services. The Proposed Development will incorporate the; *reduce, reuse and recycle* approach in terms of soil excavations on site. The Construction Phase will be carefully planned to ensure only material required to be excavated will be excavated with as much material left in situ as possible. All excavation arisings will be reused on site where possible.

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

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes and road sweeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads. Refer to Chapter 8 (Microclimate, Air Quality & Climate) for more details.

Export of material from the Site

Where material cannot be reused on site (e.g. not all topsoil will make suitable engineering fill) it will be exported for reuse off site subject to the appropriate permissions being in place at the receiving site. Additionally, any soil to be exported may be classified as a by-product rather than a waste via an Article 27 Declaration (or Article 28) to the EPA. Where material cannot be reused off site it will be sent for recovery at an appropriately permitted facility. This is discussed further in the CEMP which is submitted as a separate document in support of this planning application.

The control of material will be carried out in accordance with the Waste Management Act (including recording material source and destination) and further details are included in the Construction Environmental Management Plan (**CEMP**) incorporating the CDWMP.

Sources of Fill and Aggregates

All imported fill and aggregate for the Proposed Development 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 project;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

The use of fill and aggregate containing recycled or recovered materials shall be considered.

Fuel and Chemical Handling

The following mitigation measures will be in place during the Construction Phase in order to prevent any spillages to ground of fuels and prevent any resulting soil and / or groundwater quality impacts:

- Designation of bunded refuelling areas on the Site (if required);
- 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 concrete bunded areas;
- 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 should be secured and moved on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

The list of measures is non-exhaustive and will be included in the outline CEMP, as part of this planning application.

Construction Environment Management Plan (CEMP)

In advance of work starting on site the works appointed Contractor will develop a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Authority. The appointed Contractor will also update the CEMP as required. The CEMP sets out the overarching strategy for ensuring that construction of the Proposed Development will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project. The CEMP incorporating the CDWMP are included in the main submission.

Control of Water during the Construction Phase

Run-off from excavations / earthworks cannot be prevented entirely and is largely a function of the 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. There will be minimal inflow of shallow / perched groundwater into any excavation due to the very low permeability of the Dublin Boulder Clay.

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 offsite impacts. All run-off will be prevented from directly entering into any waterbody.

Should any discharge of construction water be required during the Construction Phase, discharge will be to foul sewer regulated under a Discharge Licence obtained from the Regulator (Irish Water) issued under the Water Pollution Act. This is assessed in more detail in Chapter 7 (Hydrology, Water & Hydrogeology).

6.5.1.2 *Operational Phase*

During the Operational Phase of the Proposed Development there will be an imperceptible impact on the geological environment from site activities

The proposed scheme will have a combination of district and local heating systems all of which will be fuelled by mains gas. Therefore, there is no requirement for fuel oil storage removing any potential source of soil contamination.

6.5.1.3 *'Do-Nothing' Scenario*

In the case where the Proposed Development was not developed there will not be any mitigation measures required.

6.5.2 *Monitoring*

6.5.2.1 *Construction Phase*

- Monitoring shall be carried out as specified in any Discharge Licence associated with the Construction Phase of the Proposed Development.

- Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act. Regular auditing of construction/mitigation measures will be undertaken (e.g. concrete pouring, refuelling in designated areas etc.).

No additional monitoring required as part of the Construction Phase.

6.5.2.2 *Operational Phase*

There is no requirement for monitoring in the Operational Phase.

6.6 Residual Impacts

The predicted residual impacts of the Proposed Development are outlined in the detailed assessment Table 6-6.

6.6.1 *Construction Phase*

The predicted impacts of the Construction Phase are described in Table 6.6 below in terms of quality, significance, extent, likelihood and duration. The relevant mitigation measures are detailed, and the residual impacts are determined which take account of the mitigation measures.

The primary residual impacts from the Construction Phase is the change of use and removal of soil to facilitate the basement construction. These impacts are unavoidable given the nature, requirement and design of the Proposed Development.

6.6.2 *Operational Phase*

During the Operational Phase of the Proposed Development there is very limited to no potential impact on the geological environment of the area. There is no requirement for any fuel oil stores as all heating will the fuelled by mains gas.

6.6.3 *'Do Nothing' Scenario*

In the case where the Proposed Development was not developed there would be no resulting additional impacts on the geological/hydrogeological environment in the area of the Site.

6.6.4 *Cumulative Impacts*

Given the scale of the Proposed Development and the capacity of the surrounding environment to accommodate a development of this nature, it is considered that the overall cumulative impact in the area will have a negative moderate, permanent impact on the

geological environment, through the addition of buildings, infrastructure and hardstanding. However, provided sufficient mitigation measures are in place the overall impact on geological environment will be neutral and not significant.

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and currently under appeal.

The cumulative impact of the Proposed Development with the newly constructed 'Ardilaun Court' residential estate, is not significant for land, soils and geology.

Table 6-6: Impact Determination - Construction Phase

Constraint		Impact Assessment							
Activity/Source	**Construction Element**	**Impact Description**	**Quality**	**Significance**	**Extent**	**Likelih.**	**Duration**	**Mitigation**	**Residual Impact**
Earthworks	• Site Clearance • Basement Excavation • Basement Construction	Excavation of Natural Soils and Subsoil for basements, attenuation tanks, drainage etc.	Negative	Moderate	Local	Certain	Permanent	The minimum amount of space to construct the project has been designed for. Material will be reused on site where possible.	Moderate Negative
		Reuse of suitable material off site	Positive	Slight	Local (potentially a number of sites)	Likely	Long-term	Spoil generated on site is a resource and shall be re-used on site where possible. Where material must be exported offsite it will be reused where possible in line with relevant Waste and Planning Legislation. Art. 27 declarations will be made to the EPA where required to classify the material as a by-product where required.	Slight Positive
		Soil erosion causing airborne dust and/or nuisance dust on public roads and neighbouring properties	Negative	Slight	Local	Unlikely	Short term	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the excavation period. Vehicle wheel wash facilities will be installed at site exits and a road sweeping programme will be implemented. Refer to Chapter 8 Air Quality and Climate.	Imperceptible
		A degree of fill will be required during the works which will included imported fill and aggregates	Negative	Slight - Moderate	Local (potentially a number of quarry sites)	Likely	Long-term	Contract and Procurement Procedures will ensure that all aggregates and fill material required for the construction are sourced from reputable suppliers. Declarations of conformity/compliance certificates will be required to ensure all aggregates supplied meet the specified engineering specifications.	Imperceptible

Constraint		Impact Assessment							
Activity/Source	**Construction Element**	**Impact Description**	**Quality**	**Significance**	**Extent**	**Likelih.**	**Duration**	**Mitigation**	**Residual Impact**
Storage of potentially polluting materials	• Site Clearance • Basement Excavation • Installation of Retaining Walls • Basement Construction	Potential leak or spillage from construction related liquids on site	Negative	Significant	Local	Unlikely	Short term	Good housekeeping on all project sites and proper handling, storage and disposal of any potentially polluting substances can prevent soil and/or water contamination. Designated and bunded storage areas will be maintained. Further details are included in the CMP	Imperceptible
Discharge to Ground	•Basement Excavation and Construction •General Construction	Potential contaminated run-off percolating to ground and the underlying aquifer	Negative	Significant	Local	Unlikely	Short-term	There will be no direct discharge to groundwater or land during construction. However indirect discharges to the underlying bedrock aquifer and land may occur and the aquifer vulnerability will increase, albeit not significantly given the thickness of Boulder Clay beneath the site, as the subsoil is removed from site. Protection of groundwater and land from potentially polluting substances will be dealt with through a number of measures including correct handling and storage of potentially polluting substances.	Imperceptible

6.7 Summary

6.7.1 *Summary of Likely Significant Environmental Effects*

Based on the regional and site-specific information available the type of Geological / Hydrogeological Environment as per the IGI Guidelines is Type A – Passive geological / hydrogeological environment.

The Proposed Development will not give rise to any likely significant long-term effects. Slight negative effects will be experienced during the Construction Phase with the removal of soil for basement construction.

6.7.2 *Summary of proposed mitigation and monitoring measures and their influence on design*

Proposed mitigation and monitoring measures relate to the Construction Phase only and are summarised under the following aspects:

- Control of soil excavation and export from Site.
- Sources of fill and aggregates for the project.
- Fuel and chemical handling, transport and storage.
- Control of water during the Construction Phase.
- Monitoring shall be carried out as specified in any Discharge Licence associated with the Construction Phase of the Proposed Development.
- Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act.

6.7.3 *Summary of Residual Impacts*

The primary residual impact from the Construction Phase is the excavation of soil to facilitate the basement construction. This impact is unavoidable given the nature, requirement and design of the Proposed Development. The significance of this impact will be diminished through; the reduction of the amount of material requiring excavation through the design; management of work on site; reuse of material on site where possible and reuse of material offsite where possible. Overall the effect will be not significant.

6.8 References

The sources for the geology desk study included:

- EPA Envision Data Viewer: http://gis.epa.ie/Envision

- Farrell, E.R., and Wall D. (1990*). Soils of Dublin*, Institution of Engineers of Ireland, 115, 78-9.

- Geological Survey of Ireland General Data Viewer http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple

- Geological Survey of Ireland Geotechnical Data Viewer http://spatial.dcenr.gov.ie/GeologicalSurvey/GeoTechnicalViewer/index.html

- Geological Survey of Ireland Geotechnical Database (Reports No 1069, 56, 4901, 392, 707, 4688 and 4690).

- Geological Survey of Ireland GeoUrban Data Viewer http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GeoUrban

- Geological Survey of Ireland National Groundwater Viewer http://spatial.dcenr.gov.ie/GeologicalSurvey/Groundwater/index.html

- Geological Survey of Ireland Quaternary Geology map of Dublin.

- Looby, M. & Long, M. *Deep Excavations in Dublin, Recent Developments*. Paper first presented to a meeting of the Geotechnical Society of Ireland at Engineers Ireland, 22 Clyde Rd, Dublin 4, on 11th December 2007.

- Long, M., Brangan, C., Menkiti, C., Looby, M. & Casey, P. 2012. *Retaining walls in Dublin Boulder Clay, Ireland*. Proceedings of the ICE – Geotechnical Engineering [Online], 165. Available: http://www.icevirtuallibrary.com/content/article/10.1680/geng.9.0091

- Long, M. & Menkiti, C.O (2007). *Geotechnical Properties of Dublin Boulder Clay*. Geotechnique, No. 7, 595-611.

- Long, M. & Murphy, B. (2003). *Difficulties with Ground Anchorages in Hard Rock in Dublin, Ireland*. Geotechnical & Geological Engineering, 21, 87-111

- McConnell, B. and Philcox, M., (1994). *Geology of Kildare-Wicklow: A geological description to accompany the Bedrock Geology* 1:100,000 Scale Map Series, Sheet 16, Kildare-Wicklow. Geological Survey of Ireland.

- Skipper, J., Follett, B., Menkiti, C.O., Long, M. & Clark-Hughes, J. (2005). *The engineering geology and characterisation of Dublin Boulder Clay,* QJEGH, 38, 171-187.

In addition to the general relevant sources listed the following site specific information sources were reviewed as part of the baseline data collection:

- Ground Investigation Reports (Appendix 6-1)

- Laboratory Analytical Certificates and OCSC Waste Assessments (Appendix 6-2)

7 HYDROLOGY, WATER & HYDROGEOLOGY

7.1 Introduction

This Chapter provides; a description of the Proposed Development (in respect of hydrology, water and hydrogeology); the baseline hydrology, water and hydrogeology environments for the Site; and a statement of the likely significant impacts associated with both the Construction and Operational Phases of the Proposed Development. A 'do-nothing' scenario has also been considered. Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, and reinstatement or remedial measures and recommendations for monitoring are included where appropriate. Predicted residual effects are described. Assessments for the Site are detailed in this Chapter with relevant technical information included in:

- A Site-Specific Flood Risk Assessment (**SSFRA**)
- Engineering Service Report (**ESR**)

This assessment was carried out by Jonathan Burke B. Eng. Tech Civil Eng. DIT of O'Connor Sutton Cronin (**OCSC**), Multidisciplinary Consulting Engineers. Jonathan has over 8 years' experience in Civil Engineering Design Consultancy and is a Member of Engineers Ireland.

7.2 Study Methodology

7.2.1 *Approach*

The assessment followed a phased approach as outlined in Chapter 4.4 of the EPA *Draft Advice Note for Preparing Environmental Impact Statements* (EPA, 2015). A Conceptual Site Model (**CSM**) was developed in order to identify any likely Source-Pathway-Receptor (**SPR**) linkages relating to the site of the Proposed Development. The SPR approach identifies the location and characteristics of potential sources for environmental impact (Source) followed by the identification of any potential receptors which could be harmed by exposure to the source impact (Receptor) and finally, identifies any connecting pathways which might allow source to receptor connectivity (Pathway). The phases of assessment are outlined below.

Phase 1: Initial Assessment

An initial assessment was carried out which defined the project in terms of location, type and scale; established the baseline conditions; established the type of hydrological environment; established the activities associated with the Proposed Development and; undertook initial assessment and impact determination. The information sources were utilised to establish the baseline conditions for the Site and all available information was compiled into a preliminary CSM. The CSM is based on the accepted SPR model for assessing environmental impacts. The CSM went through iterative reviews and was updated with site specific data obtained through site investigations and studies.

Phase 2: Direct and Indirect Site Investigations and Studies

A site investigation was carried out at the Site during September and October 2015. The work was undertaken, scoped and specified by an Environmental Geologist in line with the Institute of Geologists of Ireland (**IGI***) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*. Works were carried out relevant to hydrology by Ground Investigations Ireland Ltd. (**GII**) and consisted of the following work:

- Installation of 9 no. groundwater monitoring wells;
- Measurement of groundwater levels;
- Soakaway / infiltration tests;
- Assessment of the soil chemistry results with respect to potentially hazardous properties (HazWasteOnline Assessment); and
- Assessment of the soil chemistry results with respect to the potential risk properties associated with landfilling of the material (Waste Acceptance Criteria assessment).

Surface water sampling was undertaken by Enviroguide between 7th April and 4th May 2019, upstream and downstream of the proposed surface water outfall as shown below in Figure 7-1. The laboratory analysis was carried out by City Analysis Ltd. and an assessment of the results are presented as baseline for the receiving watercourse water quality (see Appendix 7.1).

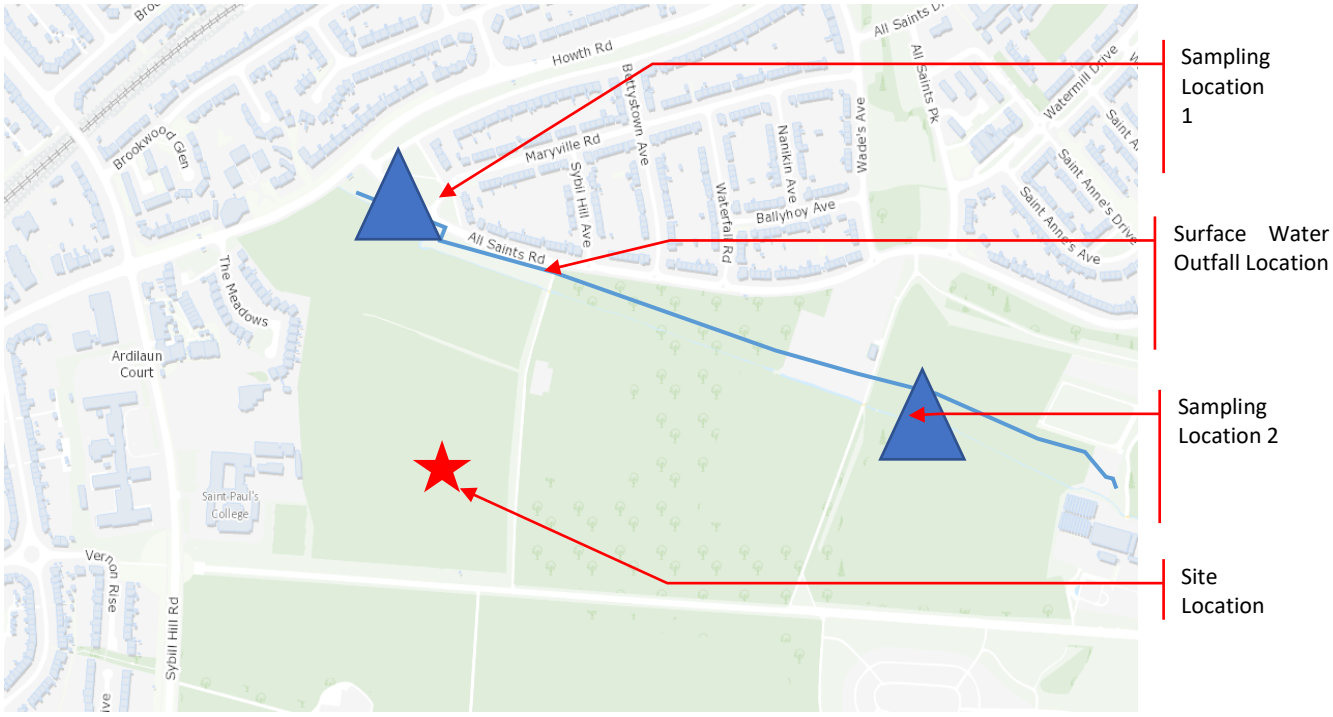

Figure 7-1: Surface Water Sampling Locations

Groundwater was monitored in boreholes for seven days in October 2015 and for three days in February 2018. An assessment and the opinion of the Hydrogeologist are presented as baseline for the receiving waterbody water quality, see Section 7.3.10.

The Site Investigation Report is attached in Appendix 6-1 of Chapter 6 (Land, Soils & Geology).

Refinement of the Conceptual Site Model

Throughout the detailed site investigations and studies the CSM was continually updated, tested and refined with new site-specific information. The outcome of this refinement is presented in this Chapter and the associated figures and technical reports.

Detailed Assessment and Impact Determination

A Detailed Assessment and Impact Determination undertaken by OCSC was carried out which incorporates the full range of site investigations and studies, the refined CSM and a full assessment of any potential impacts.

The approach adopted is as per the Construction Industry Research and Information Association's (**CIRIA**) publication CIRIA C753-SuDS Manual and the '*Greater Dublin Strategic Drainage Study*', (**GDSDS**) each of the potential effects of the development have been described in terms of Quality, Significance, Extent, Probability and Duration.

The classification of impacts / effects in this Chapter follows the definitions provided in the Draft EPA Guidelines (EPA, 2017).

Additional guidance and EIA definitions are contained in the NRA Guidelines (NRA, 2009). These guidelines provide useful matrices outlining how additional assessment criteria based on the Importance of a feature to be protected and the Magnitude of the potential impact. This approach has been adopted where appropriate.

Where the Initial Impact Determination concluded that the level of potential impact is capable of measureable and noticeable consequences it is carried into the next assessment phase.

Phase 3: Mitigation, Residual and Final Impact Assessment

Phase 3 builds on the outcome of the initial assessment and detailed site assessments, by identifying mitigation measures to address the identified impacts and by considering how the Proposed Development is amended through the assessment process to incorporate mitigation measures. Mitigation measures which have been built into the Proposed Development design have been considered in this process.

The Proposed Development including all identified mitigation measures (assumed implemented) is then subject to impact assessment, to identify any residual impacts.

The Final Impact Assessment presented in this Chapter incorporates the outputs from the Detailed Assessment and Impact Determination, Mitigation Measures and Residual Impact Assessment.

Phase 4: Completion of the EIAR Section

The final phase of work was the completion of this EIAR Chapter with associated Figures and Appendices. The format follows the EPA Guidance Note and Design Team Template.

7.2.2 *Assumptions and Limitations*

The description of existing conditions is based on the available desk study, surveys and public service records information as outlined in Section 7.3.5 below. Given the site history does not include intensive development and site activities it is not envisaged that any significant existing services exist within the Site and no such services have been identified during site walkovers or site investigations.

7.3 The Existing Receiving Environment (Baseline Situation)

The receiving environment is discussed in terms of; hydrology; contamination / pollution and hydrogeology. This Section and the accompanying figures can be considered as the hydro environmental CSM of the Site. The Site is near both the North Dublin Bay Special Area of Conservation (**SAC**) (000206) and the North Bull Island Special Protection Area (**SPA**) (004006) and as such is in quite a sensitive location.

7.3.1 *Description of Proposed Development*

The Proposed Development comprises of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level, the site will accommodate car parking spaces, bicycle parking, refuse, storage and plant. Landscaping will include extensive communal amenity areas, and a significant area of public open space. The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road along with the demolition of an existing pre-fab building. This is to facilitate the construction of an access road from Sybil Hill Road, between Sybil Hill House (a protected structure) and St Paul's College (Secondary School), incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road.

The Proposed Development also includes the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken[10] Stream. The Proposed Development includes the demolition and reconstruction of an existing pedestrian river crossing in St Anne's Park with integral surface water discharge to Naniken Stream.

The potential impacts of the Proposed Development which might impact the Hydrological & Hydrogeological environment include an increase in hardstanding area, foul water arisings and surface water runoff from roads and other areas.

7.3.2 *Sourcing Baseline Information*

The Site is within an extensively investigated and studied region with a wealth of hydro-environmental data sources available within a 5km site catchment radius as shown in Figure 7-2 below. The hydrology of the Dublin region, including the properties and characteristics of

[10] It should be noted that the terms Naniken River and Naniken Stream are interchangeable and for the purpose of this planning application and all supporting reports and documentation both names refer to the same waterbody.

the waterbodies, catchments, rivers, streams and estuaries have been well studied and there are several resources including;

- Greater Dublin Strategic Drainage Study (2005);
- River Basin Management Plan 2009-2015 (2010) - Eastern River Basin District (**ERBD**);
- Eastern River Basin Management Plan 2009-2015 - Coastal waters; Programme of measures; Summary Report (2010) - ERBD; and
- Eastern River Basin Management Plan 2009-2015 - Transitional water bodies; Programme of measures; Summary Report (2010) - ERBD Eastern River Basin District.

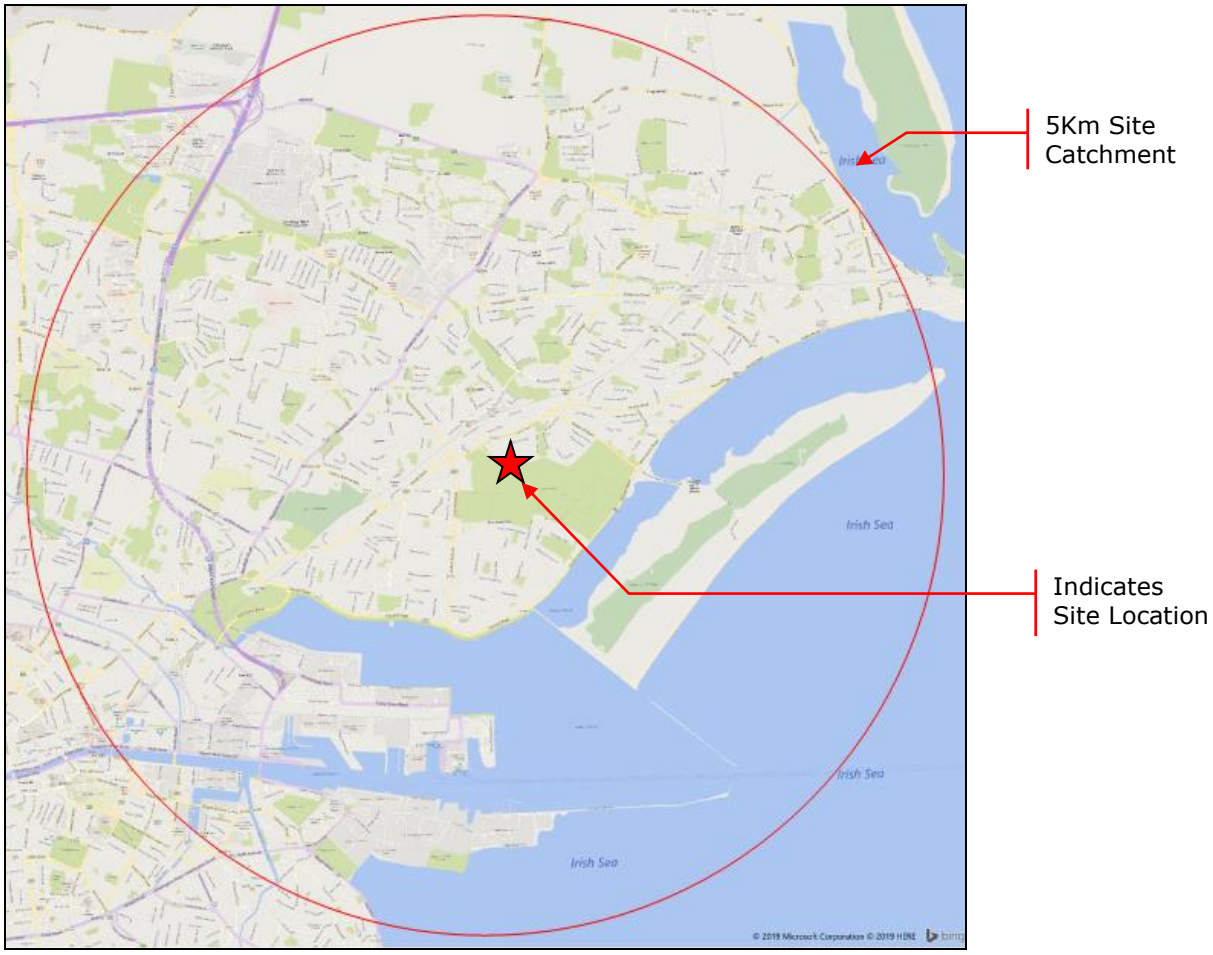

Figure 7-2: Site 5KM Catchment (Source: Bing Maps)

Additional sources of information include databases held by Geological Survey of Ireland (**GSI**), the Environmental Protection Agency (**EPA**), Ordnance Survey of Ireland (**OSI**) and National Parks and Wildlife Service (**NWPS**). Existing services information was obtained from Irish Water records i.e. surface water sewer, water main and foul water sewer. Additional sources of information include mapping, site visits and records as noted in Section 7.3.5. A full list of references is included in Section 7.12.

7.3.3 *Topography & Setting*

The regional topography of Dublin City is generally flat being on a low lying coastal plain, and the flood plain of the River Liffey. The regional highpoints are the Dublin Mountains (elev. 540 meters above Ordnance Datum (**mOD**)) located to the south of the City and the hills to the north-west (elev. 230mOD). To the west of the Site the elevation increases gradually to merge with the midlands plain while to the east land within the City falls towards Dublin Bay and the Irish Sea. The topography of the Inner City is dominated by the River Liffey which flows through the middle of the City centre.

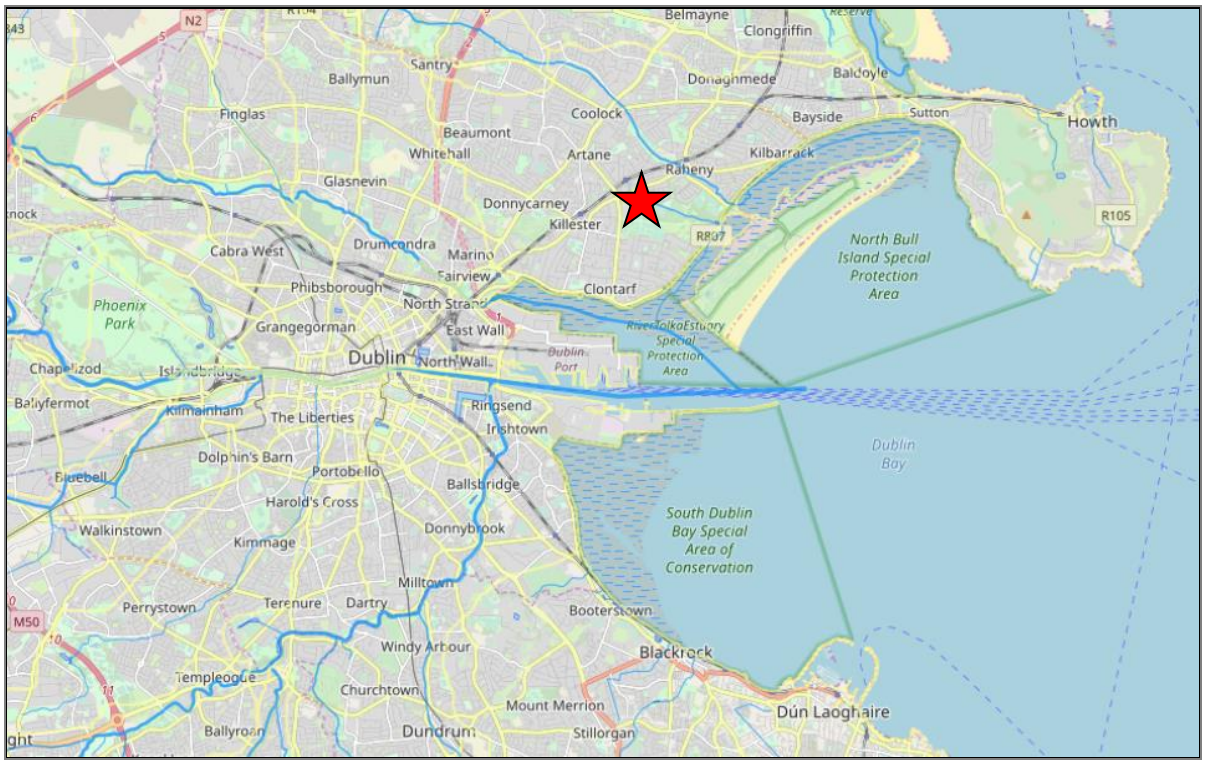

Figure 7-3: Site Location (Source: EPA Website)

The area subject to development comprises c. 6.4 hectares (**ha**) (It is noted that the redline area for planning is 6.7ha). The Site of the Proposed Development is located off the R808 Sybil Hill Road, Raheny, Dublin 5, on lands to the east of St Paul's College as shown on Figure 7-4 below. The Site's immediate surrounding area is mixed use in nature.

The Site topography is generally level at c. 24.5mOD in the north-west to 21.5mOD in the south-east corner. The ground level falls gradually away to the east through St Anne's Park (c. 13mOD) and then to the sea at Dollymount (c. 1mOD). Beyond Dollymount is North Bull Island and then Dublin Bay which is c. 2.5km to the south-east of the Site boundary. A detailed topographical survey has been carried out for the Site and has informed this EIAR and design.

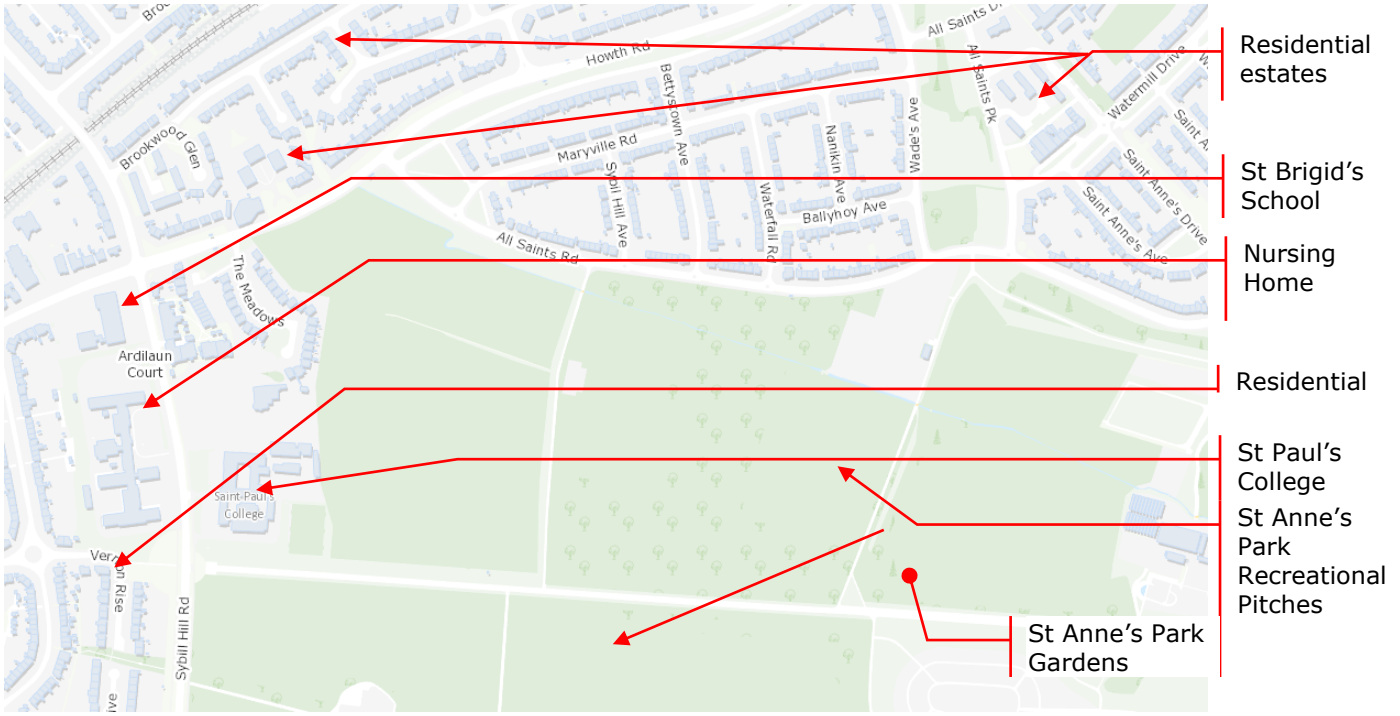

Figure 7-4: Site Context (Source: Geohive)

Figure 7-5: Aerial Image of Site (Source: Bing Maps)

The Site, as shown on Figures 7-4 and Figure 7-5 above, is bound to the north, south and the east by St Anne's Park which comprises a large area of open green space with mature tree lines and a number of sports pitches. Beyond the northern pitches is the Naniken Stream which flows eastwards discharging to Dublin Bay at Dollymount. There are 2 no. sports pitches to the east of the Site and a further 2 no. pitches to the north of the Site. There is a residential development ('The Meadows' residential estate) to the west of the Site (from the north-west corner). St Paul's College campus is to the west as is Sybil Hill Road, the main road.

7.3.4 *Receiving Environment*

The study area is located within the Eastern River Basin District (ERBD), as defined by 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**). There are a number of rivers within the study area. A river is defined in the WFD as "a body of inland water flowing for the most part on the surface of the land, but which may flow underground for part of its course".

The WFD establishes a framework for the protection, improvement and management of surface water and groundwater. Catchment dataset forms part of a three tier hierarchy. The Base unit (**Tier 1**) are the WFD River waterbody (RWB) basins. The Middle tier (**Tier 2**) will consist of the WFD sub-catchments and the final layer (**Tier 3**) will be the WFD Catchments.

The Site is located in the Santry RWB (Tier 1), the Mayne WFD sub-catchment (Tier 2) to form the Liffey and Dublin Bay WFD Catchment (Tier 3).

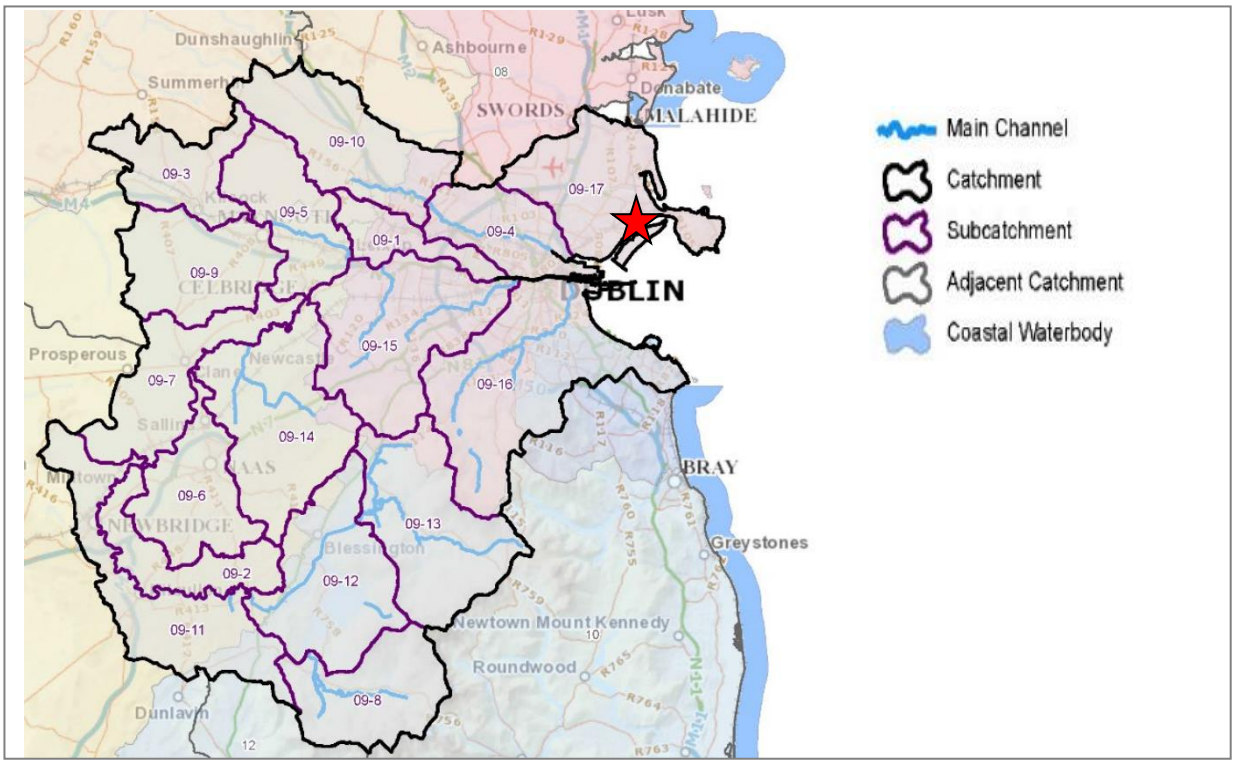

Figure 7-6: Liffey and Dublin Bay WFD Catchment and Sub-Catchments (Source: EPA Website)

The Naniken Stream is in the sub-catchment of the Santry River RWB and is located north of the Tolka River and to the south of the Santry River. For the purpose of this assessment, the

hydrological and hydrogeological attributes of the Naniken Stream and the receiving transitional waterbodies are considered the baseline environment of importance.

All rivers of the Liffey and Dublin Bay Catchment drain to the Irish Sea at Dublin Bay via Transitional and Coastal waterbodies. The Transitional waterbodies within the Liffey and Dublin Bay WFD catchment which are of particular importance in the context of the Site are:

- North Bull Island (Code: IE_EA_090_0100); and
- Tolka Estuary (Code: IE_EA_090_02000).

The following, Sections 7.5.8 and 7.5.9, discuss these receiving waters, which could be impacted, in more detail.

7.3.5 *Description of Other Related Projects*

A separate planning application (Ref: 3777/17) has been submitted to Dublin City Council (**DCC**) by the Vincentian Fathers (trustees to St Paul's College) for a proposed sports complex on the south-west of the lands and granted. The sports complex application consists of a 2-storey, 1,584sqm sports hall, one large all-weather pitch, one small all-weather pitch and all supporting infrastructure including additional car parking and floodlighting.

The recently completed 'Ardilaun Court' residential development (Reg. Ref. 3383/14) lies to the north-west of the Sybil Hill House and is considered as part of the EIA process. This development consists of 75 no. residential units comprising 7 no. houses and 68 no. apartments.

7.3.6 *Data and Survey*

The data necessary to carry out the assessment will comprise:

- A Site-Specific Flood Risk Assessment (SSFRA) and Engineering Service Report (ESR) have been completed and are included as a standalone report with this submission. The SSFRA and ESR have contributed to the contents of this EIAR, and the assessment below;
- Existing services information was obtained from Irish Water records i.e. surface water sewer, water main and foul water sewer, the GSI, the EPA and the OPW;
- Information provided from site investigations by GII;
- A topographical survey of the Site was commissioned and supplied by the client (Crekav Trading GP Limited) in order to assist in the determination of existing topography for the Site;
- Information on the surface water course running to the south of the Site was assembled from Site inspections, GDSDS Data and topographical survey information;
- Information on the hydrogeology of the Site was assembled from geological survey maps and GSI database information; and

- Information for the unmitigated predicted surface water quality and mitigated surface water for Sustainable Urban Drainage Systems (**SuDS**) from the Proposed Development has been obtained from the CIRIA C753-SuDS Manual (2015).

These objectives were achieved by way of a desk study and baseline data collection. A list of sources for the desk study together with relevant legislation are included below. The source of knowledge will be based on the following guidelines:

- DCC Local Authority Requirements (with liaison with technical departments);
- BS EN 752 - Drainage Outside Buildings;
- The Building Regulations - Technical Guidance Document Part 'H';
- Recommendations for Site Development works for Housing Areas, Department of the Environment, Housing and Local Government, 1998;
- GDSDS;
- BS EN 12056-2:2000 Gravity drainage systems inside buildings;
- The SuDS Manual (Ciria C753);
- EPA Wastewater Treatment Manual, For Small Communities;
- Irish Water Code of Practice for Water Infrastructure; and
- Irish Water Code of Practice for Wastewater Infrastructure.

Additional information has been compiled through consultation and feedback from stakeholders and the project / EIAR Team and from the following sources:

- GSI;
- EPA;
- Site Investigation Report (GII);
- Site visit completed by OCSC;
- GSI online maps and databases;
- Eastern Catchment Flood Risk Assessment and Management Study (**ECFRAMS**) flood mapping from the OPW;
- EPA online maps and databases;
- River Basin Management Plan 2009-2015 (2010) - ERBD;

- Eastern River Basin Management Plan 2009-2015 - Coastal waters; Programme of measures; Summary Report (2010) - ERBD;

- Eastern River Basin Management Plan 2009-2015 - Transitional water bodies; Programme of measures; Summary Report (2010);

- OSI;

- NPWS;

- Dublin City Development Plan (**DCDP**) 2016 -2022;

- Volume 7 DCDP 2016 - 2022: SSFRA; and

- Correspondence and meetings with DCC.

7.3.7 *Areas of Hydrological / Hydrogeological Interest & Historic Land-Use*

Details of the site history and previous land use are included in Chapter 11 (Archaeology, Architecture and Cultural Heritage). The historical assessment of the Site confirms the Site has primarily been occupied by agricultural fields and later developed as playing fields, the site is now fallow land.

7.3.8 *Regional Hydrology*

The Dublin City drainage network is made up of local authorities that make up the Greater Dublin Area, which include:

1. DCC;
2. South Dublin County Council;
3. Dun Laoghaire County Council;
4. Fingal County Council;
5. Kildare County Council;
6. Meath County Council; and
7. Wicklow County Council.

The boundaries of the Study and the 7 no. Councils are shown in Figure 7-7 below. Storm water drainage systems are sparse in the established urban areas including the City centre, Docklands and Dun Laoghaire, which are served by foul / combined or partially separate sewerage systems. Most storm water systems have been constructed as part of the separate systems serving post 1960’s developments.

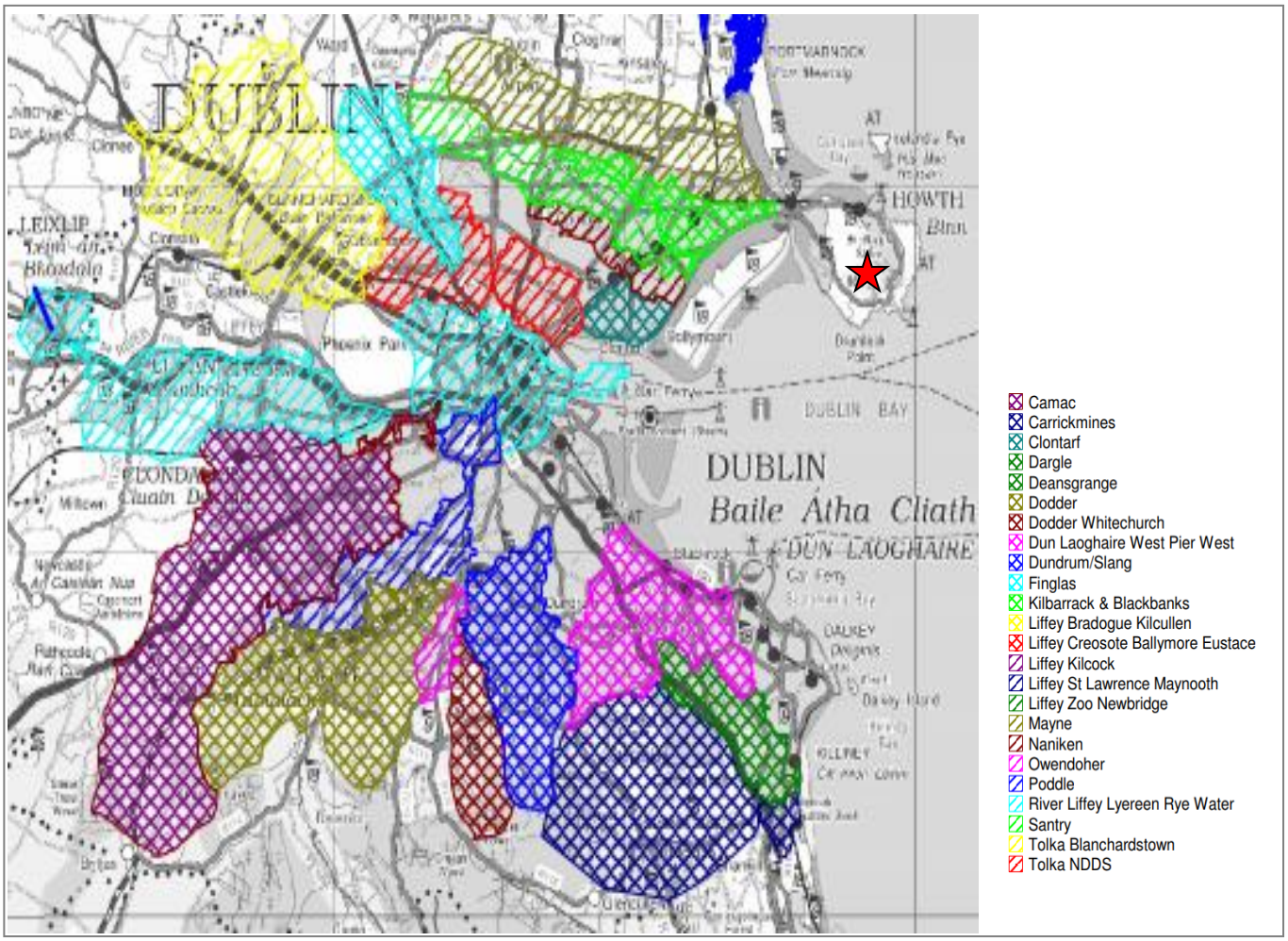

Figure 7-7: Dublin City Water Catchments (Source: GDSDS Website)

Dublin City and the greater region is split into 33 no. river and storm water catchments which discharge into the Irish Sea. Regional surface waterbodies that are considered to be relevant to the Proposed Development include the following waterbodies and SPA's / SAC's; The Proposed Development will discharge to the Naniken Stream (see Local Hydrology section following) which has a direct link to the Tolka Estuary Transitional Waterbody and from there to the Dublin Bay Coastal Waterbody. The important waterbodies for this chapter are therefore:

- The Tolka Estuary Transitional Waterbody;
    - Naniken Stream;
- Dublin Bay Coastal Waterbody;

The Tolka Estuary Transitional Waterbody

The Tolka Estuary Coastal Waterbody has a WFD status 2010 – 2015 of moderate and at risk.

This classification indicates that the water quality in the waterbody is of not of sufficient standard to meet the requirements of the WFD. The waterbody has high phytoplankton status

or potential and good status for fish or potential. Other Aquatic Flora status and supporting chemistry conditions are moderate.

The Naniken Stream flows into the Tolka Estuary Coastal Waterbody. The Naniken has a WFD status 2010 – 2015 of unassigned and at risk. This means that the catchment is at risk of not meeting its WFD objective.

Dublin Bay Coastal Waterbody

The Dublin Bay Coastal Waterbody has a WFD status 2010 – 2015 of good and not at risk.

This classification indicates that water quality in the waterbody is of sufficient standard to meet the requirements of the WFD.

The maps overleaf show the waterbodies in question and reference to close by SACs and SPAs.

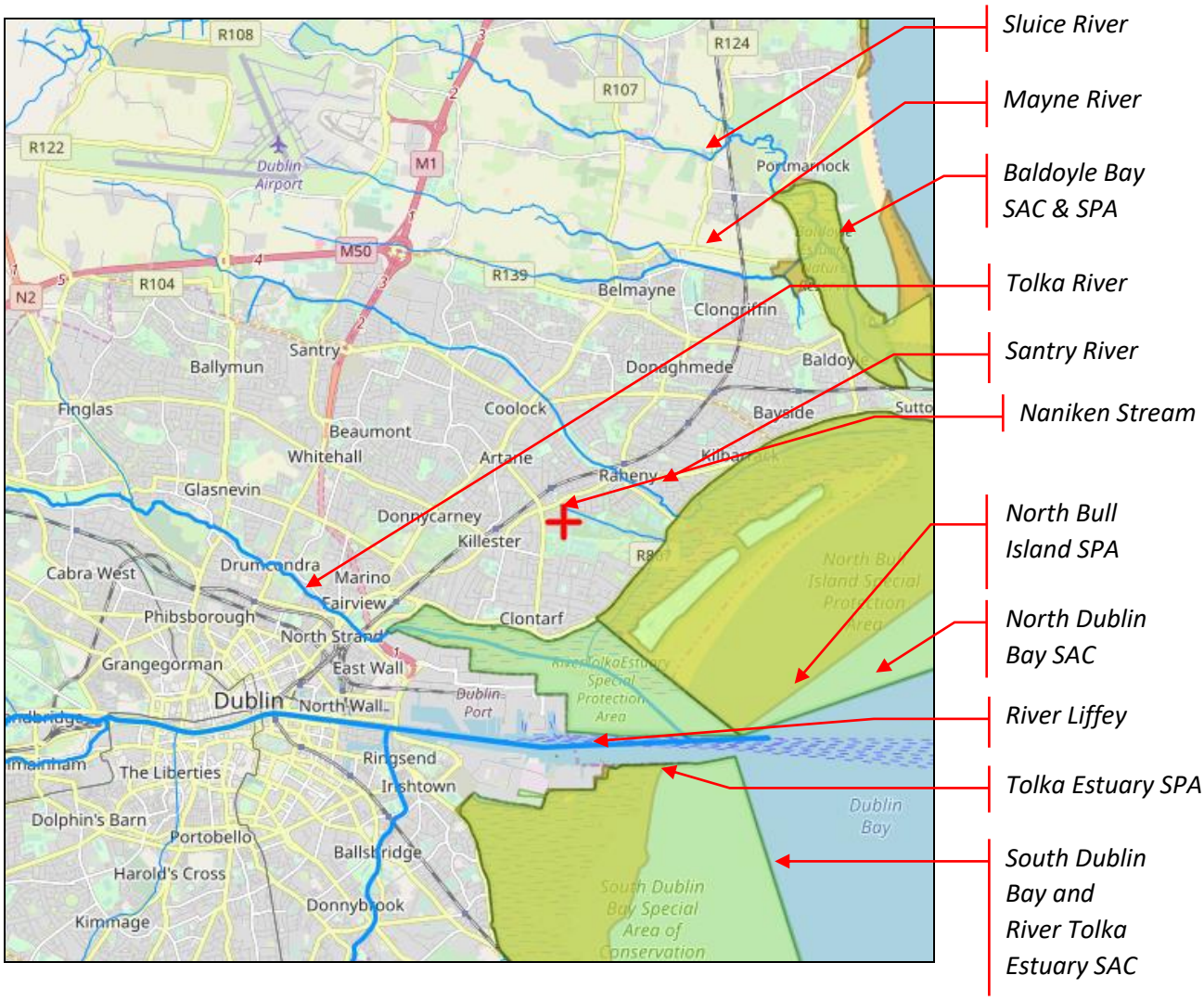

Figure 7-8: Regional Hydrological Features with SPAs and SACs (Source: EPA Mapping)

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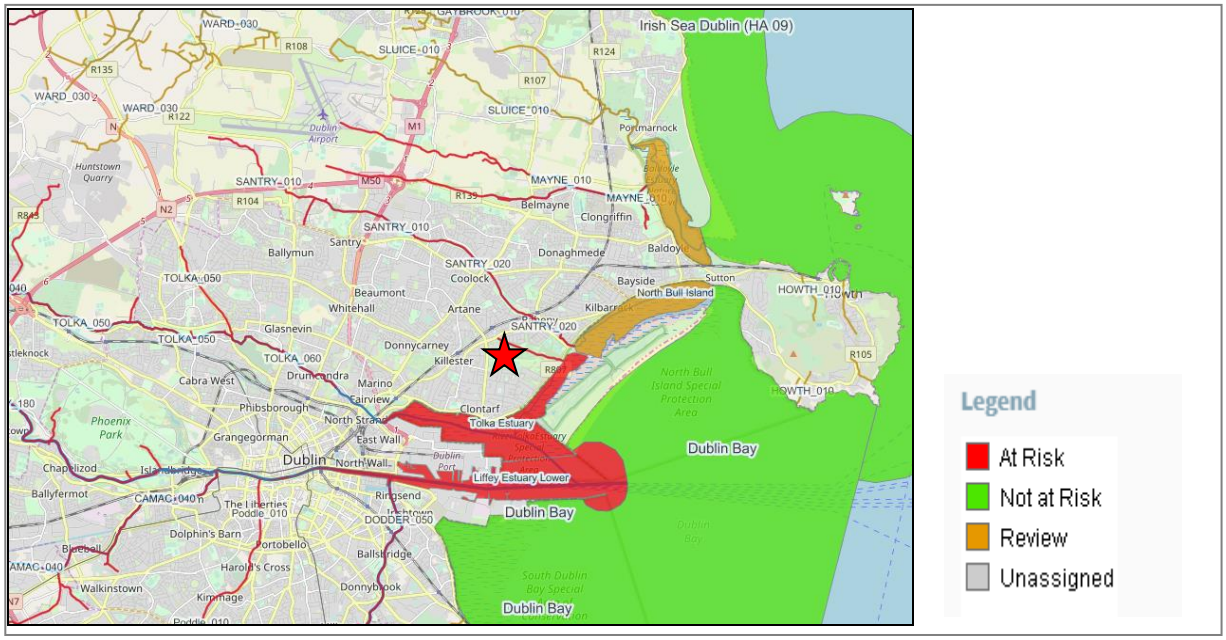

Figure 7-9: WFD Waterbody Risk Status (Source: EPA Mapping)

7.3.9 *Regional Hydrogeology*

The primary Groundwater Body (**GWB**) in the region is the Dublin Urban GWB. The Dublin Urban GWB covers 837km^2 and includes most of Dublin City to the eastern seaboard and extends west to include parts of Kildare and Meath. In addition to the Carboniferous limestones and shales, there are also some sandstones present. The bedrock aquifer is a fractured system i.e. it is dominated by secondary (fracture or fissure) flow with very little to no flow within the matrix i.e. the bedrock is largely impermeable. The limestone aquifer has low storage capacity in the order of 1-2%. The Dublin Urban GWB comprises:

- LI: Locally important aquifer, moderately productive only in local zones; and
- PI: Poor aquifer, generally unproductive except for local zones.

The Site is separated from the northern limestones along the Donnybrook-Tallaght syncline. To the south of the Dublin Urban GWD there is till derived from Granite (Northern and Upper Liffey Valley Plutons) and Lower Palaeozoic rocks in the Dublin Mountains. The Granite (Igneous Intrusive rocks - Pale grey fine to coarse-grained granite) in the vicinity of the site is classified by the GSI as a Poor aquifer (PI), generally unproductive except for local zones. In general, permeability is poor below 1-10m^2/day (Creighton *et al*.). Between the coast and the Site there are deposits of Irish Sea Till, which is the least permeable of the subsoils.

In general, fracture flow dominates and there is a distinct reduction in permeability with depth. Packer tests show permeabilities reduce an order of magnitude for each five metres of depth in the limestone (Aspinwall & Company, 1979). The majority of flow is in the upper weathered bedrock and is common within fractures and fissures at depths of up to 50 metres below ground level (**mBGL**). Regional groundwater flow is towards Dublin Bay and the Irish Sea to the east.

Groundwater Vulnerability

Vulnerability mapping of the Site has been published by the GSI and ranges from extreme to low. Vulnerability ratings are related to a function of overburden thickness and permeability which might offer a degree of protection and / or attenuation to the underlying aquifer from surface activities and pollution. A rating of extreme indicates a very thin overburden depth or highly permeable strata such as gravels. A rating of low indicates a thick overburden depth (<10m) of low permeability strata such as clay or glacial till. Given the depth of glacial till present on this site the vulnerability here is low.

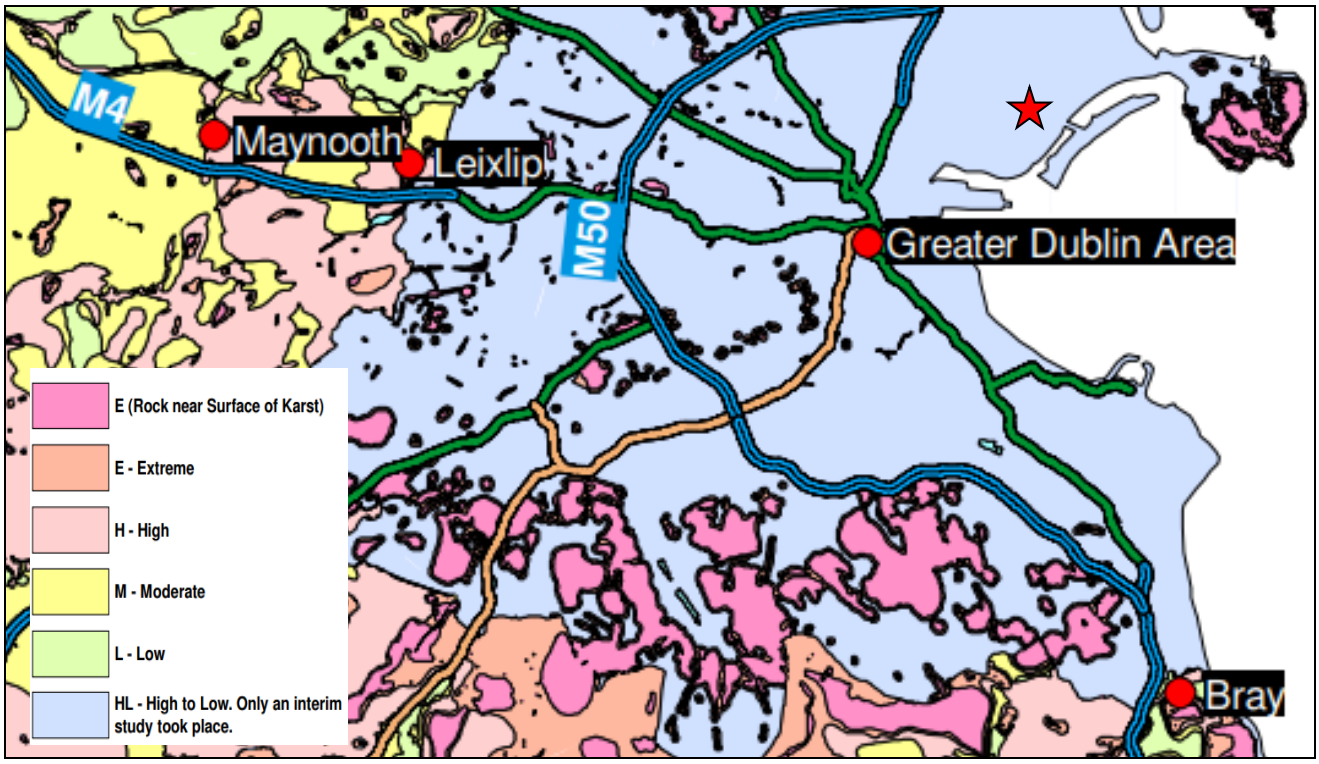

Figure 7-10: Regional Groundwater Vulnerability (GSI Website)

Groundwater Status

An assessment carried out under the WFD has concluded that the groundwater within the Dublin Urban GWB has a “Good” status. The objective to the end of 2015 is to protect the “Good” status by recognising that the quality of the groundwater in the Dublin Urban GWB is at risk due to point and diffuse sources of pollution which are normally found in an urban environment such as contaminated land and leaking sewer networks.

Groundwater Recharge

Dublin City is a highly urbanised area. The ground is generally made up of a cement and tarmacked impermeable cap which limits recharge to the bedrock. The only open areas where recharge may occur are at parks and gardens. It is conservatively estimated that 10% of the City area is available for recharge. Some recharge occurs from leaking sewers, mains and storm drains. Elsewhere diffuse recharge will occur via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. Due to the generally low

permeability of the aquifers within the Dublin Urban GWB, a high proportion of the recharge will run off and discharge rapidly to surface waterbodies via the upper layers of the aquifer, effectively reducing further the available groundwater recharge to the aquifer.

Based on the GSI website the effective rainfall in the vicinity of the Site is 23m/year. Recharge to the aquifer can only occur where rainfall can percolate through any subsoil to the aquifer. However, given the thickness of low permeability boulder clay, any water which percolates through the subsoil is likely to be perched on the significant thickness of Dublin Boulder Clay and consequently it is likely that recharge to the Northern and Upper Liffey Valley Plutons is minimal to insignificant in the area of the site. The GSI have designated that the recharge coefficient in the immediate area of the Site as 7.50%. Based on the GSI's Recharge Model the total recharge would be equivalent to approximately 200mm/year.

Groundwater Abstractions

There are two recorded wells on the GSI database which are located c. 1.5km north of the Site. Both are groundwater monitoring wells associated with an industrial site. There are no recorded groundwater abstractions/users within the study area and there are no source protection zones mapped in the area.

All water users in the vicinity of the Site are serviced by the mains water supply and the Proposed Development will also rely on mains water.

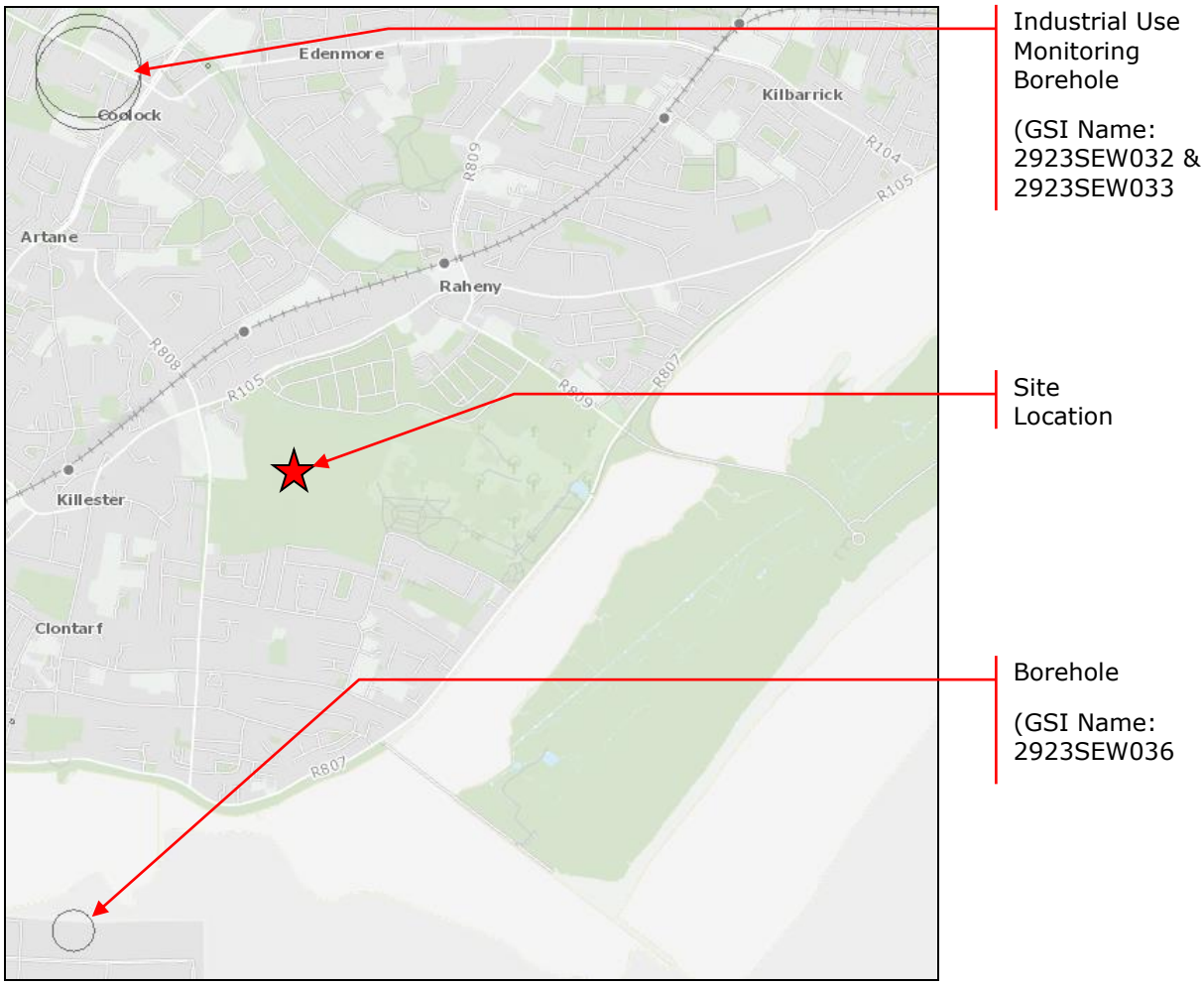

Figure 7-11: Recorded Groundwater Abstractions (Source: GSI Website)

Groundwater Dependent Terrestrial Ecosystems

Groundwater dependent terrestrial ecosystems (**GWDTEs**) are those ecosystems which are dependent on the groundwater either partially or completely for survival. They are designated for protection under Article 1 of WFD. The closest GWDTE is the North Bull Island SPA (site code: 004006) which is located c. 1.5km north-east of the Site.

7.3.10 *Local Hydrology*

The site of the Proposed Development is located within the DCC local authority. DCC is responsible for the operation and maintenance of surface water sewer networks within the county.

The Naniken Stream

The Naniken Stream originates in Santry and travels into Dublin Bay c. 1km from the outfall location of the storm water from the Proposed Development. The Naniken Stream flows in a south easterly direction from Artane passing through Coolock, Raheny and St Anne's Park and enters the Irish Sea at the south Bull Island lagoon. The Naniken catchment is small (437.22 ha), narrow and heavily urbanised with no significant tributaries. The upper portion of

the watercourse is culverted until entering St Anne's Park. Attenuated surface water runoff will be discharged to the Naniken Stream from the Proposed Development.

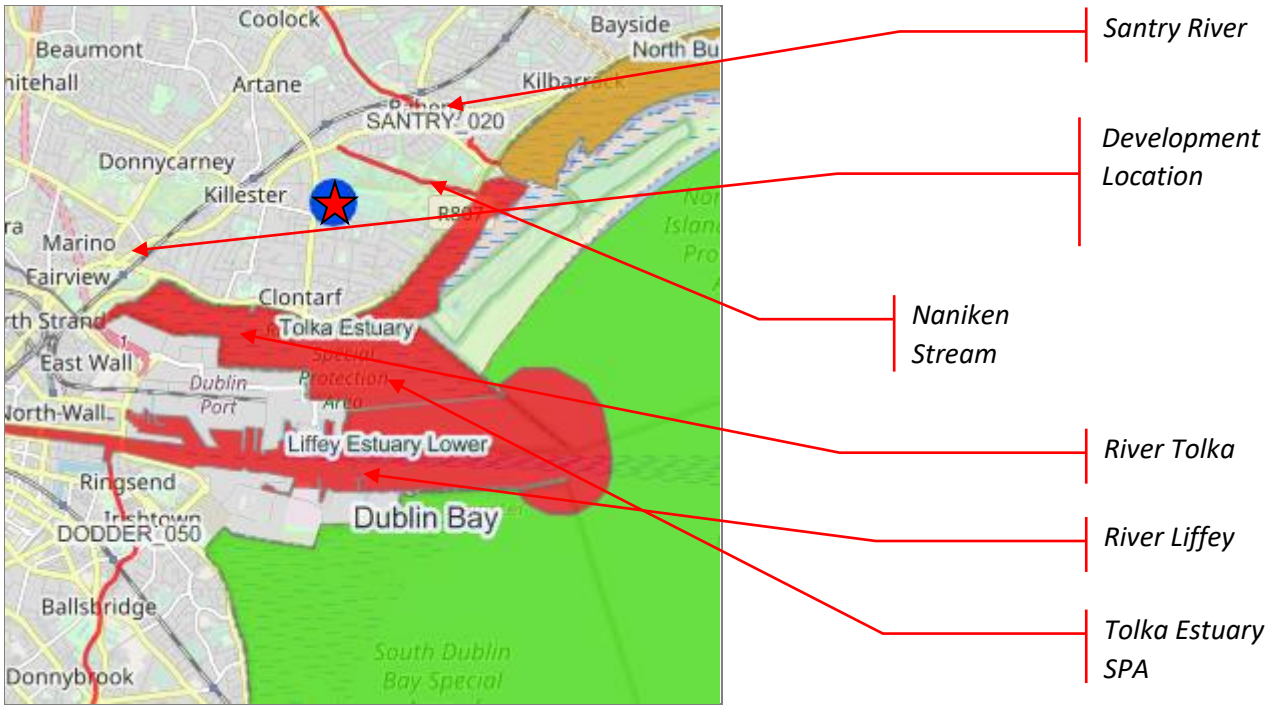

Figure 7-12: Local Hydrological (Source: EPA Mapping)

The site of the Proposed Development is greenfield natural parkland coverage. Surface water currently naturally infiltrates to ground and runs-off to an existing watercourse in line with the existing topography of the Site. The Site drains to the Naniken Stream, which is located c. 100m north of the site within St Anne's Park.

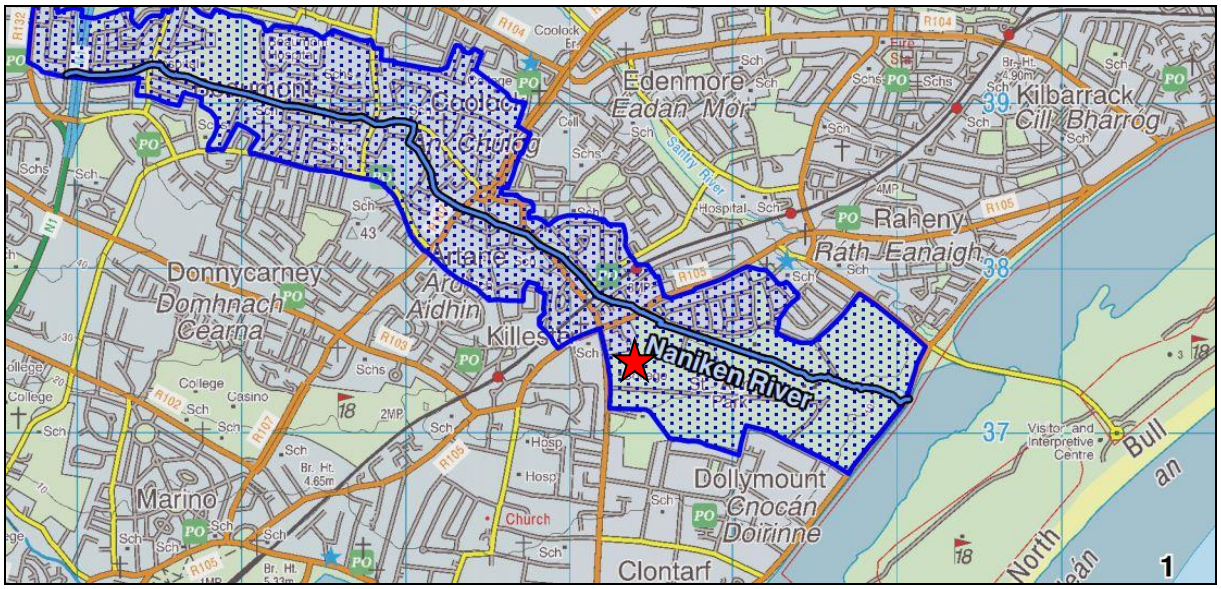

Figure 7-13: Naniken Stream Storm Level 2 Catchment (Source: GDSDS – Final Report)

The site of the Proposed Development related to the Naniken Stream is shown in Figure 7-13 above. Information available from the EPA website suggests that the Naniken Stream is currently “unassigned” and “at risk” of not achieving a “good” water status in terms of the WFD. The water quality of the Naniken Stream will be particularly affected by the quantity and quality of surface water run-off from the adjacent lands.

Additional water quality testing was undertaken of the Naniken Stream, between 7th April and 4th May 2019 by Enviroguide. The laboratory analysis was carried out by City Analysis Ltd. and an assessment of the results are presented as baseline for the receiving watercourse water quality, see Appendix 7-1.

Flooding & Flood Defence

A standalone SSFRA has been carried out in respect of the Site.

Flood Zones are used to indicate the likelihood of a flood occurring as defined by ‘The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009'. The Flood Zones are based on an undefended scenario and do not take into account the presence of flood protection structures such as flood walls or embankments and are categorised as follows:

- **Flood Zone A:** Indicates a high probability of flooding;
- **Flood Zone B:** Indicates a moderate probability;
- **Flood Zone C:** Indicates a low probability of flooding from fluvial or tidal sources.

The SSFRA clearly demonstrates that site of the Proposed Development is in Flood Zone C.

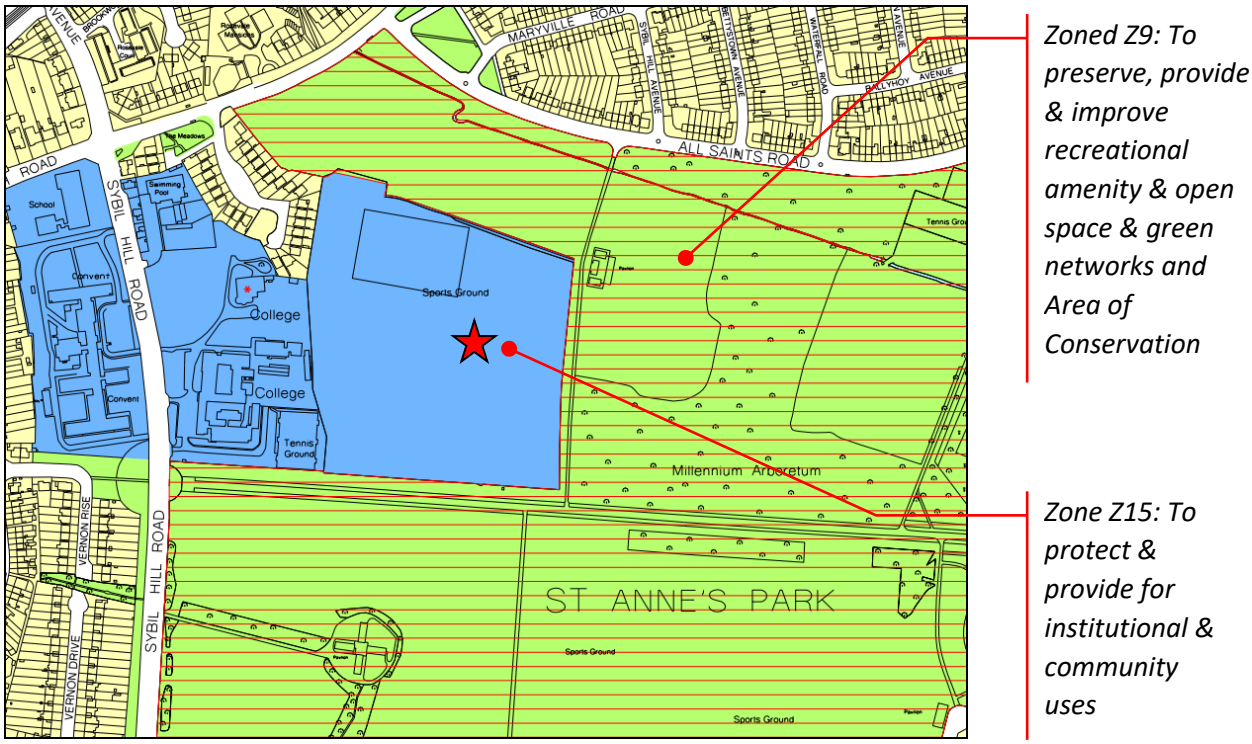

Figure 7-14: Site Zoning Map (Source: Dublin City Council Development Plan 2016-2022)

The Naniken Stream is c. 600m south of the Santry River. The Santry River can have additional flooding during high tides. The Naniken Stream flowing through St Anne's Park can flood due to fluvial or fluvial plus high tides.

A new sea wall and embankment was constructed to a height of 4.25mOD to protect against 0.5% Annual Exceedance Probability (AEP) Storm Event as part of the Dollymount Promenade and Flood Protection Project (**DPFPP**) which defends from coastal flooding. This section of the sea wall spans north from the Mount Prospect Avenue junction for c. 620m and terminates opposite the pond at St Anne's Park.

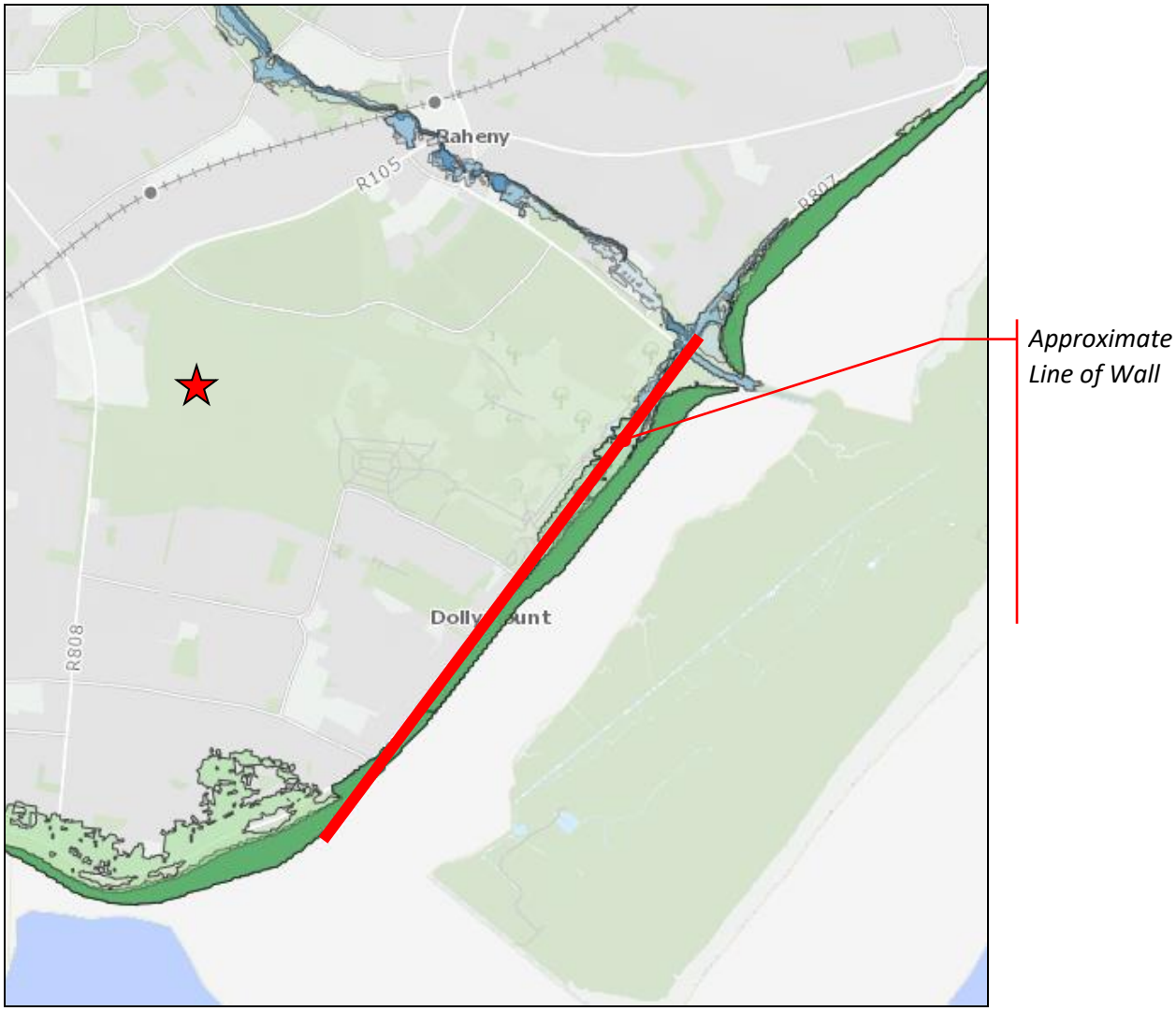

Figure 7-15: Flooding in Proximity to Site (Source: Floodinfo.ie Mapping)

Recently, it has been proposed, to reduce the flood protection in some sections lower to the 1% AEP storm event water level. The 1% AEP water level would be 0.1m lower than that of the 0.5% AEP water level. A DCC – Dollymount Flood Wall Report[11] noted that there is storage capacity within the areas allocated to 'store' floodwater in the event of a storm event greater than 1% AEP tide event with respect to potential wall overtopping and flooding of the

[11] http://www.dublincity.ie/main-menu-services-water-waste-and-environment-water-projects/dollymount-promenade-and-flood

Santry River and Naniken Stream in a 1% AEP high tide event. The DCC – Dollymount Flood Wall Report further notes:

> '*During a tidal event greater than a 100 year tidal event, the roadway north of Mount Prospect Junction will flood and provide storage of flood waters until the tide recedes at which time the road drainage will discharge the flood waters. A natural high point in the roadway at the Mount Prospect Junction will block flood waters from impacting upon residential and business properties to the south of the junction.'*

Similar to the Santry River, there is no formal flood defence along the Naniken Stream, although as described in Appendix 1 of the SSFRA, existing river embankments, walls and bridges on the Naniken Stream provide significant flood defence; however feasibility of further works to bring these up to the national standard is being investigated.

Figure 7-16: Extent of Dollymount Sea Wall Flood Protection (Source: Dublin City Council Sutton to Sandycove Sea Wall Works – James Larkin Road Sea Wall Works Part 8 Report)

Piped Drainage Network

The closest existing surface water sewer to the Site is the 300mm diameter sewer located along Sybil Hill Road in the south-west corner of the Site which discharges directly to Dublin Bay. There are flooding issues in the existing public surface water network downstream of the Site as shown in the GDSDS 2031 system performance model. All surface water from the

Proposed Development will discharge to the Naniken Stream and not to the public sewer network as directed by DCC.

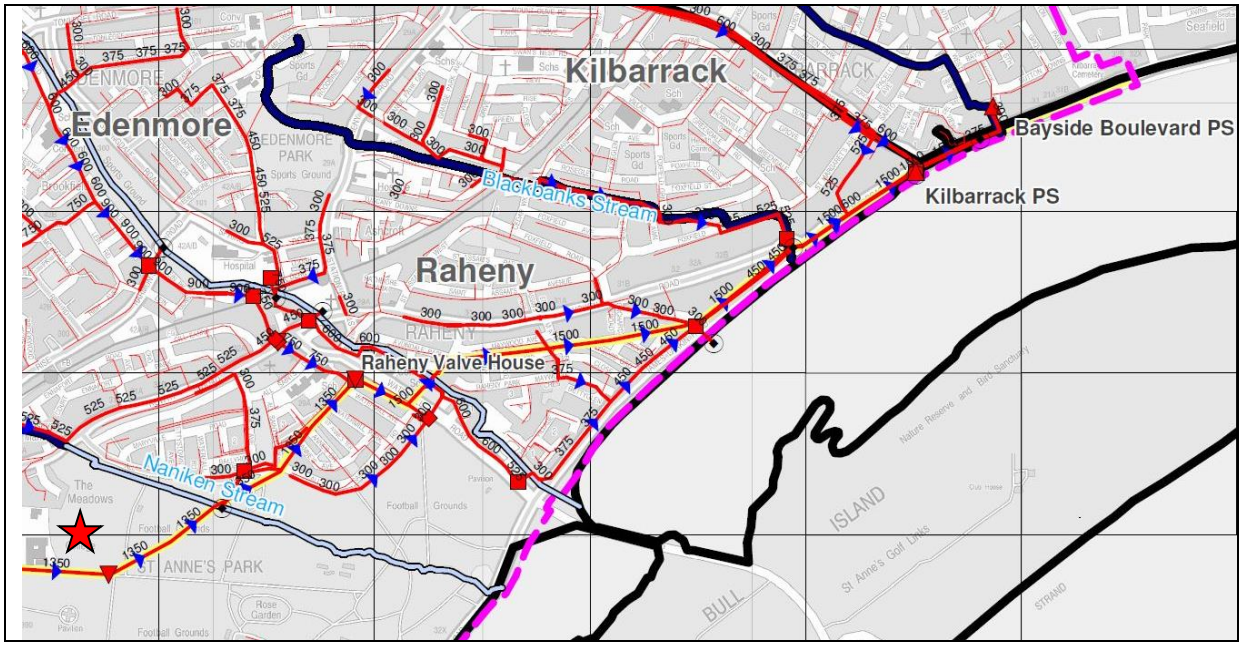

Figure 7-17: NDDS & North Fringe Catchment (Source: GDSDS – Final Report)

7.3.11 *Local Hydrogeology*

The bedrock aquifer was not encountered during the site investigations with depth to rock being greater than 7.6mBGL. There was no groundwater encountered during site investigations. The GII site investigation records for the Site, indicate that the natural soils on site are generally cohesive deposits (clay), described as firm to stiff brown, grey or dark grey sandy gravelly CLAY with occasional cobbles and boulders. Gravel lenses were occasionally present in the glacial till throughout the Site.

Standpipes were installed in a number of the boreholes (5 no.) and water levels were measured during February and March 2019. These installations were used to allow the equilibrium groundwater levels and measured water levels ranged from 0.7mBGL to 3.65mBGL.

The GSI Groundwater Data Viewer indicates that the Bedrock Aquifer is "*poo*r", meaning the Bedrock is Generally Unproductive except for local Zones.

Figure 7-18: Groundwater Vulnerability Risk (Source: EPA Mapping)

The GSI Groundwater Data Viewer indicates that the Groundwater Vulnerability is classified as "*Low Vulnerability*". Vulnerability is a term used to represent the natural ground characteristics that determine the ease with which groundwater may be contaminated by human activities.

Figure 7-19: GSI Bedrock Aquifer

The opinion of the Hydrogeologist from the Preliminary Hydrological Assessment included in Appendix F of the ESR concluded that:

- Groundwater wells were installed during 2015 and 2018;
- The bedrock aquifer was not encountered during either site investigation as is estimated to be at least 8mbGL;

- Level loggers installed within the wells in 2018 indicated a perched water present within the weathered boulder clay overlain by reworked material;

- Groundwater levels on site vary between +20.200 and +24.100m Above Ordnance Datum (mAOD) depending on location within the Site;

- Groundwater levels measured in February 2018 are likely to relatively close to expected Maximum; and

- Redevelopment of the site will reduce the area available for infiltration, reducing recharge to the perched water table thus reducing likely range of groundwater level fluctuations in the upper boulder clay.

7.4 Characteristics of the Proposed Development

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, residential tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas.

The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken Stream.

7.5 Potential Impact of the Proposed Development

Due to the Works being in close proximity to the Naniken Stream, a critical element of the risk assessment process is the establishment of a CSM for the Site. A CSM describes the potential sources of contamination at a site, the migration pathways it may follow and the receptors it could impact. If complete SPR scenarios exist, then there is a potential pollutant linkage that needs to be characterised and assessed (via formal risk assessment). All three elements need to be present for a viable risk to exist (e.g. if a source and receptor exist but no pathway is present then there is no pollutant linkage and hence no risk). A completed CSM is attached in Table 7-4 at the end of this Chapter.

Sources

- No potential contamination sources identified on site;
- There will be some small sources of potential contamination present on site during the Construction Phase (e.g. machinery oils, fuel, cement etc.);
- Surface water run-off can contain minor levels of pollutants (e.g. mineral oils) and high concentrations of suspended solids; and
- There will be no significant sources of potential contamination present on site during the Operational Phase of the Proposed Development. Surface water runoff will be attenuated and will feature petrol interceptors. A separate foul water system will be used and appropriate SuDS measures will be put in place.

Receptors

- The bedrock aquifer constitutes a potential receptor;
- The surrounding surface waterbodies constitute a receptor; and
- The surrounding land, soils and geology constitute a receptor.

Pathways

- Migration of contaminants from surface spills to land, soils, geology, groundwater or surface water constitutes a potential pathway; and
- Migration of contaminated run-off (e.g. during the Construction Phase or Operational Phase) to groundwater, surface water or surrounding geology constitutes a potential pathway.

Potential Pollutant Linkages

Works are in close proximity to the Naniken Stream and hence the Tolka Estuary Waterbody and the Dublin Bay Waterbody The potential pollutant linkage CSM is summarised in Table 7-1 below.

Table 7-1: CSM Pollutant Linkages to Surface Waterbodies and Groundwater bodies

Source	Pathway	Receptor	Potential Pollutant Linkage (Y/N)	Mitigation and Management Measures
Deleterious materials (such as oils, paints and cleaning chemicals) stored on site during the Construction Phase	Migration of surface spills / contaminated run-off	Surrounding Land / Soils or Groundwater in the bedrock aquifer	Y	All materials stored on site will be subject to strict control measures and local containment measures (e.g. bunded tanks and pallets). The bedrock aquifer will be protected by the thick depth of clay which is in place and will remain in place post construction.
Contaminated run-off from Construction Phase activities			Y	Generation of contaminated run-off will be reduced through the CEMP and control measures implemented during the Construction Phase. The bedrock aquifer will be protected by the thick depth of clay which is in place and will remain in place post construction including beneath the single level basement.
Deleterious materials stored on site during the Construction Phase	Migration of surface spills / contaminated run-off	Potential surface watercourses (Naniken Stream, Tolka Estuary Transitional Waterbody)	Y	All materials stored on site will be subject to strict control measures and local containment measures (e.g. bunded tanks and pallets. Appropriate set back and protection measures to be implemented to ensure no direct discharge to a stream except where regulated under a Discharge Licence from the Regulating Authority.

Source	Pathway	Receptor	Potential Pollutant Linkage (Y/N)	Mitigation and Management Measures
Contaminated run-off from the Construction Phase activities		Potential surface watercourses (Naniken Stream, Tolka Estuary Transitional Waterbody)	Y	Generation of contaminated run-off will be reduced through the CEMP and control measures implemented during the Construction Phase. Appropriate set back and protection measures to be implemented to ensure no direct discharge to a river except where regulated under a Discharge Licence from the Regulating Authority.
Illegal disposal of chemicals and oil Cleaning activities Leaks and spillages (e. g. from vehicles) Litter / animal faeces Vegetation / landscape maintenance Soil erosion De-icing activities Vehicle Deposit Exhausts & Pollutants	Migration of Deleterious materials / contaminated run-off	Surrounding hydrogeology or Groundwater in the bedrock aquifer. Potential surface watercourses (Naniken Stream, Tolka Estuary)	Y	The drainage system for the Proposed Development will contain a range of SuDS treatment methods for surface water including green roofs, permeable paving, bioretention within landscaping on podium & filter drains and treatment via open graded crush rock (**OGCR**) below all SuDS measures preventing materials / contaminants discharging the Site. A Full Retention Interceptor will remove contaminants (oils and sediments) from surface water runoff from the Site prior to discharge to the Naniken Stream.

The mitigation measures set out in Table 7-1 are discussed in further detail in later sections.

7.5.1 *Construction Phase*

There are a number of elements associated with the construction of the Proposed Development which have the potential to impact on the environment with respect to hydrology and hydrogeology. The activities are detailed in Table 7-2 below.

Table 7-2: Site Construction Summary

Phase	Activity	Description
Construction Phase	Discharge to Ground	Run-off percolating to ground at the construction site.
	Earthworks: Excavation of Superficial Deposits	Removal of topsoil and of subsoil (above the water table) to allow for the formation of finished levels, subsurface structures including a basement, attenuation tanks and associated services. Excavated and stripped soil can be disturbed by site vehicles during the construction. Silt can runoff and into water courses if not properly managed.
	Storage & Disposal of Hazardous Material	Fuel and chemical storage during the Construction Phase. There is a potential for spillages.
	Import / Export of Materials	A degree of fill will be required during the Construction Phase which will include the importation of engineering fill, concrete and aggregate. As topsoil is unsuitable for engineering fill, the majority will be exported for reuse offsite. All surplus subsoil will also be exported for reuse off site where a suitable reuse site can be identified. Soil reuse will be subject to the requirements under the Waste Management Act (e.g. Article 27 or 28). Where material cannot be reused it will be recovered or disposed of in accordance with the Waste Hierarchy and Waste Management Act. Aggregates will be required for subbase under roads, drainage and buildings. All subbase materials must meet the relevant engineering specification. The use of recycled or secondary aggregates should be considered as a replacement for primary aggregates.
	Surface Water Outfall Connections	Proposed new connection for the discharge of the surface water drainage to the Naniken Stream.
	Surface Water & Groundwater Management	Dewatering may be required to excavate the basement and to maintain dry working conditions in the excavation (for rainfall only). Pumped water will require discharge offsite should it arise. This will be to a public sewer under licence.
	Construction of sub-surface structures	Construction of the single storey basement within the superficial deposits to an elevation of c. 81.0mAOD. As this will be founded entirely within the Boulder Clay there will be no impediment to groundwater flow which is within the bedrock.
	Storage & Disposal of Hazardous Materials	Fuel and chemical storage during the Construction Phase.
	Vehicle Movements	Movement of construction vehicles, machinery on site and deliveries during the Construction Phase. Possible soil disturbance leading to runoff.

Phase	Activity	Description
		General vehicle access to Individual property driveways, residential car parks, low traffic roads including commercial maintenance vehicle and deliveries.
	Infilling	A degree of fill will be required during the works which will include the importation of concrete and stone. Construction materials which contain recycled / recovered content should be considered as part of the procurement phase.
	Cleaning Activities	Washing vehicles, windows, bins or pressure washing which wash into the drainage system.

As outlined in Table 7-2, the Construction Phase comprises of a number of activities which could potentially impact on the surface water environment. These activities primarily pertain to the excavation and infilling activities required to construct the basement car park and raise site levels including:

- Excavated and stripped soil can be disturbed and eroded by site vehicles during the Construction Phase. Rainfall and wind can also impact on non-vegetated / uncovered areas within the excavation or where soil is stockpiled. This can lead to run-off with high suspended solid content which can impact on waterbodies. The potential risk from this indirect impact to waterbodies from contaminated water would depend on the magnitude and duration of any water quality impact;

- Construction Phase dewatering may be required to excavate the basement and to maintain dry working conditions in the excavation (for rainfall only). Pumped water will require discharge offsite and will be managed by silt traps and petrol interceptors;

- 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 during the Construction Phase can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed to pollute groundwater, watercourses and soils. The potential main contaminants 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) from oils / diesel – accidental spillages from construction plant or onsite storage; and

    - Wastewater (nutrient and microbial rich) – arising from the poor management of on-site welfare facilities.

The Proposed Development will not give rise to any likely significant long-term impacts. There are effects on the hydrological and hydrogeological environments which could potentially occur due to the Proposed Development namely:

- Accidental Spills or contaminated run-off during the Construction Phase – these are considered to be localised and not significant and will be mitigated by on site housekeeping measures, they will be short term and negligible.

There are some effects on the land, geological and hydrogeological environments that will occur due to the Proposed Development namely:

- Soil excavation – removal of soil for basement construction – these are considered to be localised and not significant although they are permanent and will only have a neutral effect on water and ground water.

7.5.2 *Operational Phase*

There are a number of elements associated with the Operational Phase of the Proposed Development which have the potential to impact on the environment with respect to hydrology and hydrogeology. The Operational Phase activities associated with the Proposed Development which have the potential for impact are detailed in Table 7-3 below.

Table 7-3: Site Operations Summary

Phase	Activity	Description	Significance	Duration	Quality
Operation Phase	Storage & Disposal of Hazardous Materials	Fuel and chemical storage during the Operational Phase and/or during maintenance works.	Imperceptible	Long Term	Neutral
	Vehicle Movements	Movement of vehicles on site and deliveries during the Operational Phase. General vehicle access to surface carpark spaces, residential car parks, low traffic roads including commercial maintenance vehicle and deliveries.	Imperceptible	Long Term	Neutral
	Cleaning Activities	Washing vehicles, windows, bins or pressure washing which wash into the drainage system.	Imperceptible	Long Term	Neutral
	Road Maintenance	De-icing / gritting activities.	Imperceptible	Long Term	Neutral
	Storage & Disposal of Hazardous Material	No heating oil storage required for Operational Phase. All heating will be provided by natural gas systems.	Imperceptible	Long Term	Neutral

As outlined in Table 7-3 below, the Operational Phase of the Proposed Development has few activities which would constitute a risk to the hydrology and or hydrogeological environment.

7.5.3 *Potential Cumulative Impacts*

The cumulative impacts take into account the combined effects of the Proposed Development and other proposed projects in the surrounding area. Cumulative impacts occur as a result of

actions taking place in the same area and within the same timeframe as the Proposed Development.

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal.

There will be an increase in the discharge rate to the Naniken Stream, as both developments share the same outfall. This has been taken into account and the maximum discharge to the Naniken Stream will be 14.84l/s which is moderate. The impacts under the criterion in accordance with GDSDS will be adhered to for the increase flows i.e. to be in line with predevelopment runoff rates and to be subject to appropriate upstream SuDS measures.

7.5.4 *"Do Nothing" Impact*

In the 'Do Nothing' scenario the site would not be developed there would be no altering of groundwater / surface water regime by drainage, increasing hard standing area and basement construction. There would be no direct point surface water discharge connection to the Naniken Stream and no upgrade to the existing pedestrian bridge connecting St Anne's Park to All Saints Road.

The Proposed Development is located on an in-fill site in a strong urban area located c. 1.5 km from Dublin Bay with direct hydrological connectivity to the Irish Sea via the Naniken Stream catchment. In the 'Do Nothing' scenario the housing supply requirements may be satisfied with a new residential development in another location. This may result in the development of an area more remote to natural hydrological pathways and require the reliance on unsustainable new / existing buried surface water infrastructure further from the Sea.

7.6 Avoidance, Remedial & Mitigation Measures

In line with EIA guidance, each potential impact of the Proposed Development should be described in terms of its Quality, Significance and Duration. The potential impacts, mitigation measures and resulting residual impacts have been combined in a Detailed Assessment Table presented in Appendix 7.1.

7.6.1 *The potential hydrological impacts during the Construction Phase are presented in Table 7-1. Construction Phase*

The following mitigation measures for the Proposed Development shall be implemented with the construction of the surface water sewer network and the wider site construction:

- The filtering of surface water that is likely to be contaminated by soil particles in order to reduce the silting effects of these particles in the receiving downstream watercourse;

- Construction of suitable silt traps prior to the surface water out-falling to the existing watercourse;

- Relocation of existing services and preparation of detailed construction Methods Statements; and

- The preparation of a detailed Construction & Environmental Management Plan (CEMP) to include measures to protect against contamination and runoff, building on the CEMP submitted as part of this planning application.

It is considered that the adoption of the mitigation measures set out herein and, in the CEMP, will ensure that any potential impact of the Construction Phase of the Proposed Development on hydrology or hydrogeology will be imperceptible.

7.6.2 *Operational Phase*

It is proposed to implement the following mitigation measures for the surface water design for the operation phase in accordance with the GDSDS and SSFRA Volume 7 of the DCDP. The provision of Sustainable Urban Drainage Systems (SuDS) is a requirement to meet the environmental legislation, set out by the Water Framework Directive (WFD). This requires that storm water is reviewed under four Criteria.

(i) Criterion 1 – River Water Quality Protection;

(ii) Criterion 2 – River Regime Protection;

(iii) Criterion 3 – Level of Service (Flooding) site; and

(iv) Criterion 4 – River Flood Protection.

Criterion 1 –River Water Quality Protection

The drainage system for the Proposed Development will contain a range of treatment methods for surface water including:

- Green roofs will provide a first level of treatment at roof level. The removal of pollutants or sediments, ecological value and a reduction of surface water runoff volumes and discharge rates for small events (Interception) will be provided;

- A basin will be provided downstream of the above SuDS components for attenuation during an exceedance event. The basin will be shallow and designed with a maximum top water level (TWL) of 250mm including 150mm freeboard to proposed ground level. Basin to be located in public areas and will be useable, maintainable and safe. Basin will be provided with attenuation tank underneath to enable use by the local community for non-extreme storm events;

- Infiltration to natural ground for surface water runoff will be facilitated underneath basin, landscaped areas and permeable paving outside of podium where practical. The scope for infiltration is limited on site due to the podium footprint and underlying clay below the surface;

- Bio-retention areas will be provided extensively throughout the site by tree pits and planters on podium and act as a first level of treatment for surface water run off around the site;

- Trees/planting within the soil filled tree pits / raingardens will collect, store and treat runoff for small events (Interception) while providing amenity and biodiversity;

- Permeable Paving / Open Graded Crushed Rock (OGCR) will be provided below hardstanding and landscaping on and off podium. The outfalls of each sub catchment will be limited / throttled to provide attenuation storage in the sub-base. The removal of pollutants at source and a reduction of surface water runoff velocities at source will be provided. The surface water flows through the stone medium at first level of treatment of runoff before controlled release to SuDS components downstream;

- Attenuation Storage will be provided to ensure that there is adequate attenuation storage for the required limited discharge of surface water volumes. The SuDS components within sub catchments to reduce flows, volumes and provide treatment of run-off, as part of the surface water management train. Attenuation will be provided for events up to, and including, the 1.0% AEP rainfall event adjacent the site outfall;

- Limiting discharges from attenuation tanks will ensure that discharge rates are maintained below the greenfield runoff rate at 2.0l/s/ha;

- Catch Pits will remove sediments and silts upstream and downstream of all SuDS systems. The storm tech isolator row will capture any sediment which is not removed by catch pits upstream;

- A Full Retention Interceptor will be provided for the treatment of all surface water runoff before it is discharged from site. A full retention oil separator (NSBA020) will separate oil and silts in accordance with EN858-1 and PPG3 from surface water before it discharges to the public surface water network;

- During the Operational Phase of the project trapped gullies will lessen debris discharging into the surface water system;

- SuDS components reduce urban runoff contamination; and

- Best management drainage policies in accordance with SuDS will be implemented and incorporated into the design of the surface water drainage.

All SuDS measures will be provided in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS systems are established by the Construction Industry Research and Information Association's publication CIRIA C753-SuDS Manual (2015).

An assessment of the potential pollutants was completed in accordance with CIRIA C753-SuDS Manual and is included in Table 7-4 with this Chapter. In summary, the Proposed Development is residential with covered car parking, low traffic roads (e.g. cul de sac, home zones, general access roads). The pollution hazard level from car parking and low traffic roads

is very low for discharge to surface waters and groundwater, including coasts and estuaries. All discharge to surface waters and groundwater, including coasts and estuaries requires the removal of gross solids and sediments only and this will be provided with the above SuDS features and mitigation measures. The implementation of the above suite of mitigation measures will reduce the impact of the Proposed Development to a level, such that it is considered to be not significant.

Criterion 2 – River Regime Protection

The site is currently greenfield and drains naturally to ground within the Naniken Stream catchment. It is proposed to provide a new surface water network connection to the Naniken Stream.

It is proposed to discharge attenuated flows in accordance with the Local Authority requirements and the Greater Dublin Strategic Drainage Study (Dublin City Council, 2005). Discharge will be made to this existing public surface water sewer via the proposed attenuation and flow control device (Hydrobrake). The proposed Hydrobrake restricts discharge as specified. The limiting discharge will restrict the discharge to a rate of 9.6l/s for the site. The proposed discharge rate takes consideration for future development on site as discussed in Criterion 4 below. The GDSDS-RDP Volume 2, Appendix E Section E2.4 states that this ensures "that sufficient storm water runoff retention is achieved to protect the river during extreme events."

Surface water runoff rates have been calculated in accordance with I.S. EN752: 2008 "Drain & Sewer Systems outside Buildings", the DOE 'Recommendations for Site Development Works for Housing Areas', 'The Greater Dublin Region Code of Practice for Drainage Works' and the recommendations of the GDSDS.

It is considered that the adoption of the mitigation measures set out herein will ensure that any potential impacts of the Proposed Development will be not significant.

Criterion 3 – Level of Service (Flooding) Site

There are 4 sub-criteria for level of service, as set out in the GDSDS-RDP Volume 2, Section 6.3.4 (Table 6-3):

(i) No flooding on site except where planned (30-year high intensity rainfall event);

(ii) No internal property flooding (100-year high intensity rainfall event);

(iii) No internal property flooding (100-year river event and critical duration for site); and

(iv) No flood routing off site except where specifically planned, (100-year high intensity rainfall event).

Calculations for the design of storm drains have been compiled with the Micro Drainage Micro Drainage Program using the Modified Rational Method in accordance with EN752. Calculations for the Storm networks are included in Appendix B of the Engineering Service Report.

Sub-criterion 3.1

The proposed drainage system has been analysed for a 30-year return period storm event. This analysis shows that no flooding will occur in 30-year return period storm events.

Sub-criterion 3.2

The proposed drainage system has been analysed for a 100-year return period storm event. This analysis shows that no flooding will occur in 100-year return period storm events.

Sub-criterion 3.3

The site topography slopes away from a high point of 27.660m (Malin) AOD at the north-western boundary (at the entrance from Sybil Hill Road) to a level of 21.430m at the (outfall location to the Naniken) south eastern boundary. The site is not in the vicinity of coastal flooding. The maximum water level in the proposed attenuation will not pose a risk to the proposed buildings. In accordance with the requirements of Sub-Criterion 3.3, all buildings are a minimum of 500mm above the design 100-year water level in the attenuation facility.

Sub-criterion 3.4

The performance of the proposed drainage system in the 100-year return period storm events has been analysed. This analysis shows that no flooding is expected in the 100-year return period storm event. No off-site overland flow is expected in the 100-year return period storm event, unless in specifically designated areas, i.e. detention basins.

Criterion 4 – River Flood Protection

Discharge for the development will be restricted to a rate of 9.6/s to the Greenfield Runoff at 2.0l/s/ha. By limiting the runoff to this flow rate, the GDSDS-RDP Volume 2, Appendix E Section E2.4 states that this ensures “that sufficient stormwater runoff retention is achieved to protect the river during extreme events.” Attenuation storage is provided for the 100-year return period storm event in the proposed attenuation storage facility. Control of runoff rates will be achieved through the use of a vortex control device (e.g. Hydrobrake), which reduces the risk of blockage present with other flow control devices. Calculations of attenuation volume are included in Appendix B of the Engineering Service Report.

No other mitigation measures are deemed to be necessary after completion of the development, other than normal maintenance of the surface water system.

Allowable surface water runoff from the development site has been calculated using the GDSDS and the Institute of Hydrology Report No.124 to estimate existing Greenfield runoff rates.

Summary of proposed Mitigation Measures and their influence on Design

All surface water from the Proposed Development will be carefully managed and provision made for significant rainfall events during high tides in accordance with the commentary and justification text in for Site 26 in the SSFRA Volume 7 of the DCDP. A one-year high tide event should be assumed during a 100-year rainfall event. The best practice with regard to surface water management will be implemented across the Proposed Development which is located

in the catchments of the Naniken Stream and Santry Rivers, to limit surface water to the current Greenfield runoff values.

The total attenuation volume provided will be 1,706 cubic meters will be provided with extensive SuDS structures across the site. All SuDS structures are designed to allow surface water to be retained and flow through them. The total discharge from the Proposed Development will be 6.9l/s for a 1.0% AEP rainfall event, below Greenfield levels, to the Naniken Stream. In addition to this and in accordance with the Greater Dublin Strategic Drainage Strategy provision for 5mm interception of surface water to ground will be facilitated through infiltration areas below all SuDS structures above the 5mm interception requirements.

It is proposed to infiltrate surface water runoff to ground underneath SuDS systems where suitable. It is determined that the risks to groundwater is 'low or medium'. Analysis of groundwater risk mapping from the EPA notes that the ground water on site is 'not at risk'. No extra measures may be required for discharges to groundwater bodies as groundwater is not a protected at this site.

The Proposed Development will not give rise to any likely significant long term-impacts once construction has been completed.

The existing site area is 100% permeable surface area. The implementation of a range of SuDS methods, including surface water attenuation, will result in an improvement in the potential impact to the surface water receiving waters being slight and long-term. It is also noted discharge of runoff to ground will be facilitated as part of the SuDS strategy not to seal the interface between the SuDS components and the underlying soil (where practical / outside podium), thereby reducing discharge to surrounding watercourses and providing the natural recharge of groundwater with treated water. The proposed SuDS strategy also includes the limiting of flow from the site to Greenfield runoff levels and the storage of same within SuDS components. There will be no adverse increase in the discharge rates to receiving water bodies during and following completion of the development as there will be a decrease in surface water flows from the site and an improvement in the water quality. These design measures are set out in Section 7.6.1.

Alternative Designs Considered

The proposed scheme consists of two main objectives in terms of hydrology and hydrogeology; provide adequate protection against pollutants entering the Naniken Stream and the Tolka Estuary Transitional Waterbody of the while maintaining protection against flooding within and adjacent to the Site. These mitigation measures are consistent with similar situations and located in and around Dublin Bay. Providing the above measures in Section 7.6 meets the required surface water criterion under the GDSDS.

A number of options were investigated to determine what would be the most appropriate method to meet the two main objectives in terms of hydrology and hydrogeology. These alternative options are noted below.

Infiltration to Ground

The feasibility of infiltrating of all surface water to ground via soakaways was assessed and determined as not practical due to the existing soil and ground conditions. Soakaway tests have been completed to confirm infiltration rates in accordance with the BRE Digest 365 (Guidelines for the Design of Soakaways). The results are included in the Site Investigations Report Appendix F. The water level dropped too slowly to allow calculation of the soil infiltration rate and infiltration. Therefore, infiltration was deemed not suitable for the discharge of surface water to ground on site.

Although infiltration to ground for surface water runoff is poor across the site, infiltration will be facilitated underneath SuDS systems. The interface between the storage facility and the underlying soil will not be sealed to maximise the environmental benefits of the design but will be designed with overflows to ensure against a level of service failure. The provision of infiltration below SuDS features will still provide a level of storage, time delay and treatment as surface water flows through the stone medium. Systems that collect and store runoff allowing it to infiltrate into ground will improve water quality, reduce runoff volumes and discharge rates for small (Interception) and large events.

Integrated Constructed Wetland

The author notes that Integrated Constructed Wetlands did not form part of the drainage elements requested at any stage in the 2019 planning application or its discussions with DCC Drainage. The following section is predominantly related to the 2017 application and details the reasons that an Integrated Constructed Wetland was not pursued. It is included for reference and historical context. DCC had noted they would like to see the provision of an Integrated Constructed Wetland (ICW) for the surface water at the tripartite SHD planning meeting (with the An Bord Pleanála, Dublin City Council and the Applicant) in October 2017 for the previous application. O'Connor Sutton Cronin have assessed the potential provision of an ICW for this proposed development. OCSC has deemed an ICW for surface water not to be appropriate for this proposed development for the following reasons;

- From discussion in meeting with DCC Pollution Control it was noted that DCC Pollution Control are engaged in a study project to examine methods to reduce the overall pollution levels of water entering the Naniken Stream;

- DCC Drainage Department requested that OCSC examine the possibility of providing an ICW within the development as part of the drainage system;

- OCSC investigated the possibility of providing an ICW in St Anne's Park to improve the water quality within the Naniken Stream. This would lead to a basin approximately 2m deep in a large area within St Anne's Park. In discussions with DCC Parks it was confirmed that the Parks Department would prefer to discuss any provision of potential water quality improvement measures for the river with their colleagues as part of a wider catchment plan rather than piecemeal;

- OCSC investigated the provision of an ICW within the development as part of the treatment train for the storm water drainage system;

- It is not practical to provide an ICW within in the site as the invert levels of the proposed surface water network would require a basin to be approx. 4.5m below the proposed finish levels and as a result the basin would have to be fenced off for safety reasons;

- Significant retaining structures would be required to due to the invert levels which is contrary to environmental conservation;

- A greater land take area in excessive of 1,600m2 would be required. This would remove the main portion of available land for the provision of amenities within the development. An ICW has a wet basin and would not be useable space;

- The provision of ICW is normally associated with foul water loadings. It is not proposed to discharge foul water to the Naniken Stream from the development**. The surface water pollution risk has been assessed in accordance with CIRCA SuDS Manual as Low Risk. The pollution hazard level from residential roofs is very low**. The pollution hazard level from individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home zones, general access roads) is low;

- The pollution risk is further reduced with the provision of extensive SuDS measures as noted above in Section 7.6.1. SuDS measures will be provided in full compliance and above the minimum requirements of the GDSDS. All surface water will flow through SuDS structures. The interception areas being provided are above the minimum 5mm interception storage requirements in the GDSDS.

The results and outcomes of this correspondence and meetings have been incorporated into the engineering design where practical.

OCSC note that DCC did not request an Integrated Constructed Wetland within their consultation process in the 2019 application. At the post tripartite meeting held between OCSC and DCC it was noted that this design solution has not been requested by DCC in either their Drainage Division Report to The Board for the Tripartite Phase in February 2019 or later. It is confirmed that the new storm water network design incorporates other SuDS treatment and attenuation measures and is fully compliant with the GDSDS.

7.7 Residual Impacts

Following the implementation of mitigation measures detailed in Section 7.6, the predicted impact on the surface water environment during the Construction Phase is considered to be *likely, neutral, imperceptible and short-term*.

Following the implementation of mitigation measures detailed in Section 7.6, the predicted impact on the surface water environment during the Operation Phase is considered to be *likely, neutral, imperceptible and long-term*

7.8 Monitoring

In advance of work starting on site the works Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a Construction

Environment Management Plan (CEMP). The CEMP sets out the overarching vision of how the construction of the project will be management in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project. The CEMP incorporating a Construction and Demolition Waste Management Plan are included in the main submission. Monitoring shall be carried out as specified in any Discharge Licence associated with the Construction Phase of the project.

Proposed monitoring measures relate to the Construction Phase only and are summarised under the following aspects:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and Chemical handling, transport and storage;
- Control of Water during Construction.
- Monitoring shall be carried out as specified in any Discharge Licence associated with the Construction Phase of the project.
- Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act.

7.9 Reinstatement

7.9.1 *Construction Phase*

It is considered that the impact of the Proposed Development being discontinued would be not significant, as the hydrological and hydrogeological regime will remain the same.

7.9.2 *Operational Phase*

It is considered that the impact of the Proposed Development being discontinued would be not significant, as the hydrological and hydrogeological regime will remain the same.

7.10 Interactions

These impacts also relate to and interact with other Chapters within the EIAR specifically:

- Chapter 5, Biodiversity: Flora and Fauna
    - Deleterious matter and suspended solids entering into the surface water network could have an interaction with the Biodiversity associated with the Naniken Stream and downstream waterbodies.
- Chapter 6, Land, Soils & Geology
    - The control of ground water and the changing of the surface to incorporate more hardstanding in the developed case would have an interaction with groundwater and in turn Land, Soils, and Geology

- Chapter 12, Material Assets: Traffic, Waste & Utilities
    - The construction of the surface water network will have an impact on the Material Assets Chapter Utilities section.

Specific interactions are listed below, further detail is provided in the relevant Chapters and in Chapter 14 Interaction.

7.11 Difficulties Encountered in Compiling

No notable difficulties were encountered with regard to assessing the potential hydrological and hydrogeological impacts of the Proposed Development.

Constraint		Impact Assessment							
Activity/ Source	**Construction Element**	**Impact Description**	**Quality**	**Significance**	**Extent**	**Likelih.**	**Duration**	**Mitigation**	**Residual Impact**
Earthworks	• Site Clearance • Basement Excavation • Basement Construction	Excavation of Natural Soils and Subsoil for basements, attenuation tanks, drainage etc.	Negative	Moderate	Local	Certain	Permanent	The minimum amount of space to construct the project has been designed for. Material will be reused on site where possible.	Moderate Negative
Altering Groundwater/Surface water	• Basement Excavation • Basement Construction • Replacing open green areas with hard standing	Altering existing local groundwater regime , possible suspended solids reaching the Stream and beyond	Neutral	Slight	Local	Unlikely	Long-term	The basement will be founded within the low permeability/impermeable boulder clay so there will no impact on shallow groundwater flows which are contained within the bedrock. The replacement of open green space (currently available for limited recharge) with hard standing (no recharge possible) will prevent a small amount of water reaching the aquifer. The relative site area is small. The site is adjacent to St Anne's park. The surface water outflow is to be protected by silt traps and a full retention separator therefore the risk is mitigated.	Imperceptible
Storage of potentially polluting materials	• Site Clearance • Basement Excavation • Installation of Retaining Walls • Basement Construction	Potential leak or spillage from construction related liquids on site	Negative	Significant	Local	Unlikely	Short-term	Good housekeeping on all project sites and proper handling, storage and disposal of any potentially polluting substances can prevent soil and/or water contamination. Designated and bunded storage areas will be maintained. Further details are included in the CEMP	Imperceptible
Discharge to Groundwater	Basement Excavation and Construction General Construction	Potential contaminated run-off percolating to ground and the underlying aquifer	Negative	Significant	Local	Unlikely	Short-term	There will be no direct discharge to groundwater during construction. However indirect discharges to the underlying bedrock aquifer may occur and the aquifer vulnerability will increase, albeit not significantly given the thickness of Boulder Clay beneath the site, as the subsoil is removed from site. Protection of groundwater from potentially polluting substances will be dealt with through a number of measures including correct handling and storage of potentially polluting substances.	Imperceptible

Table 7-4: Assessment of Potential Pollutants

7.13 References

Greater Dublin Strategic Drainage Study (2005) – Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council

The Greater Dublin Region Code of Practice for Drainage Works (2012) – Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council

CIRIA C753-SuDS Manual (2015) - Construction Industry Research and Information Association's publication

I.S. EN752: 2008 Drain & Sewer Systems outside Buildings (2008) – National Standards Agency Ireland

Recommendations for Site Development Works for Housing Areas (1998) – Department of the Environment and Local Government

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

Control of Water Pollution from Construction Sites (2001) – Construction Industry Research and Information Association

Environmental Handbook for Building and Civil Engineering Projects (2000) – Construction Industry Research and Information Association

Preliminary Hydrogeological Assessment of the ground water levels - OCSC Environmental Division (2018)

South Dublin Bay SAC Conservation objectives supporting document (2013) – National Parks and Wildlife Service

South Dublin Bay and Tolka River Estuary SPA Conservation objectives supporting document (2013) – National Parks and Wildlife Service

River Basin Management Plan 2009-2015 (2010) – ERBD Eastern River Basin District

Eastern River Basin Management Plan 2009-2015 – Coastal waters; Programme of measures; Summary Report (2010) - ERBD Eastern River Basin District

Eastern River Basin Management Plan 2009-2015 – Transitional water bodies; Programme of measures; Summary Report (2010) - ERBD Eastern River Basin District

8 MICROCLIMATE, AIR QUALITY & CLIMATE

8.1 Wind and Microclimate

8.1.1 *Introduction*

B-Fluid Limited has been commissioned by 'Crekav Trading GP Limited' to carry out a wind microclimate modelling study for the Proposed Development located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School), Sybil Hill House (a protected structure) and 'The Meadows' residential estate, in Raheny, Dublin 5. This Chapter outlines the methodology used to assess the wind microclimate impacts of the Proposed Development.

Wind microclimate studies identify the possible wind patterns around the existing environment and the Proposed Development under mean and peak wind conditions typically occurring in Dublin. Wind microclimate assessment is performed through advanced Computational Fluid Dynamics (**CFD**) which is a numerical method used to simulate wind conditions and its impact on a development 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.

The objective of this study is to maintain comfortable and safe pedestrian level wind conditions that are appropriate for seasons and the intended use of pedestrian areas within and close to the Proposed Development. Pedestrian areas include sidewalks, 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 8-1 below, in order to take into consideration all the different relevant wind directions in Dublin. 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 8-1: Summary of the 18 Wind Scenarios Modelled for the Proposed Development

DUBLIN WIND SCENARIOS AND DIRECTIONS			
	Velocity (m=s)	Direction (deg)	Frequency
1	5.601	225	11.233
2	4.626	135	6.849
3	5.847	236.25	6.792
4	6.049	258.75	6.747
5	6.034	247.5	6.689
6	5.888	270	5.662
7	4.994	315	4.338
8	5.503	281.25	3.904
9	4.974	292.5	3.436
10	5.357	213.75	3.288
11	4.736	123.75	3.105
12	4.406	146.25	2.751
13	5.101	303.75	2.648
14	5.246	112.5	2.500
15	4.121	157.5	2.386
16	4.581	101.25	2.340
17	4.169	45	2.180
18	3.558	90	2.135

This modelling study focuses on reporting 9 no. worst-case and most relevant wind speeds with cardinal directions, which are the speeds and directions showing the most critical wind speeds relevant to the Proposed Development. The 9 no. modelled scenarios reported in this study are presented in Table 8-2 below.

Table 8-2: Reported Wind Scenarios & Directions

	Velocity (m=s)	Direction (deg)	Frequency
1	5.601	225	11.233
2	4.626	135	6.849
3	5.847	236.25	6.792
4	6.049	258.75	6.747
5	6.034	247.5	6.689
6	5.888	270	5.662
7	4.994	315	4.338
8	5.503	281.25	3.904
9	4.169	45	2.180

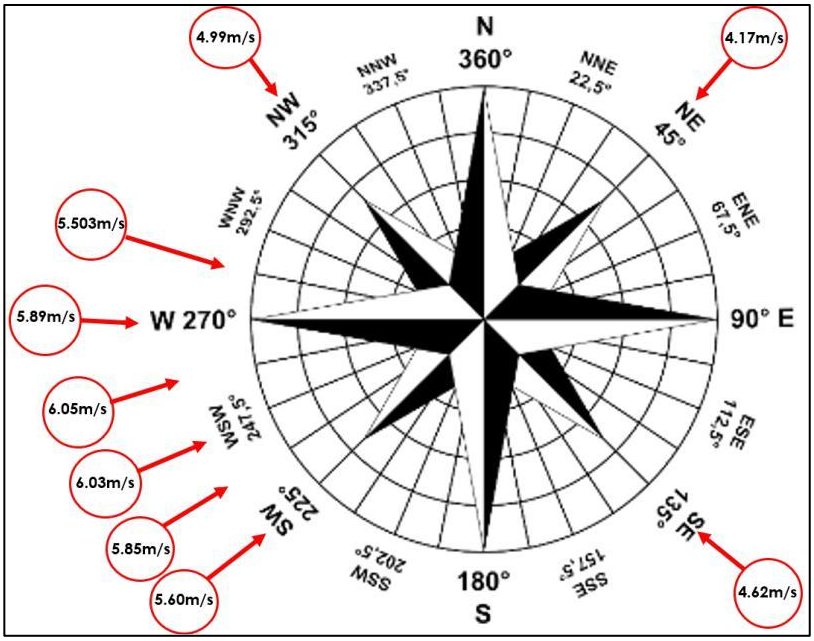

Figure 8-1: Summary of 9 Wind Scenarios Reported

Figure 8-2 below shows the site layout view of the Proposed Development.

Figure 8-2: Site Layout of the Proposed Development

This Chapter is completed by Dr. Cristina Paduano, Dr. Patrick Okolo and Dr. Eleonora Neri.

Dr. Cristina Paduano is a Chartered Engineer (**CEng**) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry with over 10 years experience. She holds a PhD in Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering.

Dr. Patrick Okolo is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for aerospace industry, urban environments, construction industry and marine industry. He holds a PhD in Computational Aeroacoustics branch of Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Mechanical Engineering.

Dr. Eleonora Neri is a CFD Aerodynamics Engineer and member of Engineers Ireland who specialises in computational fluid dynamics applications for the urban environment, the construction industry and wind tunnel measurement techniques. She holds a PhD in Aeroacoustics branch of Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aeronautical Engineering.

8.1.2 *Study Methodology*

The methodology adopted for the wind microclimate analysis of the Proposed Development is outlined as follows:

- Perform a wind desktop study of the existing baseline environment.
- Perform computational wind microclimate analysis of the Proposed Development within the existing environment.

8.1.2.1 *The following sections give details on the methodology utilised - Wind Impact Assessment on Buildings*

The construction of buildings within a development or in an existing environment can potentially calm / shield existing wind conditions within the area by providing further "*urban context*" to the existing topography, however, some areas can equally induce more critical wind conditions due to high / adverse wind acceleration and re-circulations and phenomena such as downwash, funnelling and downdraft can also be experienced.

A building / development, in principle, offers more drag to the incoming wind profile as detailed in the next section (see "Planetary boundary layer and terrain roughness"). Consequently, winds at lower levels can reduce and modify its flow path and directions. However, zones of re-circulations caused by the re-direction of the wind can also be expected, especially in the west-south-west direction (Dublin Region) where funnelling effects could potentially occur.

Impacts of the Proposed Development on the local wind microclimate is quantified through modelling of different wind scenarios and all areas of criticism are detected, appropriate mitigation is implemented and modelled to verify the reduction of potential critical winds, and the suitability of all specific areas to the designated pedestrian activities are highlighted.

8.1.2.2 *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 8-3 below shows the wind velocity profile, as described above.

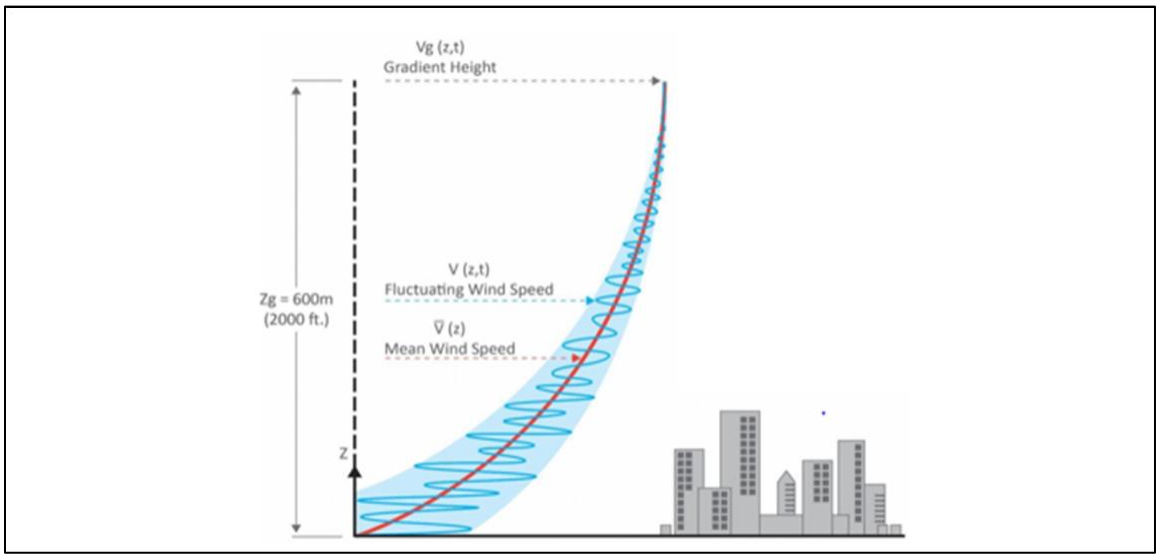

Figure 8-3: Wind Velocity Profile

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 rule, wind speed increases with height.

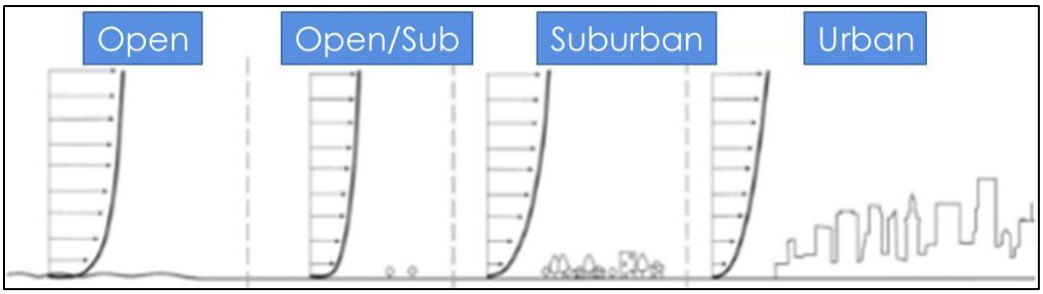

Figure 8-4: Wind Velocity Profile for Different Terrains

In order to assess the wind conditions in a particular area, it is important to know the following, (Figure 8-5):

- Weather conditions in the area.
- Location and orientation of the site.
- Buildings distribution in the area
- Flow patterns at the building.

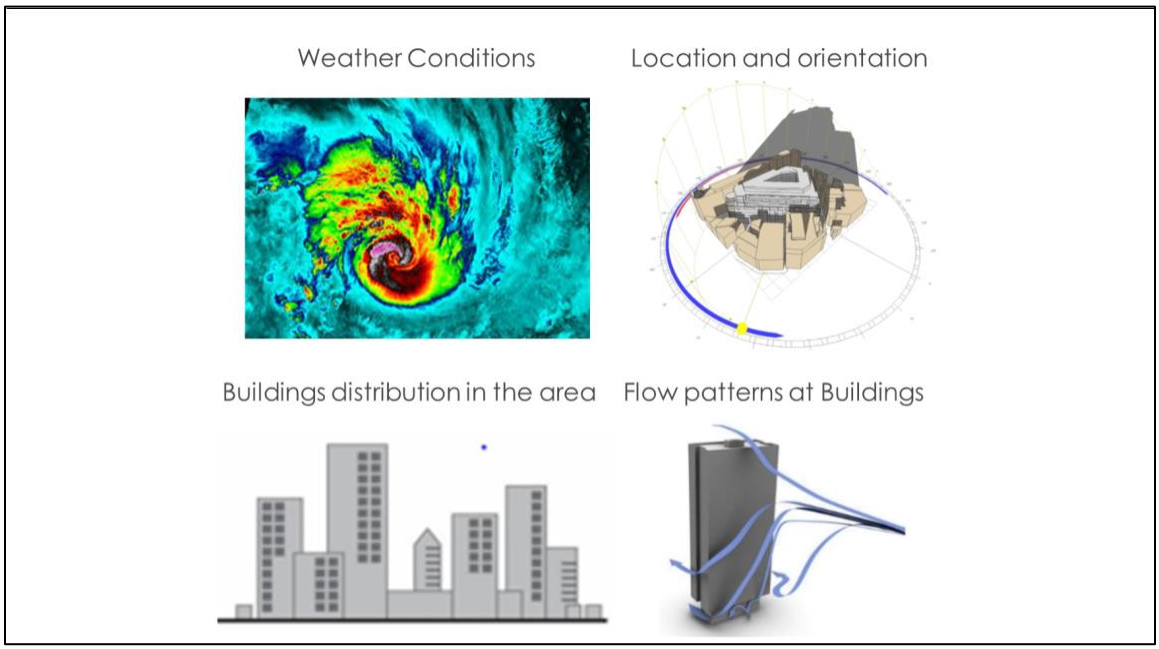

Figure 8-5: Parameters to know for Wind Conditions Assessment

Moreover, it is important to understand key flow features as follows, (Figure 8-6):

- Broad Building Face creates “DOWNWASH”.
- Low Building Upwind Increases Wind Effects.
- Gaps Between Buildings Increases Wind Velocity.
- Low Building Upwind Increases Wind Effects.

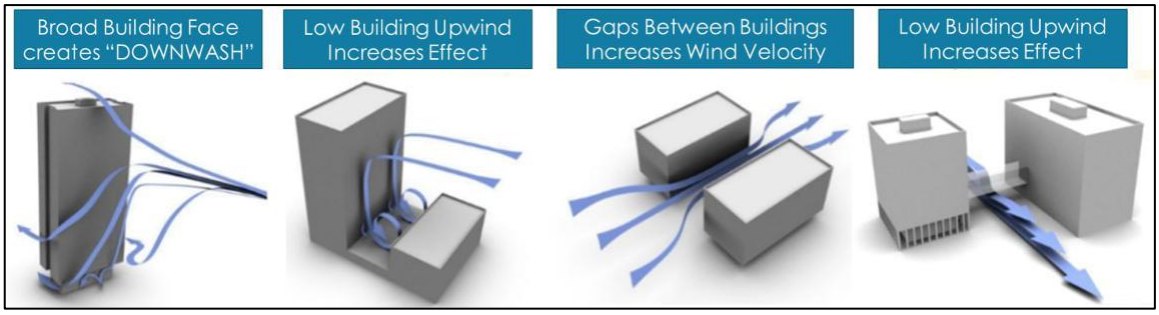

Figure 8-6: Parameters to know for Wind Conditions Assessment

8.1.2.3 *Acceptance Criteria*

Pedestrian Wind 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 no. pedestrian activities and notes that calm activity requires calm wind conditions, which are summarised by the Lawson scale, shown in Figure 8-7 below. 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 8-8 below. 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 (**AGL**). 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;
- whether there are suitable alternate routes which are not distressful; and
- 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.

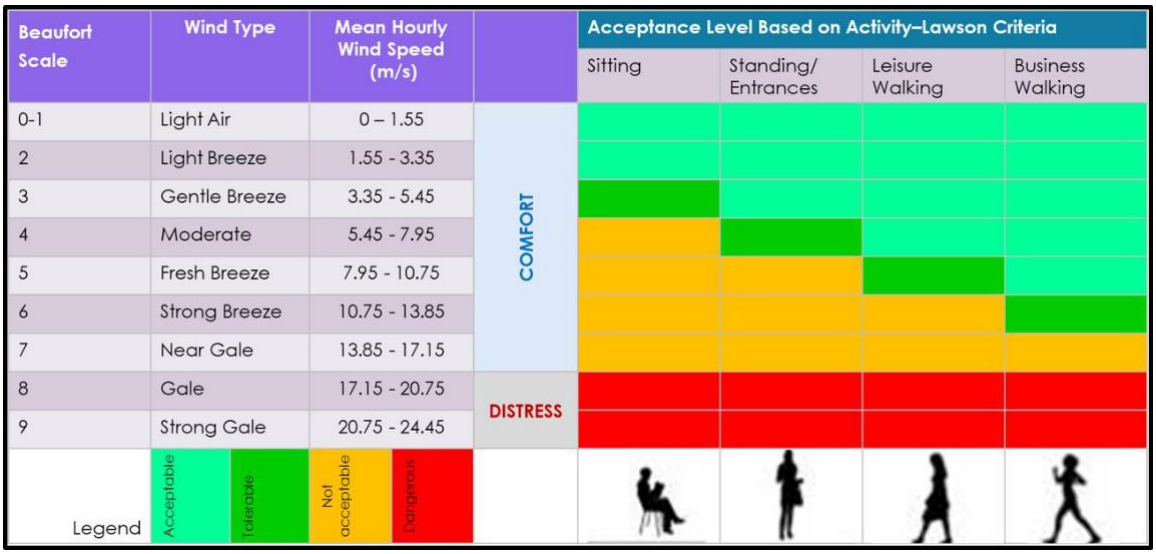

Figure 8-7: Lawson Scale

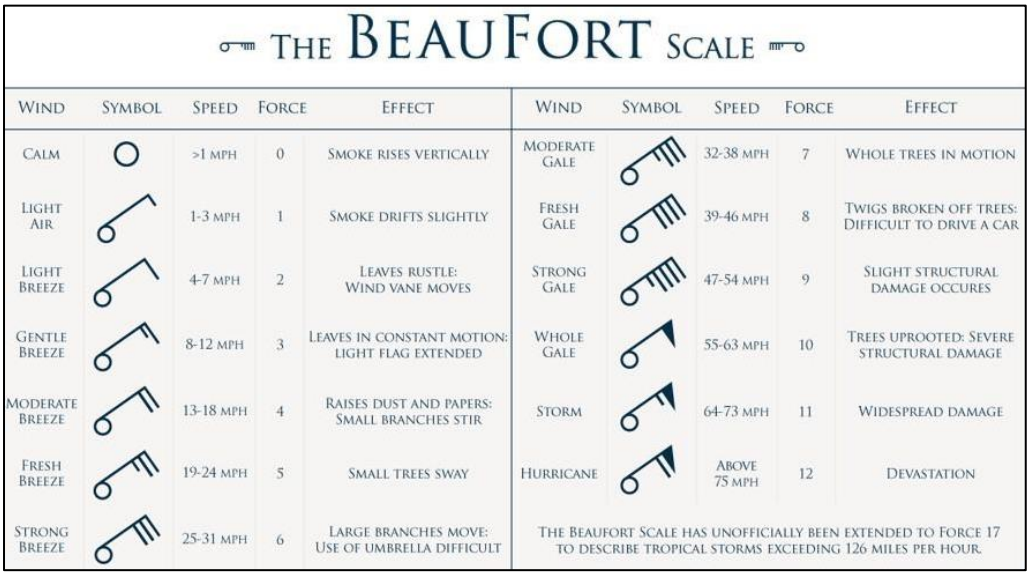

Figure 8-8: Beaufort Scale

8.1.2.4 *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 8-9 shows the hourly wind gust rose for Dublin, between 1985 and 2015. This will be necessary to assess how many hours per year on average the velocity exceed the threshold values.

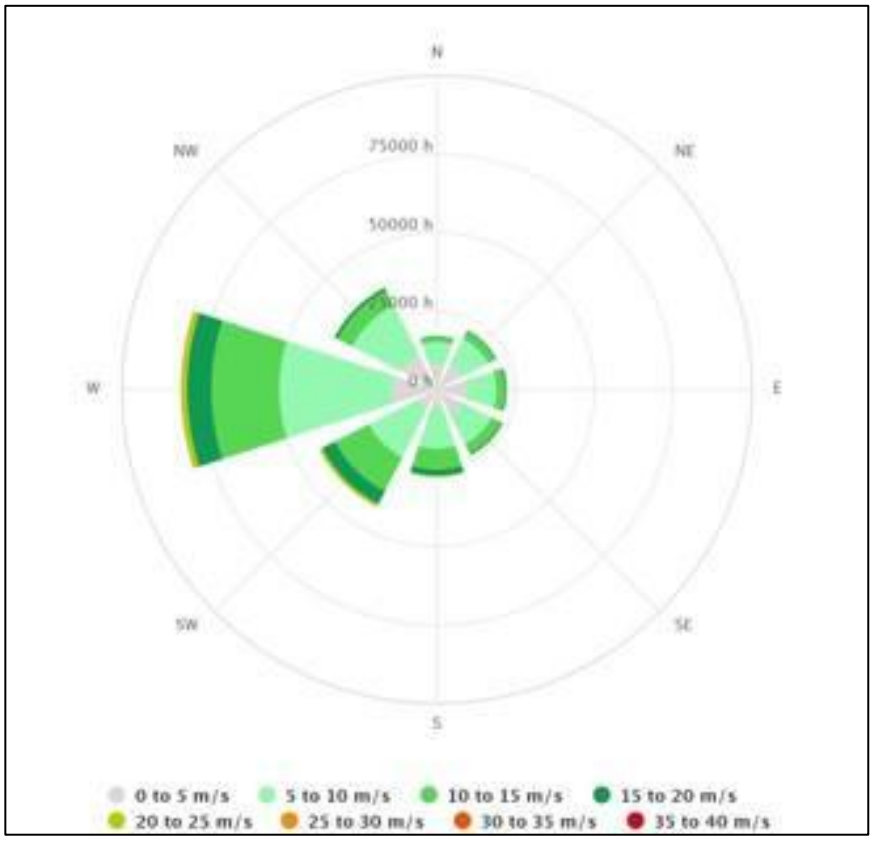

Figure 8-9: Hourly Dublin Wind Gust Rose

The criteria for distress for a frail person or cyclist are 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 Figure 8-10), it is possible to see how a gust velocity of 15m/s is exceed at pedestrian level only in the west direction, for a total of 5 hours over 30 years.

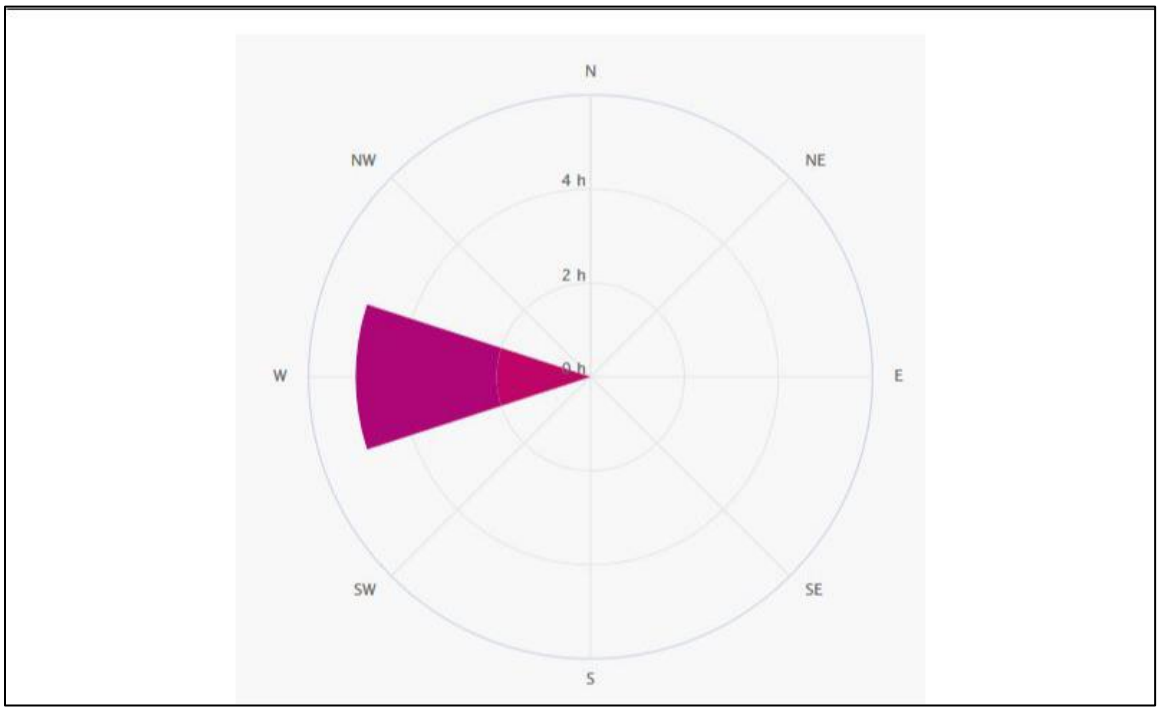

Figure 8-10: Hourly Dublin Wind Gust Rose - Cumulative Hours when the Velocity is above 15m/s

8.1.2.5 *Mitigation Measures*

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 8-11 and 8-12):

- **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.

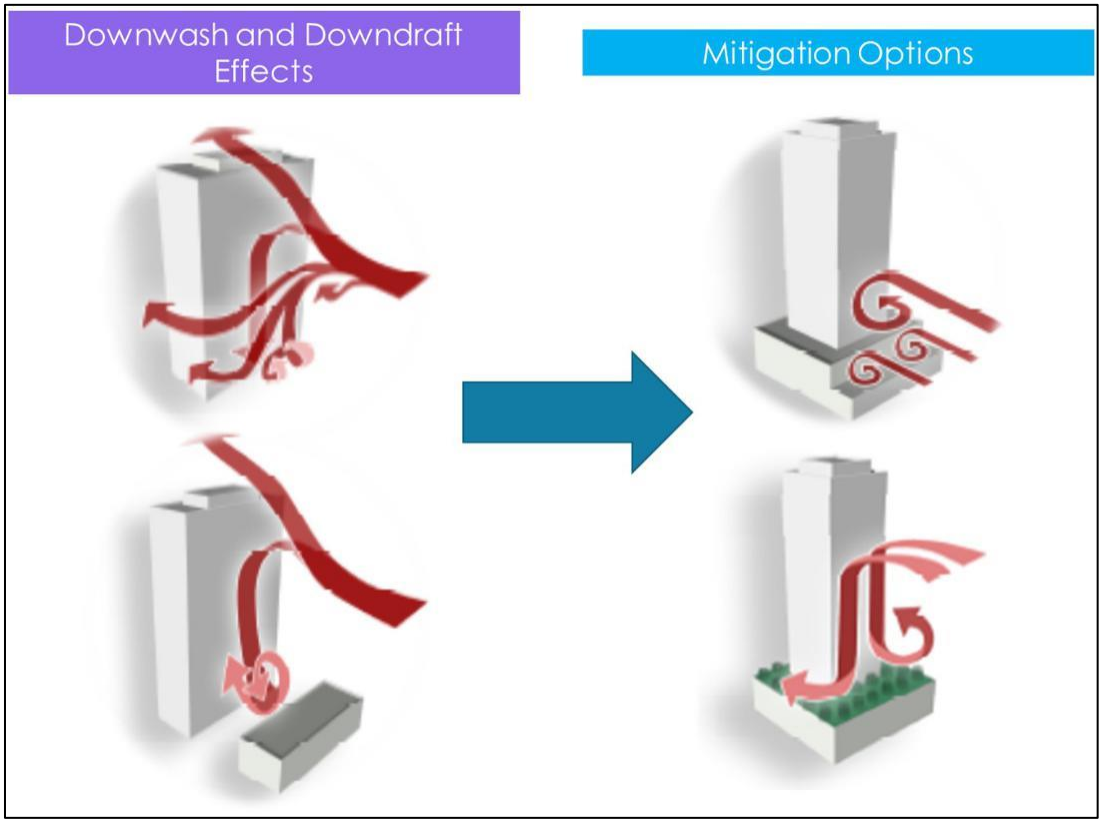

Figure 8-11: Mitigation Measures for Downwash and Downdraft Effects

Funneling 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.

Example 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.

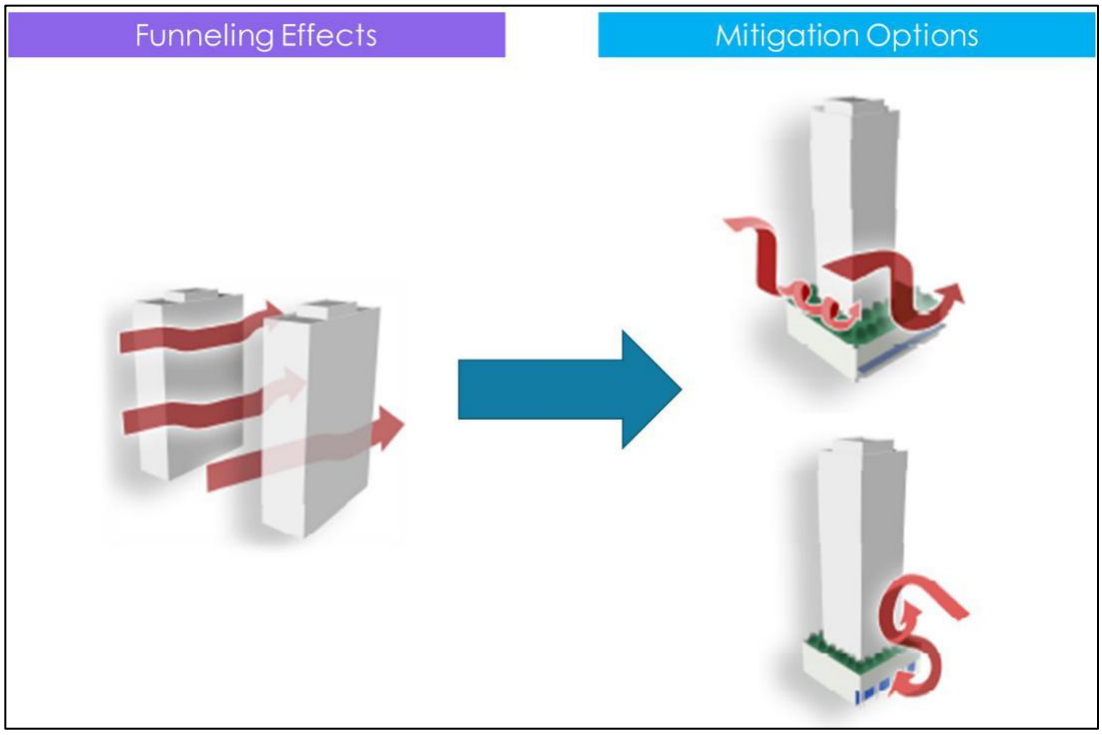

Figure 8-12: Mitigation Measures for Funnelling Effects

8.1.2.6 *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 phase: pre-processing, simulation and post-processing as described in Figure 8-13. 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.

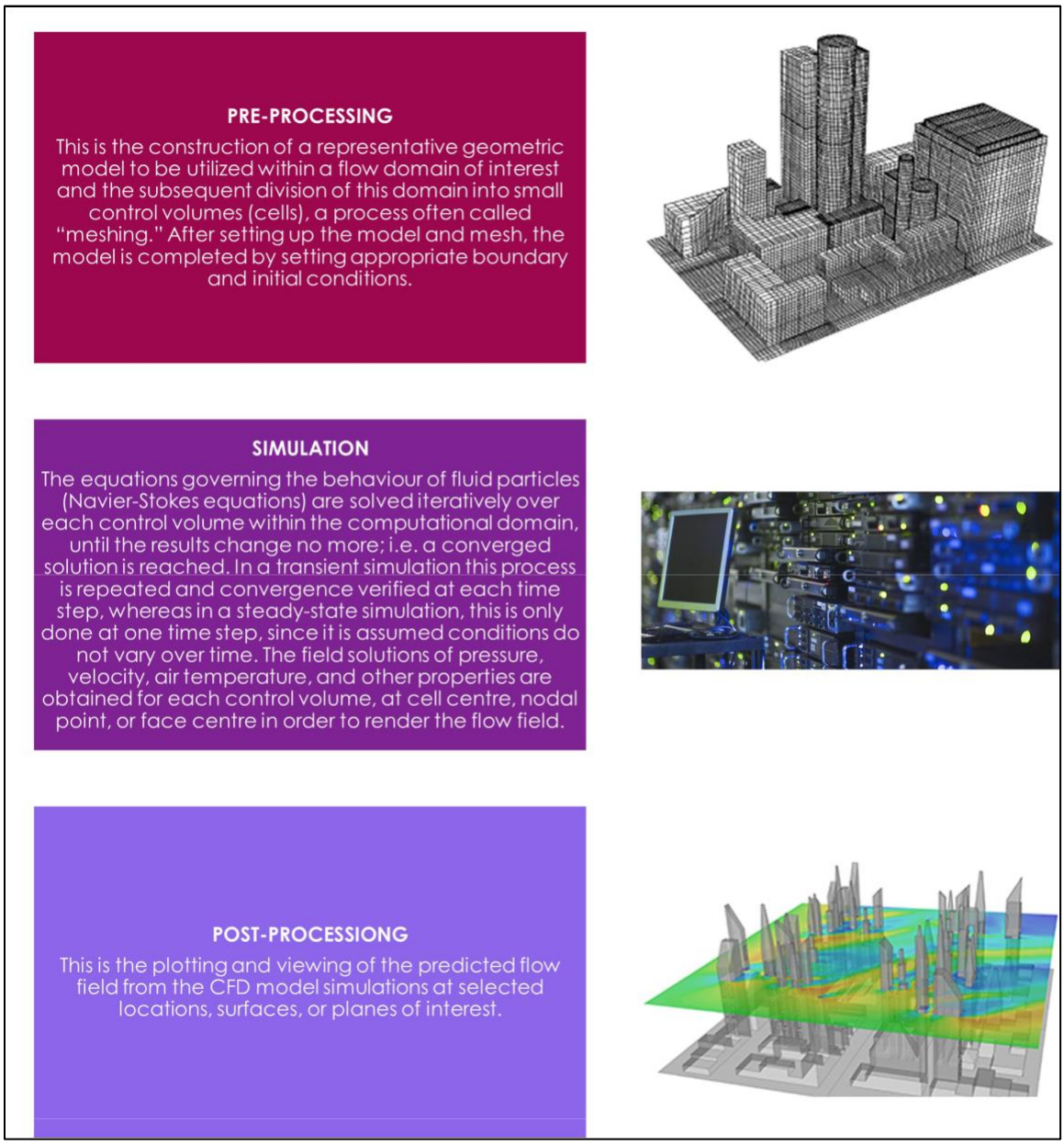

Figure 8-13: CFD Modelling Process Explanation

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).

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. These categories are essential and will be utilized to perform pedestrian comfort assessment needed for the environmental assessment within this EIAR Chapter.

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*

Figure 8-14: Main Categories for Pedestrian Activities (Source: Lawson Categories)

8.1.2.7 *CFD Model Details of the Proposed Development*

This subsection describes all features included in the geometrical and physical representation of St. Paul's Residential Development 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.

Modelled Geometry

The Proposed Development Model consists of nine no. residential apartment blocks as shown in Figure 8-15.

The modelled layout and dimensions of the surrounding environment are outlined in the Table 8-3 below.

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 2km² around the Proposed Development, as shown.

	MODELLED CFD ENVIRONMENT DIMENSIONS		
	Width	Length	Height
CFD Mesh Domain	950m approx	950m approx	120m approx

Table 8-3: Modelled Environment Dimensions

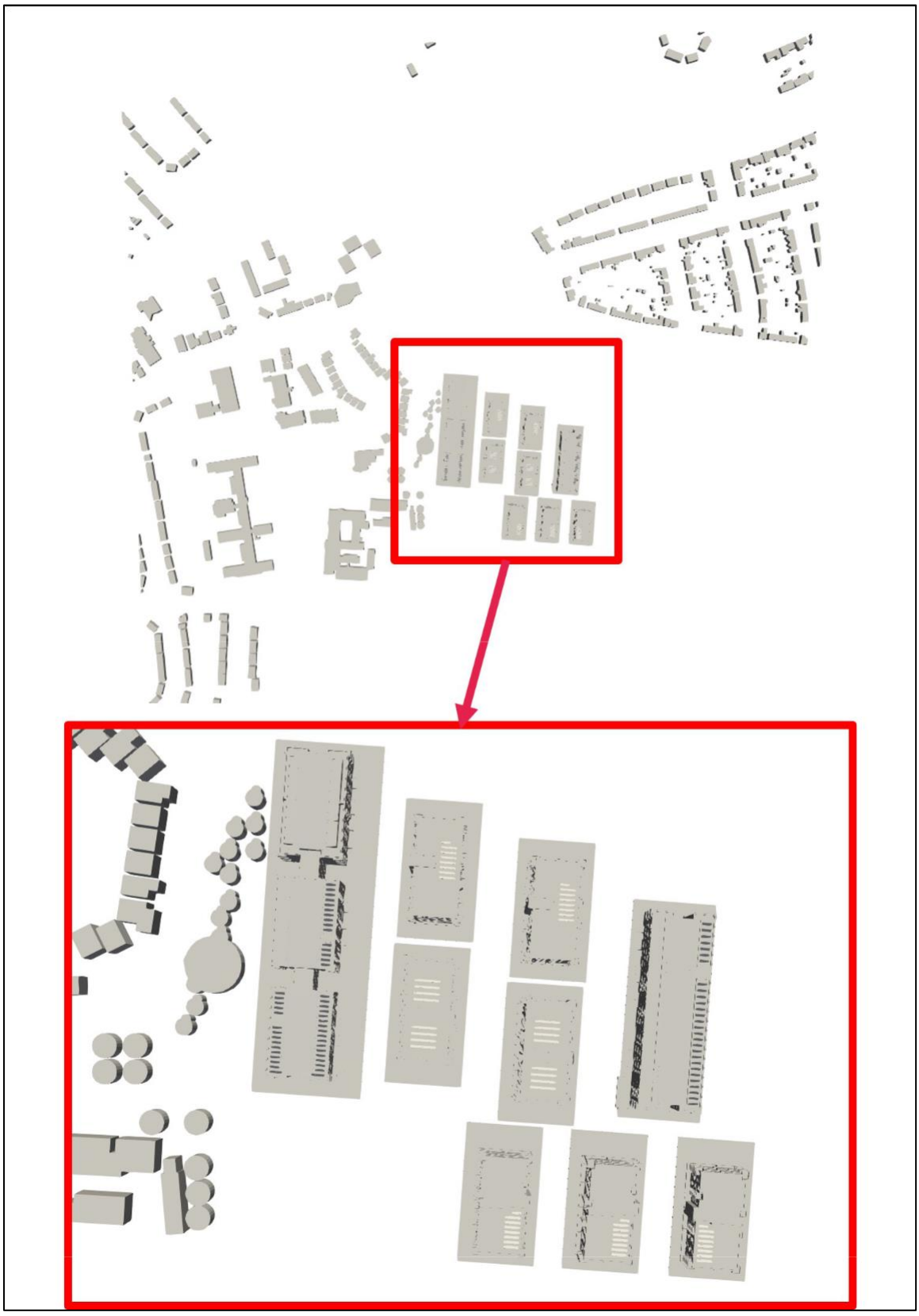

Figure 8-15: The Proposed Development Extents of Modelled Area: Blocks 1-9 Top View

8.1.2.8 *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:

$$v_2 = v_1 \frac{\ln \frac{h_2}{z_0}}{\ln \frac{h_1}{z_0}} \quad (8.1)$$

Where:

- v_1 = wind speed measured at the reference height h_1
- h_1 = reference height to measure v_1
- h_2 = height of the wind speed v_2 calculated for the wind profile
- z_0 = 0.4 [m] roughness length selected, see table in Figure 8-16 below.

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

Figure 8-16: Roughness Length and Class to be used for the Logarithmic Wind Profile

The wind profile used in the model has been calculated using the formula above and is represented in Figure 8-17 below.

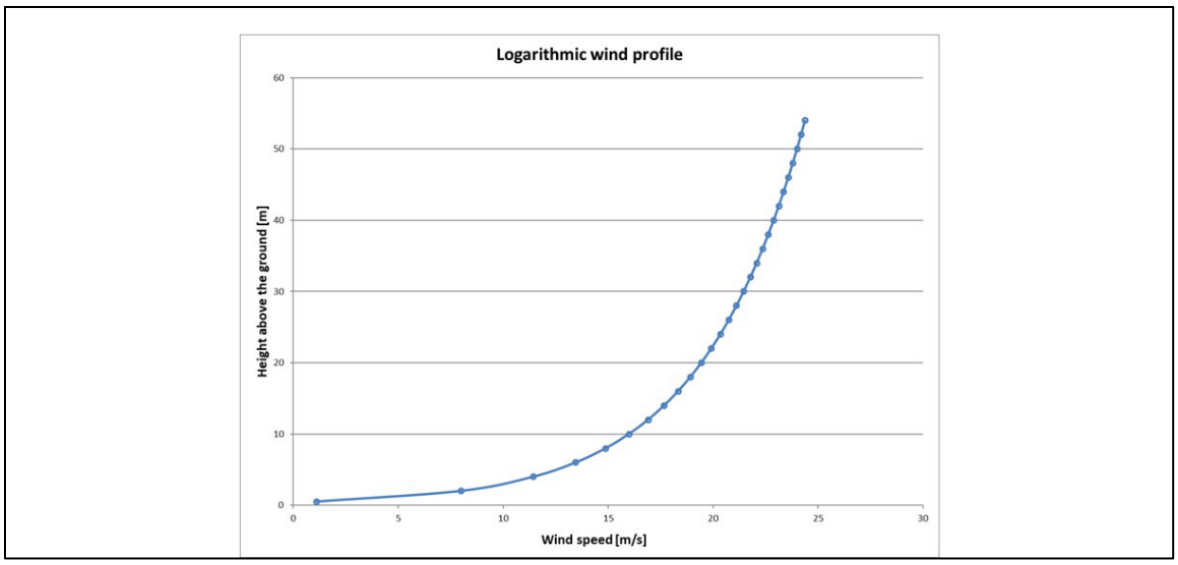

Figure 8-17: Wind Profile used in the Model

8.1.2.9 *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 8-4 below, while an example of the utilized computational mesh grid is as shown in Figures 8-18 to 8-19.

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.

AIR AND COMPUTATIONAL MESH PARAMETERS	
Air Density *r*	1:2kg=m^3
Ambient Temperature (T)	288K(approx:15C)
Min mesh cell size	0.1 m At Development Building 0.5m In The Refined Volume Surroundings 1.5m At Other Environment Buildings 2m Elsewhere
Min cell size ratio	1:1:1 (dx:dy:dz)
Total mesh size	Approx. cells number = 20 million

Table 8-4: Air Computational Mesh Parameters

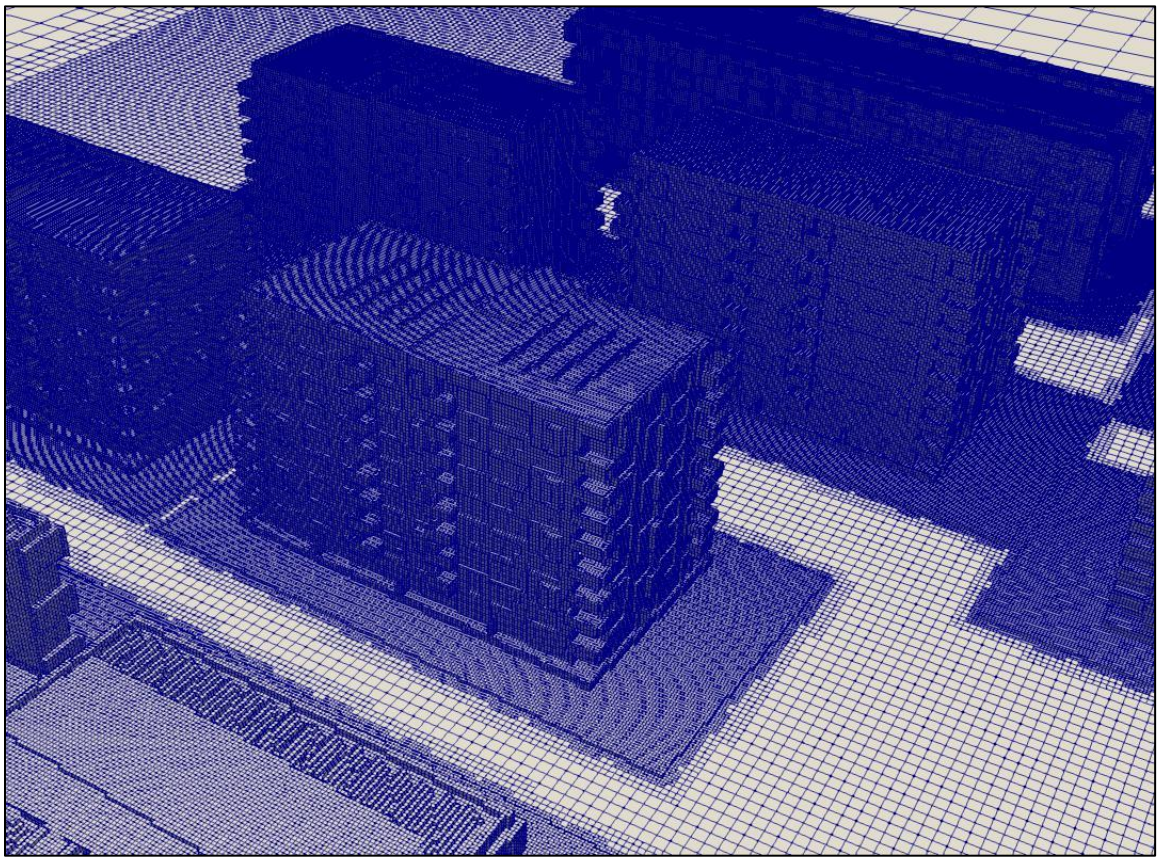

Figure 8-18: The Proposed Development Computational Mesh Utilised: South West Isometric View

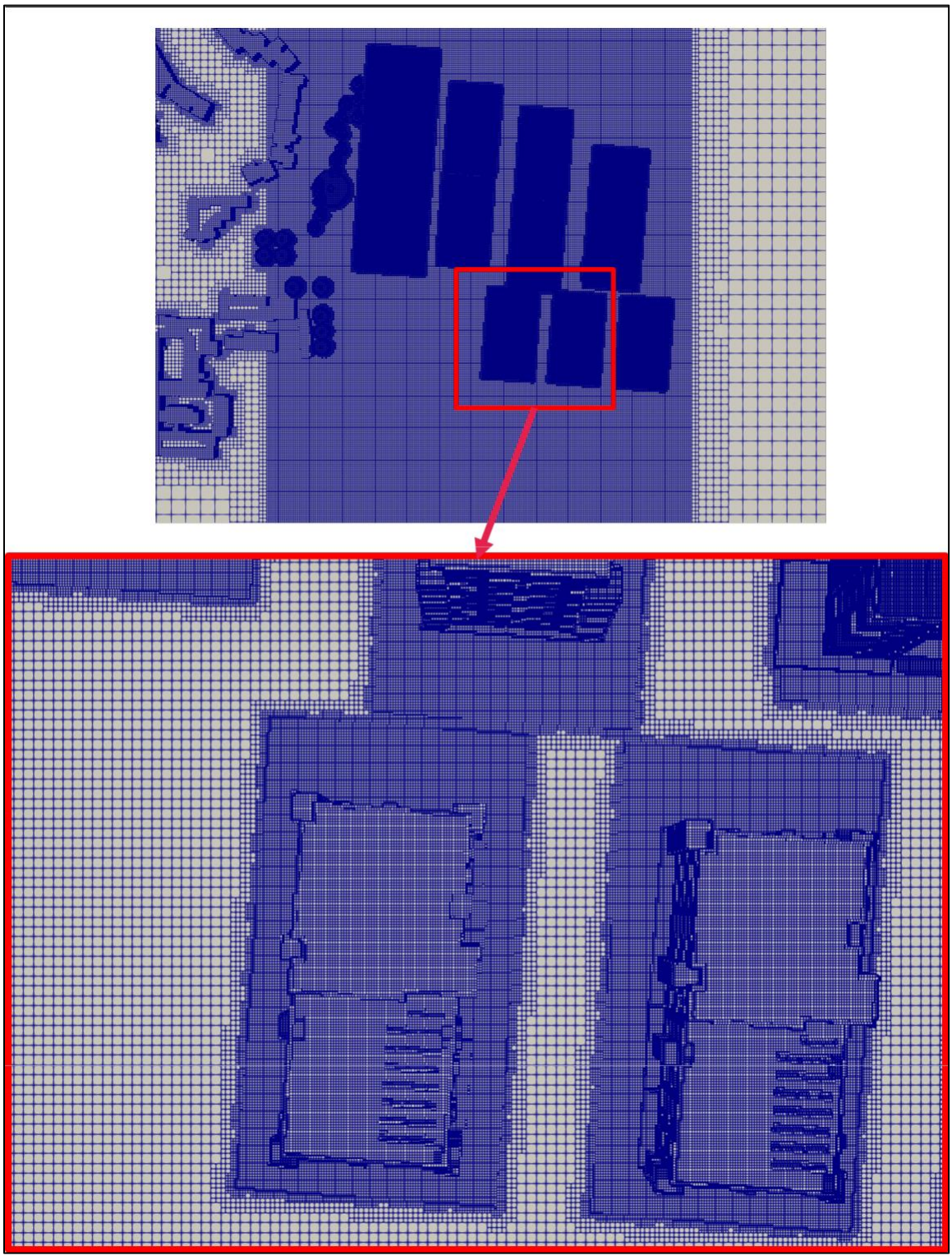

Figure 8-19: The Proposed Development Computational Mesh Utilised: Top View

A summary of CFD model input data used in for this Proposed Development is given in the table shown in Figure 8-20. This summarises the numerical modelling technique and parameters utilized.

Parameter	ST. PAUL'S DEVELOPMENT CFD MODEL DATA
Environment Conditions	
Ambient pressure	101325 Pa
Wind profile	Logarithmic atmospheric profile
Ambient temperature	15°C
Analysis type	Steady state
Computational Details	
Total cells used	> 20,000,000
Development Mesh size	0.2 m
Turbulence treatment	K-epsilon turbulence model
Convergence Criteria	$< 10^{-6}$
Boundary Conditions	
CFD Domain Inlet	Statistical Wind Profile
CFD Domain Outlet	Pressure Outlet condition (zero pressure gradient)
All Buildings	Zero velocity gradient (No-slip condition)

Figure 8-20: Summary of CFD Model Input Data

8.1.3 *Characteristics of the Proposed Development*

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River.

Figures 8-21 and 8-22 below show views of the entire Proposed Development while Figure 8-23 shows generic views of the public open spaces. Figure 8-24 shows the generic apartments (top view) layout.

Figure 8-21: The Proposed Development (Zoomed View)

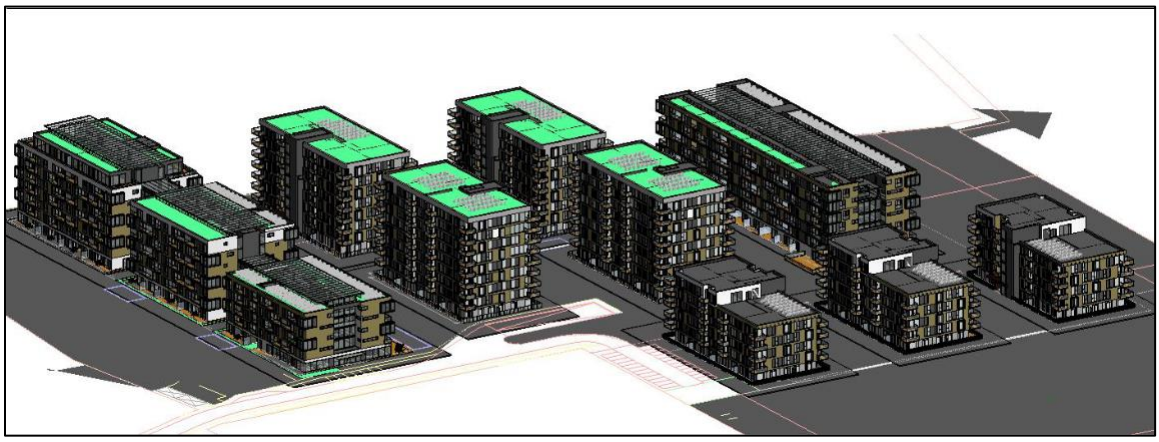

Figure 8-22: The Proposed Development 3D Model Showing Blocks 1-9: S-W ISO View

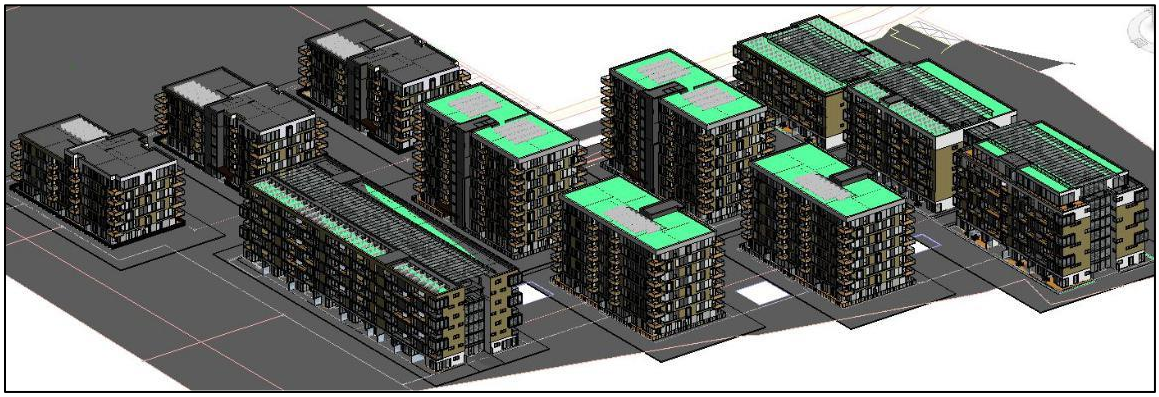

Figure 8-23: The Proposed Development 3D Model Showing Blocks 1-9: N-E ISO View

Figure 8-24: The Proposed Development - Rendered View of Apartments

8.1.4 *The Existing Receiving Environment (Baseline Situation)*

In this section, 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 Development. 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.

Figure 8-25: Existing Receiving Baseline Environment (Source: O'Mahony Pike Architects)

An initial 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 10mAGL at Dublin Airport.

- 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 Site is surrounded by landscaping. This has a beneficial effect in mitigating the impact of the incoming wind. The prevailing wind directions for the site are identified in the West, West south-west and south-east with magnitude of circa (**c**) 6m/s. In all these directions the development benefits from a good shielding through landscaping. The trees are beneficial in calming the incoming wind and deviating it.

- Areas where velocities can be potentially higher and some funnelling/recirculation effects experienced have been highlighted. However, these are mitigated by the proposed mitigation measures, with particular attention to the corners of the Proposed Development buildings.

8.1.4.1 *Site Location and Surrounding Area*

The Proposed Development is located east of the R808 Sybil Hill Road, Raheny, Dublin 5. The Site is shown in Figure 8-25 above and Figure 8-26 below. The area considered for the existing environment and Proposed Development assessment comprises a 2km² area around the Proposed Development as represented in Figure 8-27 below.

Figure 8-26: The site of the Proposed Development Location and the Existing Environment (Source: Google Earth and Google Map Views)

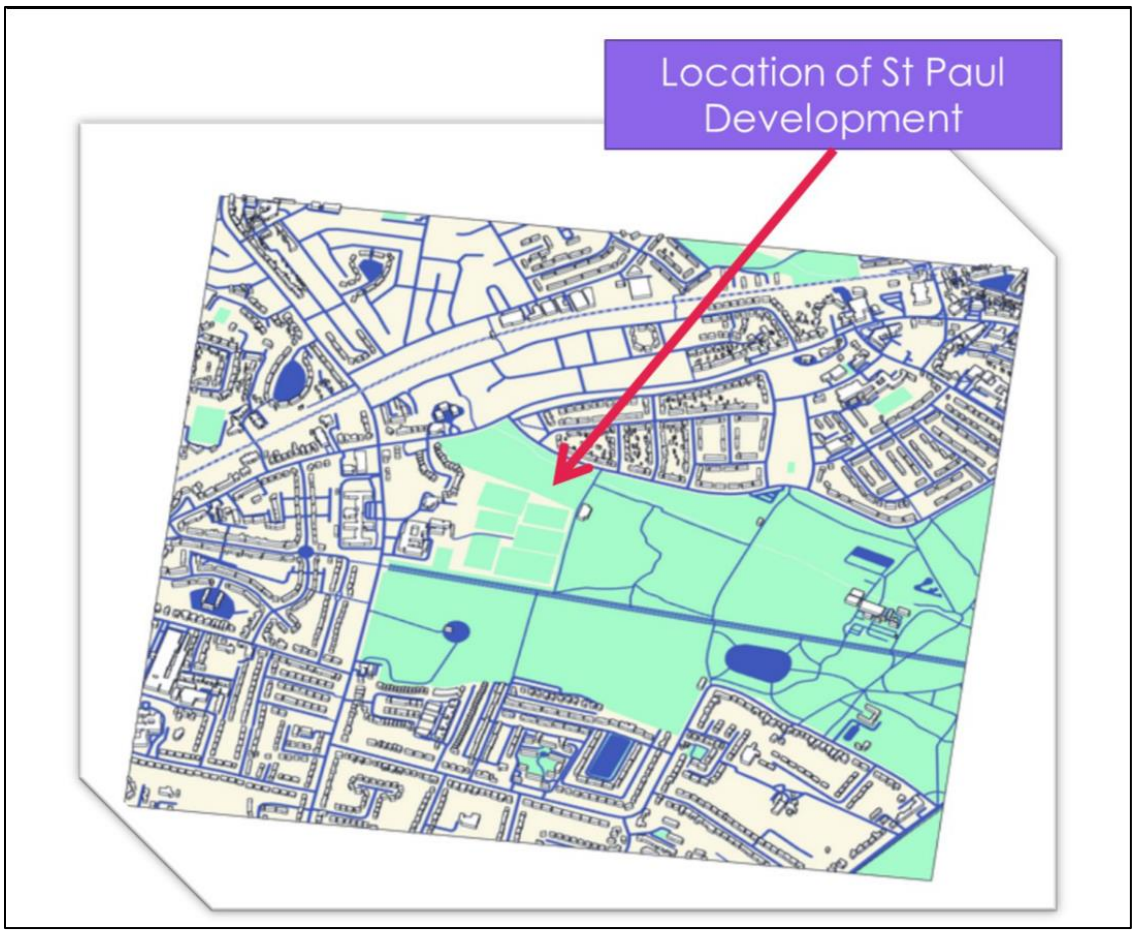

Figure 8-27: Extents of Analysed Existing Environment around the Proposed Development (Source: Google Earth and Google Map Views)

8.1.4.2 *Topography and Built Environment*

Figure 8-28 shows an aerial photograph of the terrain surrounding the site of the Proposed Development.

The site of the Proposed Development is located to the immediate north-west of St Anne's Park at Raheny. St Anne's Park extends from the higher ground at the Howth Road and Sybil Hill Road east to the lower ground at Clontarf Road along the coast at Dublin Bay. Apart from the Park and the Coast, the context is almost entirely developed, with predominantly residential buildings of varying densities, and a mix of educational, retail, religious and institutional buildings. The site is zoned Z15. Other adjacent lands also zoned Z15 include Sybil Hill House (a protected structure), St Paul's College and grounds, and the Convent grounds of the Little Sister of the Poor, which is located to the immediate west of Sybil Hill Road.

The area surrounding the Site can be characterised as an urban environment. Some shelter effect can be expected for wind approaching from certain directions. This study considered, the main wind directions of west to south-west and south-east, which are classified "urban winds". The Site is located near the coast however, between the sea and the Site, there is an urban environment, so the effect of winds from the sea is expected to be mitigated.

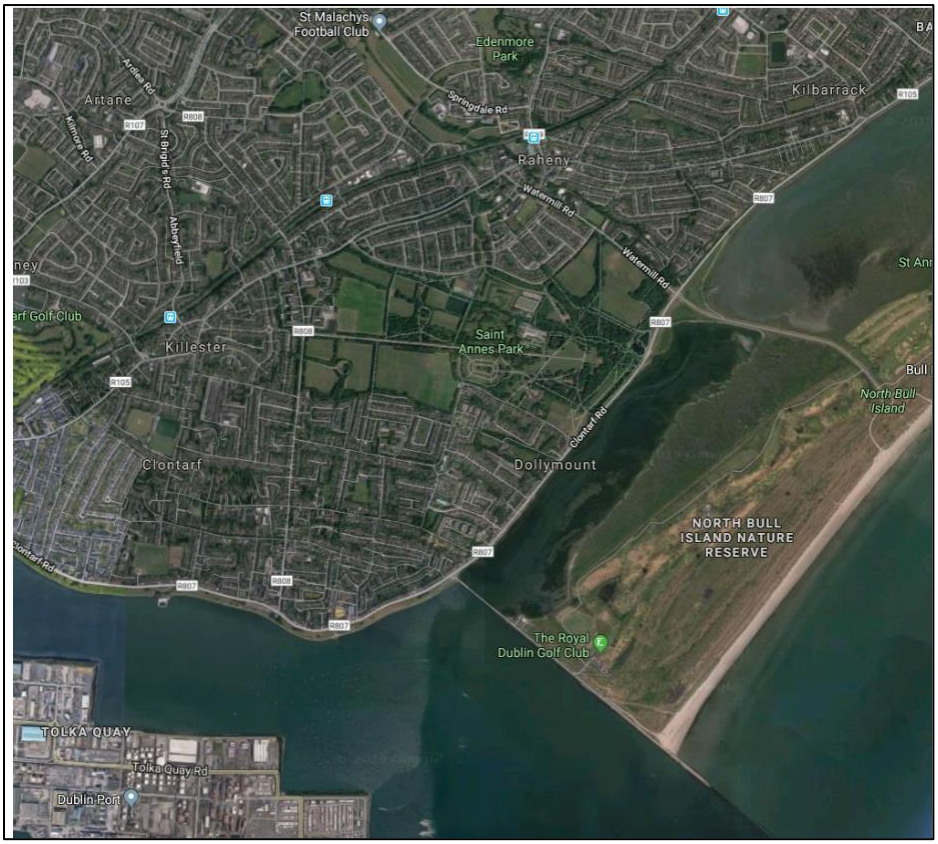

Figure 8-28: Built Environment around the Proposed Development (Source: Google Earth View)

8.1.4.3 *Wind 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 the Dublin Airport Weather Station. Figure 8-29 below shows the location of the Proposed Development in relation to Dublin Airport.

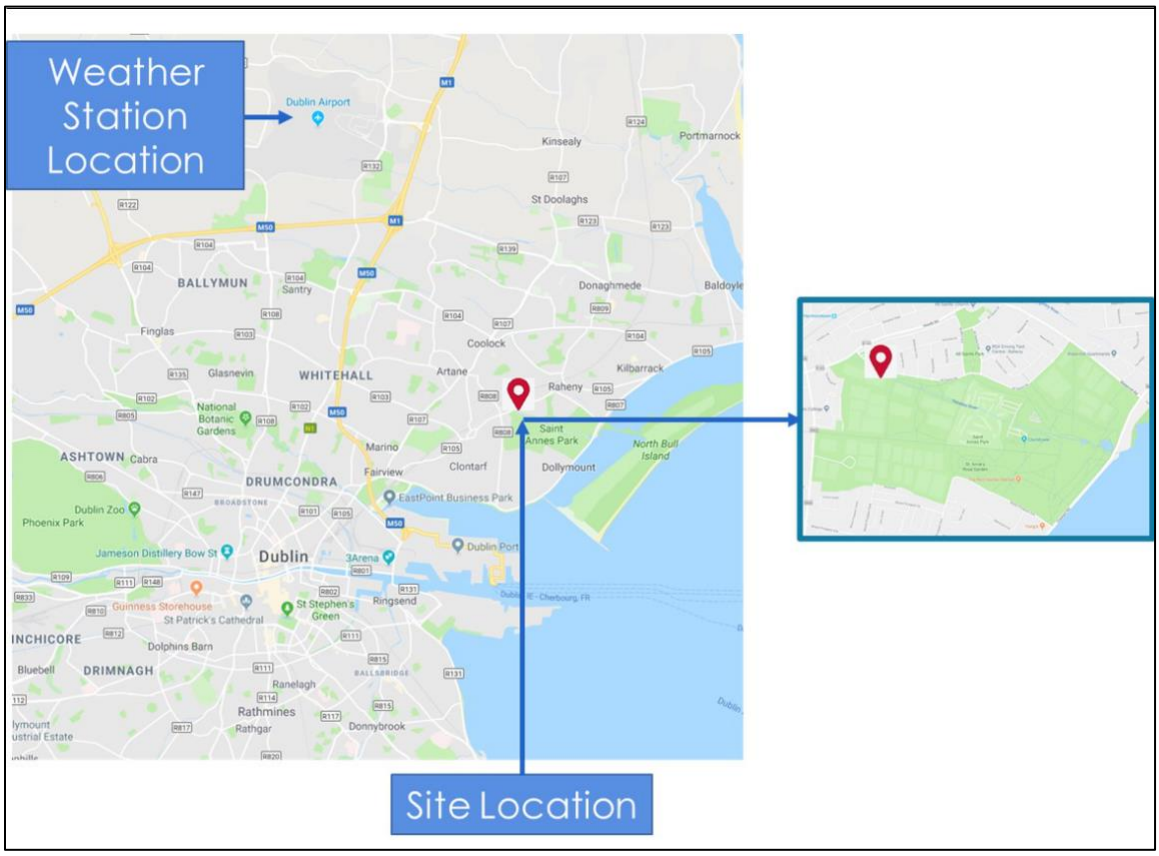

Figure 8-29: Map Showing the Position of the Proposed Development and Dublin Airport

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 Site compared to the meteorological station at the airport.

- **Wind Directions**: The landscape around the Site can in principle be characterised as flat terrain. Isolated elevations in the near area of the Proposed 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 conclude that the data from the meteorological station at Dublin Airport are applicable for the desktop assessment of the wind comfort at the site of the Proposed Development.

8.1.4.4 *Wind Conditions*

The assessment of the wind comfort conditions at the site of the Proposed Development 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 2015; and
- The mean hourly wind speeds recorded over a 10-year period between 2005 and 2015. The data is recorded at a weather station at the airport, which is located 10mAGL or 71mOD.

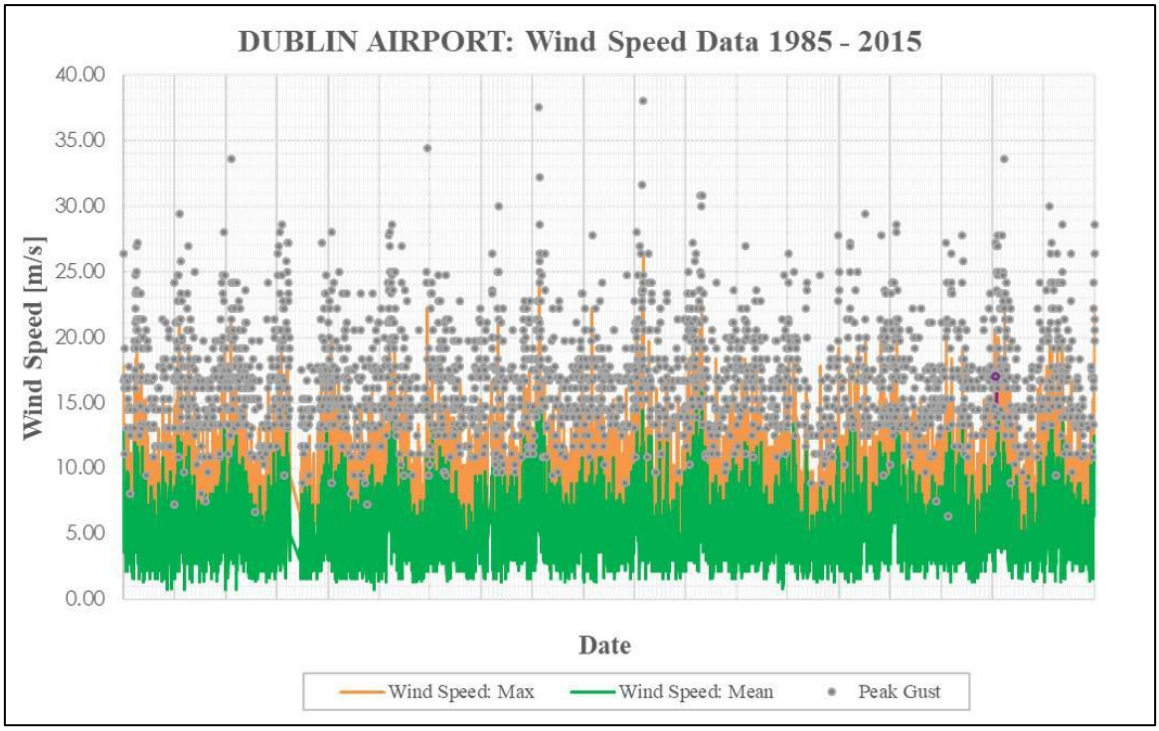

Figure 8-30: Local Wind Conditions (Source: Dublin Airport Weather Station)

Figure 8-31 below, shows the wind speed diagram for Dublin Airport, showing the days per month, during which the wind reaches a certain speed. In Figure 8-32 below, the wind rose for Dublin Airport shows how many hours per year the wind blows from the indicated direction, confirming how the predominant directions are west-south-west, west and south-west

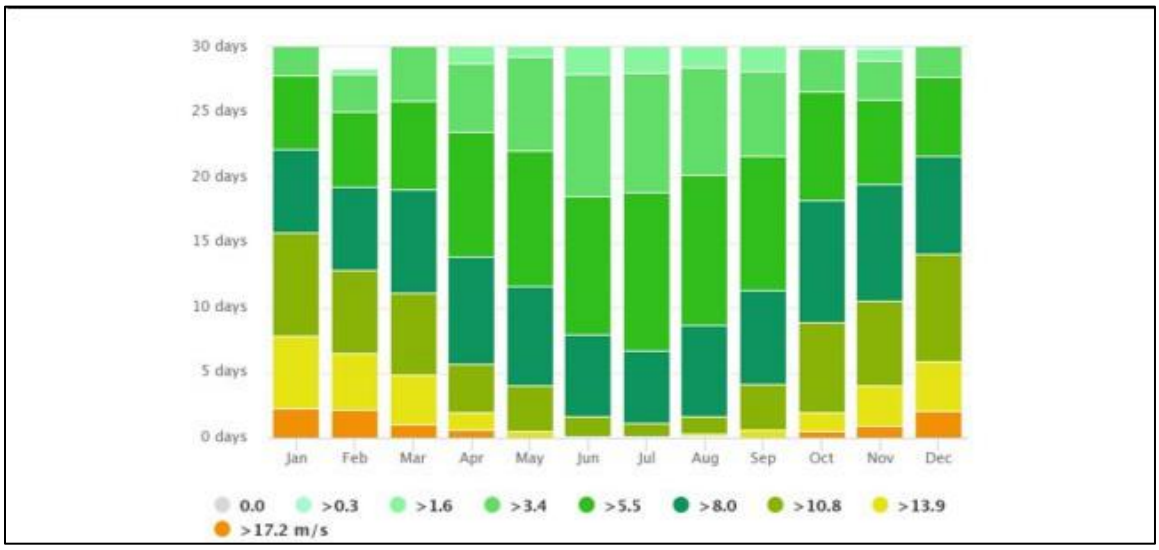

Figure 8-31: Dublin Wind Speed Diagram (Source: Dublin Airport Weather Station)

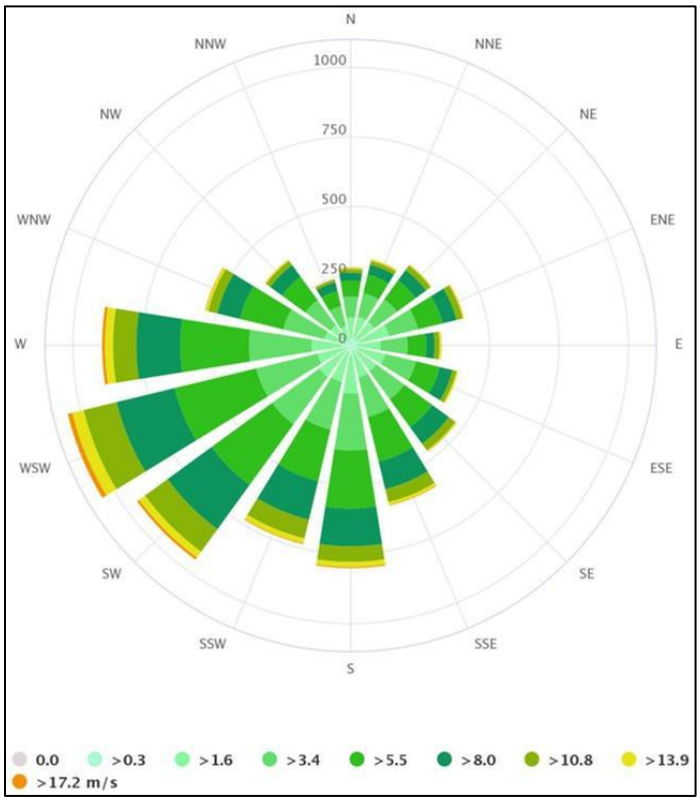

Figure 8-32: Dublin Wind Rose (Source: Dublin Airport Weather Station)

Based on the criterion of occurrence frequency the main wind directions to be considered in pedestrian wind comfort assessment are presented in Figure 8-33 below 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.

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 %	

Figure 8-33: Main Wind Directions Occurrence Frequency (Source: Dublin Airport Weather Station)

8.1.4.5 *Mean and Maximum Wind Conditions*

Examination of the daily wind data reveals that the wind predominantly blows from west and south-west directions, however, there is a secondary wind from the south-east. It is apparent that winds from other directions are rare. Maximum daily wind speeds of nearly 30m/s were recorded in the past 30 years, however, the maximum daily winds are commonly found between 6 m/s and 15m/s. the strongest winds arise from the west and south-west.

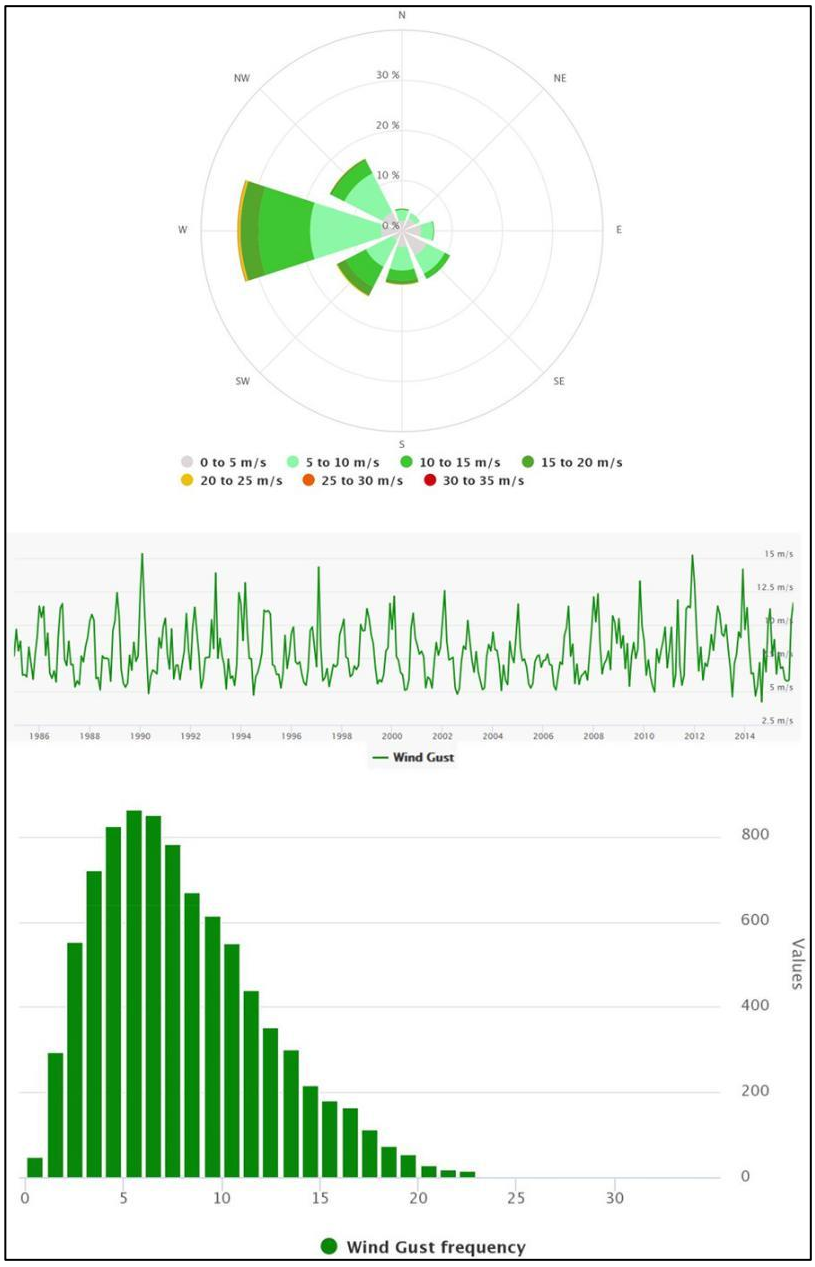

Figure 8-34: Maximum Wind Conditions (Source: Dublin Airport Weather Station)

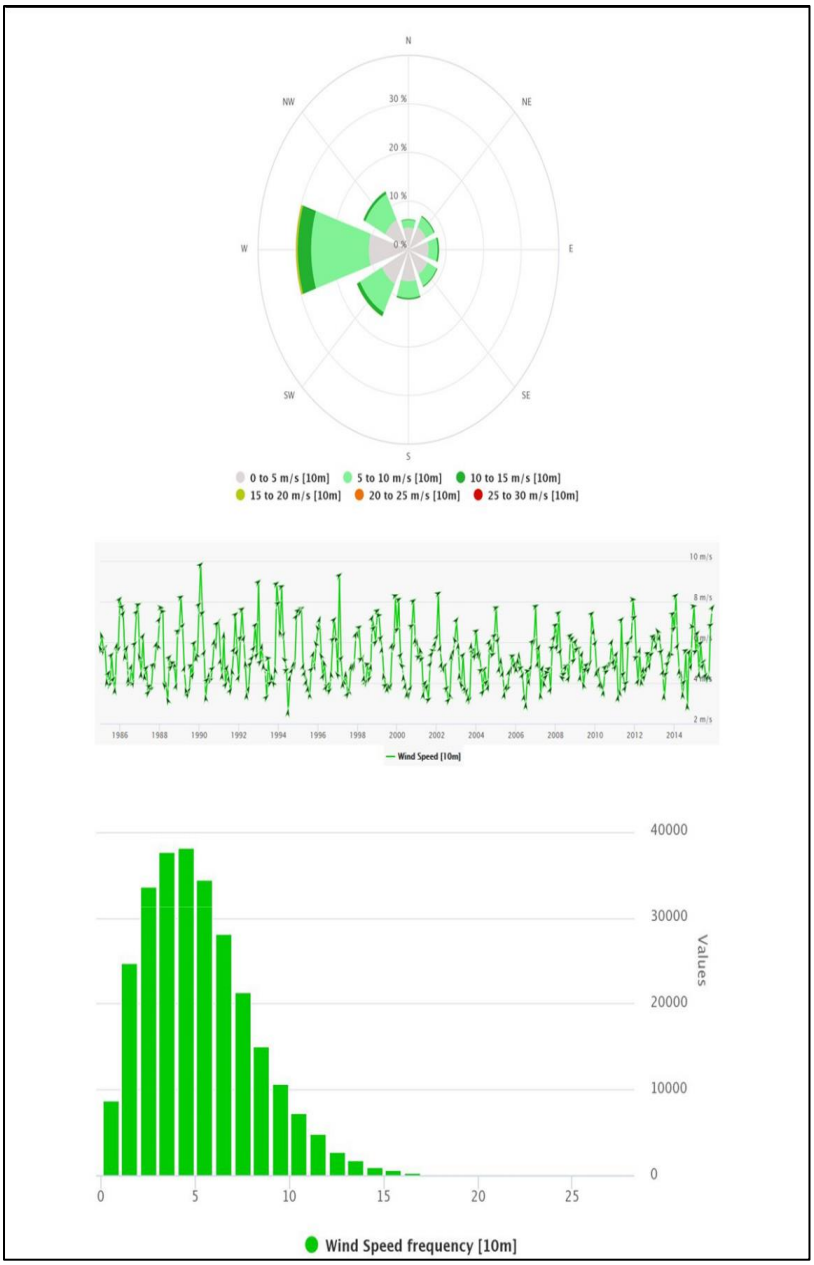

Figure 8-35: Mean Wind Conditions (Source: Dublin Airport Weather Station)

8.1.5 *Potential Impacts of the Proposed Development*

This section assessed the potential impact of the Proposed Development on the already existing environment, and the suitability of the Proposed Development to create and maintain a suitable and comfortable environment for different pedestrian activities.

8.1.5.1 *Construction Phase*

The possible effects on the wind microclimate at the Site during the Construction Phase of the Proposed Development 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 finalisation of the Proposed Development proceeds, the wind setting at the Site would progressively conform to those of the completed Proposed Development. It is possible that in the final phases of construction, implementation of the mitigation measures would be needed in areas that are expected to be windier than others, and incase some areas of the Site are expected to be functional before the Construction Phase is finalised.

Due to the fact that windier conditions are acceptable within a construction area (not accessible to the public), and the Proposed Development would not be the reason for critical wind conditions on site (and are slightly calmer when the Proposed Development 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 negligible.

In summary, as construction of the Proposed Development progresses, the wind conditions at the Site would gradually adjust to those of the completed Proposed Development. During the Construction Phase, predicted impacts are classified as negligible.

8.1.5.2 *Operational Phase*

This section shows CFD results of wind microclimate assessment carried out considering the Operational Phase of the Proposed Development. In this case the assessment has considered the impact of wind on the existing area including the Proposed Development. For this scenario, the Proposed Development has been simulated. Wind simulations have been carried out on all the various directions for which the Proposed 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 in section 8.2.3 (Lawson Scale).

It is also of interest at this point to underline once more the objectives of simulations performed. In particular:

- Pedestrian Wind Comfort and Safety Studies are conducted to predict, assess and, where necessary, mitigate the impact of the Proposed 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 Development. Results of wind flow speeds are collected throughout the simulation and analysed based on the Lawson Discomfort Criteria.

Figure 8-36 shows an example of wind speed results collected at 1.5mAGL level of the development. Red colours generally indicate critical values while blue colours indicate tenable conditions.

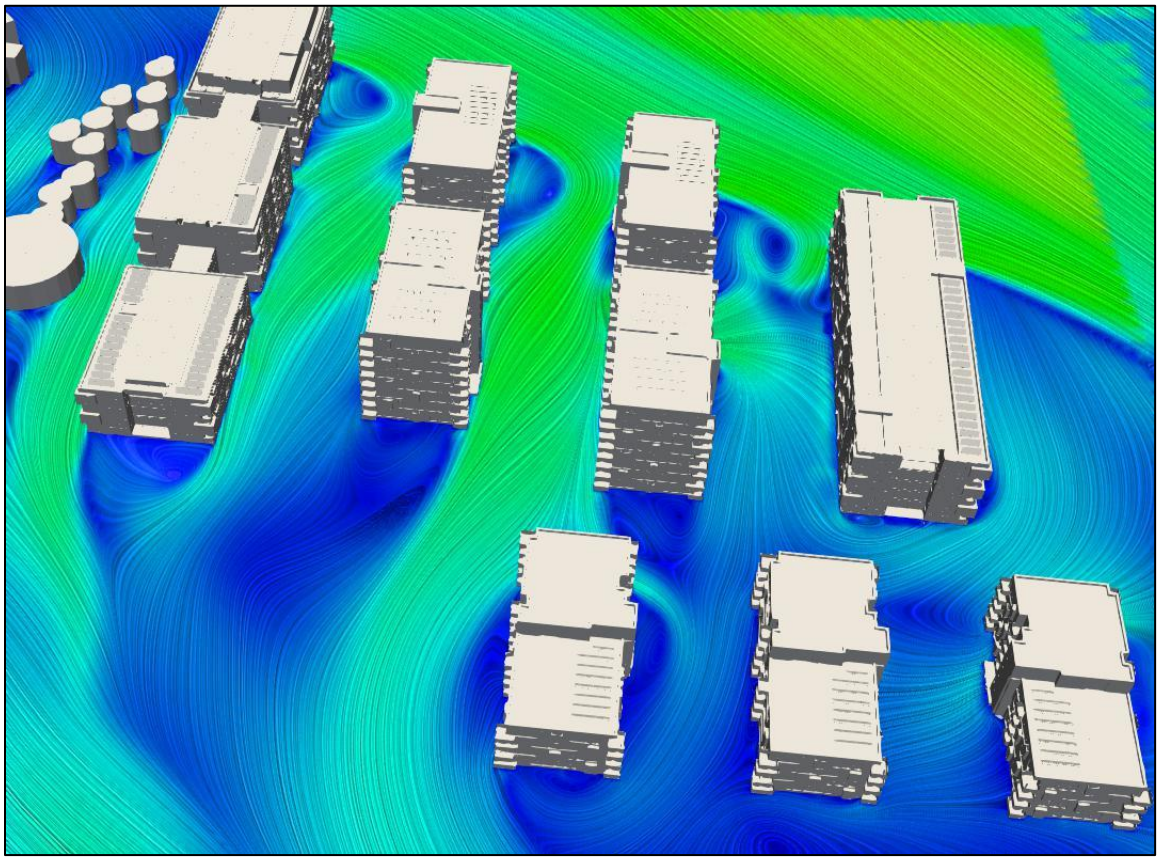

Figure 8-36: Wind Flow Results Collected at 1.5m Height above Ground Floor

Wind microclimate model assessment of the Proposed Development and its environment was performed utilising a CFD methodology. 9 no. worst-case wind scenarios are selected for presentation in this EIAR, as these scenarios and directions showed to be the most relevant wind speeds and cardinal directions.

CFD modelled results of the development scheme showed that:

- The Proposed Development will produce a high-quality environment that is attractive and comfortable for pedestrians of all categories.

- The surrounding environment and Proposed Development properly shield all paths / walkways around and within the Proposed Development. Pedestrian footpaths are always successfully shielded and comfortable.

- The Proposed Development semi-private open spaces are generally suitable for long-term sitting, short-term sitting, standing, walking and strolling activities.

- Shielding conditions in the south-west, south-east, north-east and north-west areas are always acceptable.

- Balconies within the Proposed Development are comfortable for pedestrian sitting, standing, walking and strolling.

- The Proposed Development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings.

- Pedestrian comfort assessment, performed according to the Lawson criteria, identified the areas that are suitable for different pedestrian activities in order to guarantee pedestrian comfort. In terms of distress, no critical conditions were found for “Frail persons or cyclists” in the surroundings of the Proposed Development. No critical conditions have been found for members of the “General Public”.

- During the Construction Phase of the Proposed Development the predicted impacts are classified as negligible.

Flow Velocity Results - Ground Floor Level

Results of wind speeds and their circulations at pedestrian level of 1.5mAGL are presented in Figures 8-37 to 8-41 for Cardinal and Ordinal Directions respectively in order to assess wind flows at ground floor level of the Proposed Development. Wind flow speeds are shown to be within tenable conditions.

Therefore, it can be concluded that the wind speeds that do not attain critical levels.

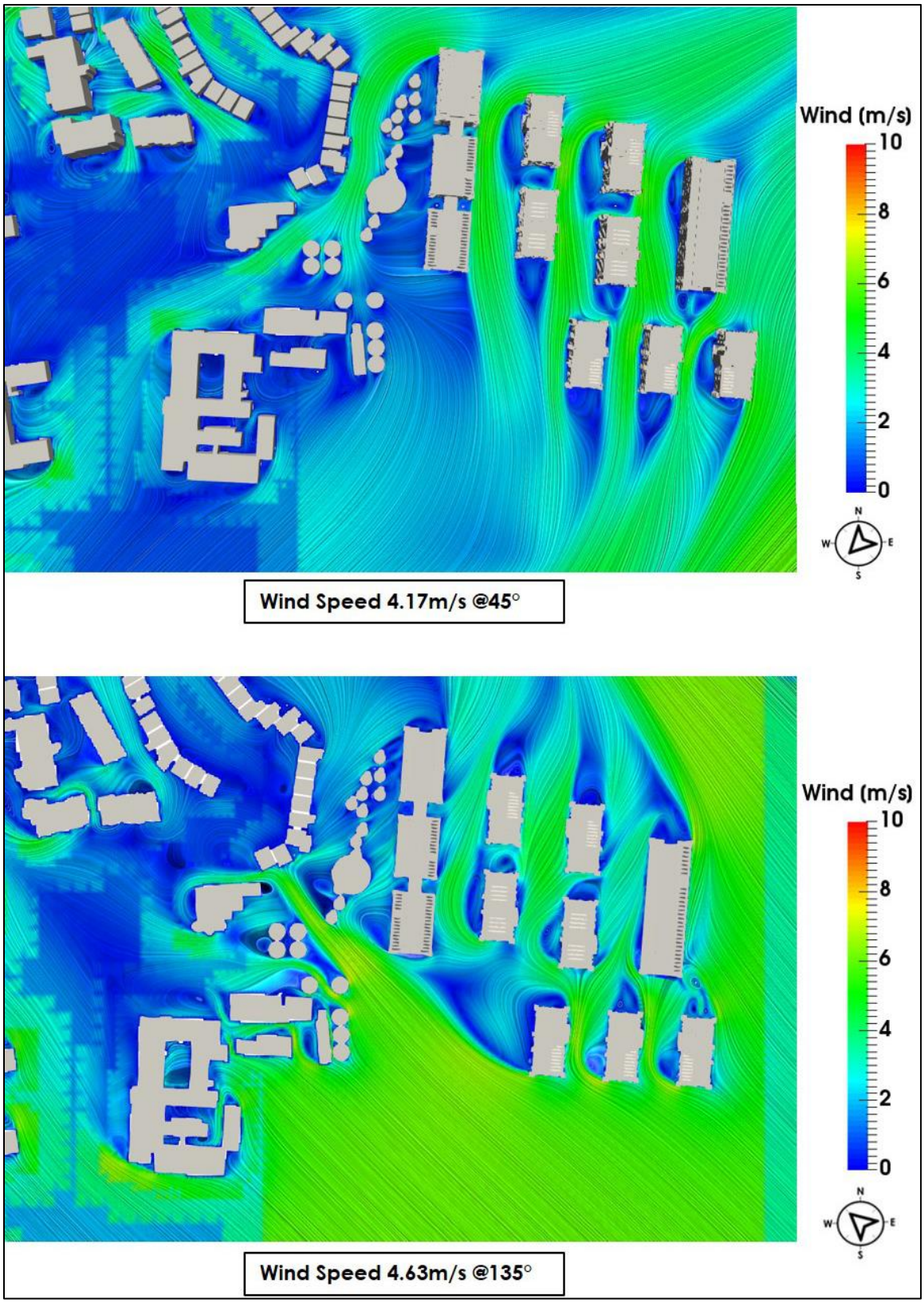

Figure 8-37: Wind Speed Results at 1.5m above Ground-Top View: 45º, 135º

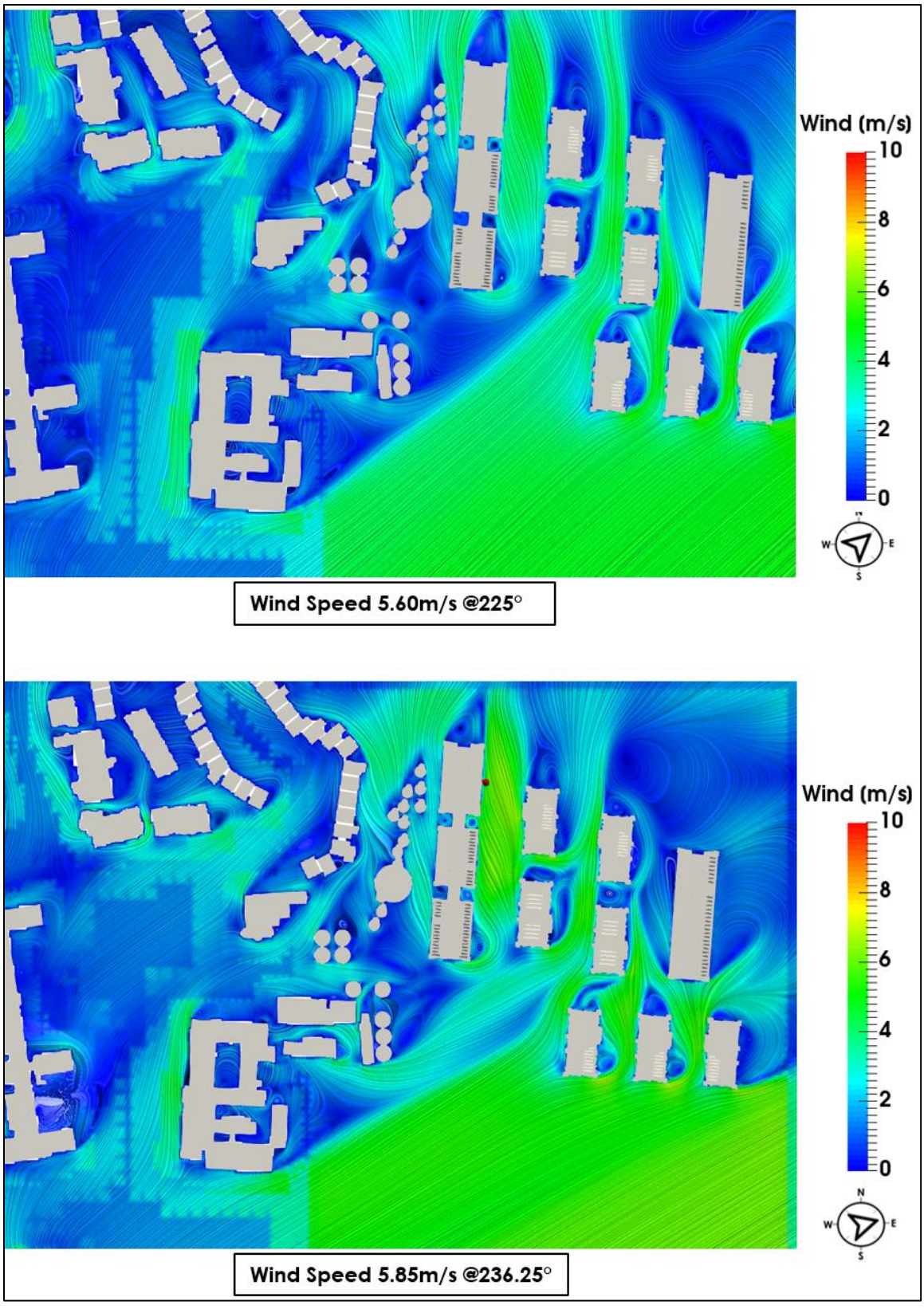

Figure 8-38: Wind Speed Results at 1.5m above Development Ground-Top View: 225º, 236.25o

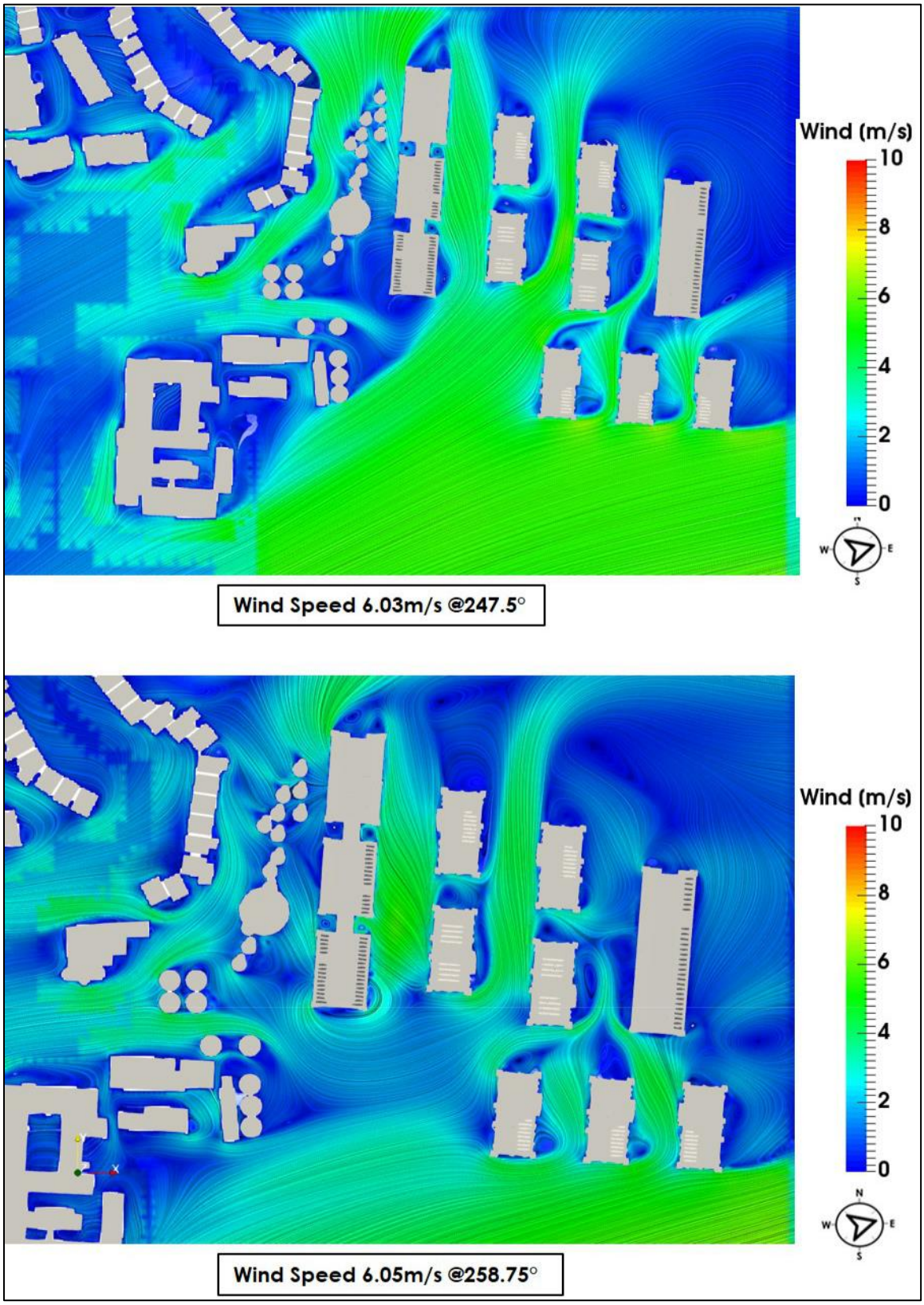

Figure 8-39: Wind Speed Results at 1.5m above Development Ground-Top View: 247.5°, 258.75°

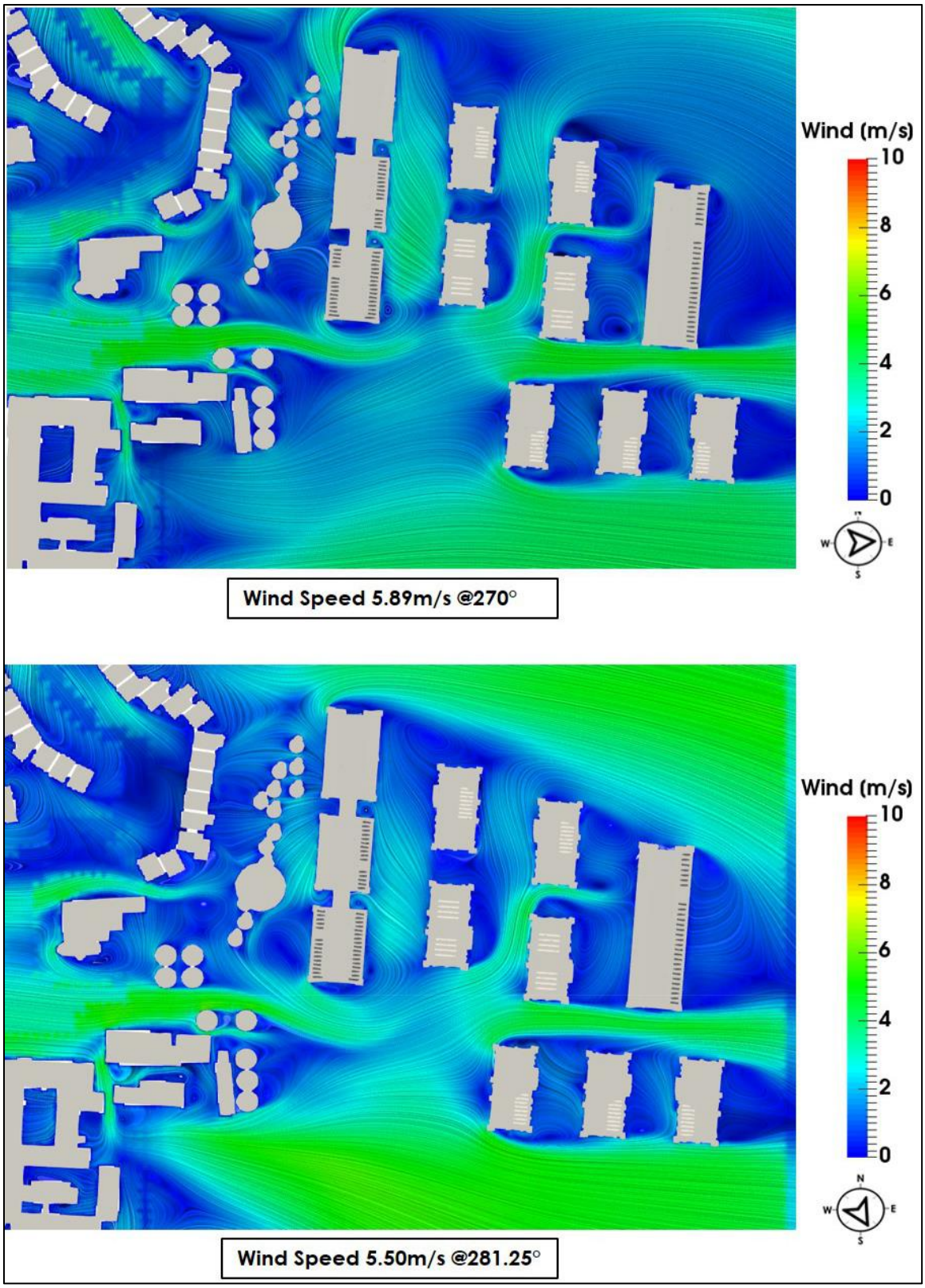

Figure 8-40: Wind Speed Results at 1.5m above Development Ground-Top View: 270º, 281.25º

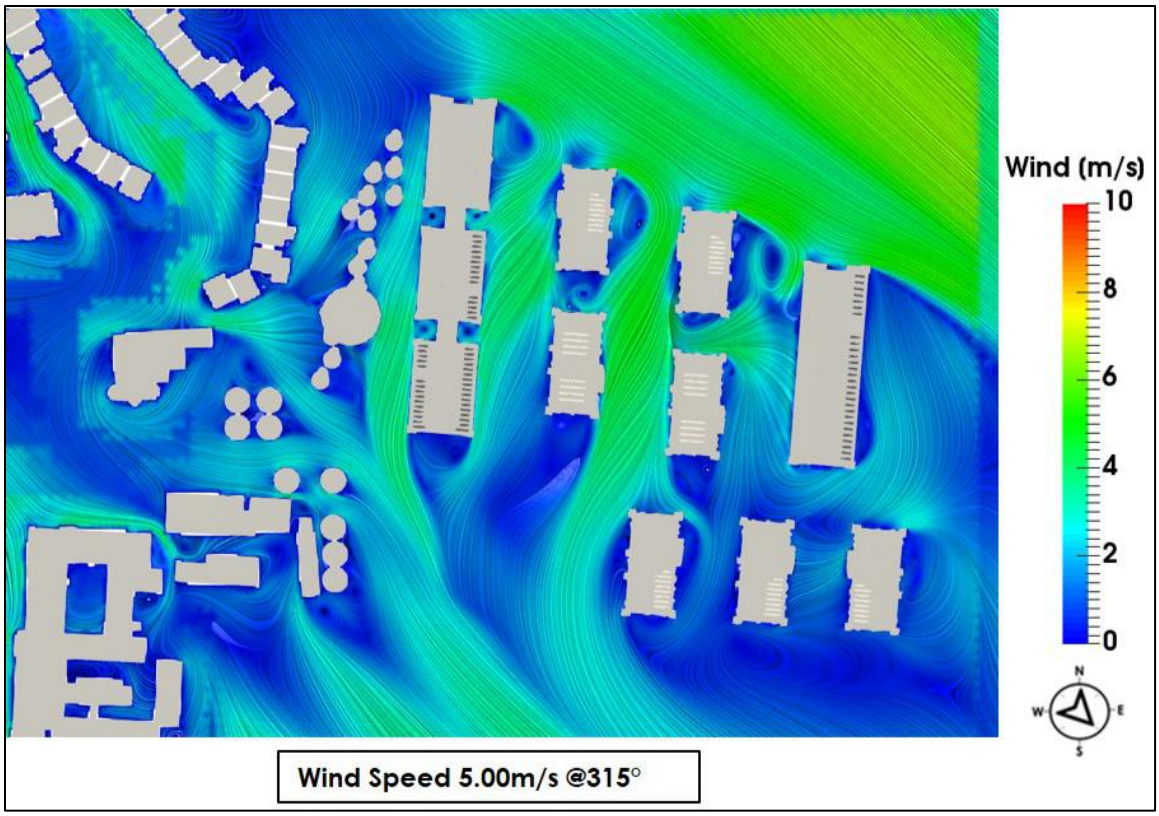

Figure 8-41: Wind Speed Results at 1.5m above Development Ground-Top View: 315°

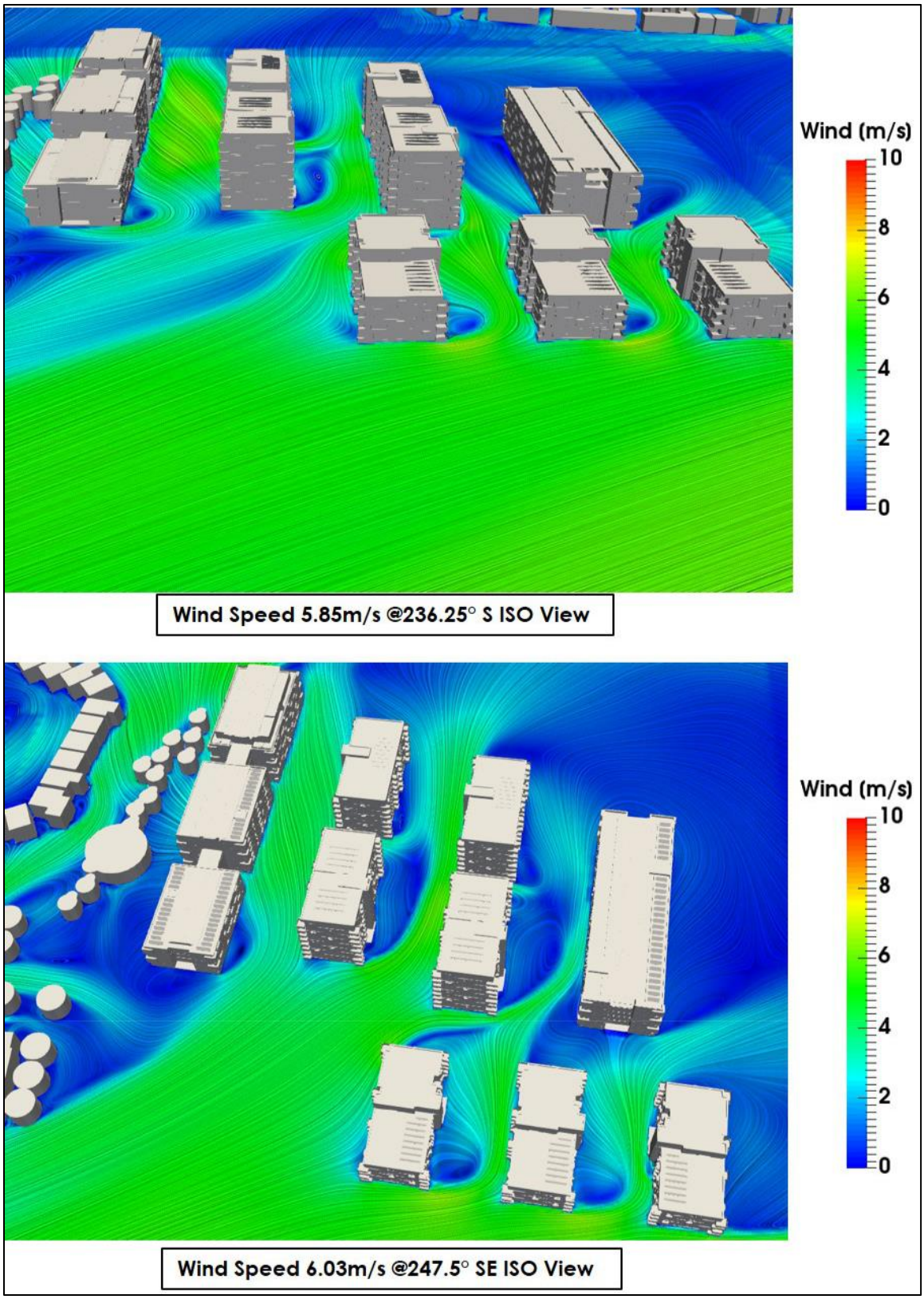

Figure 8-42: Wind Speed Results at 1.5m above Development Ground-Isometric View: 236.25°, 247.5°

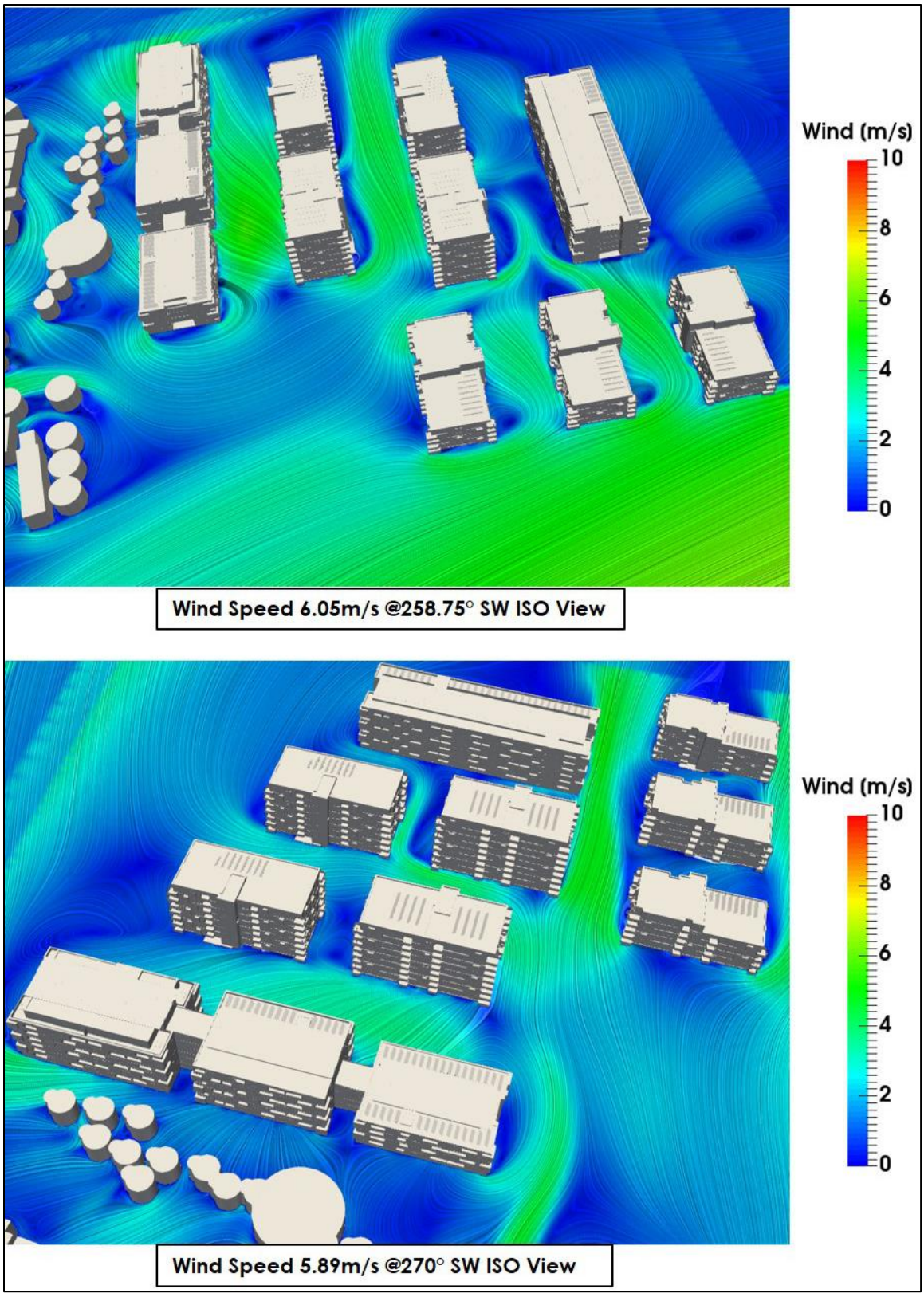

Figure 8-43: Wind Speed Results at 1.5m above Development Ground-Isometric View: 285.75º, 270º

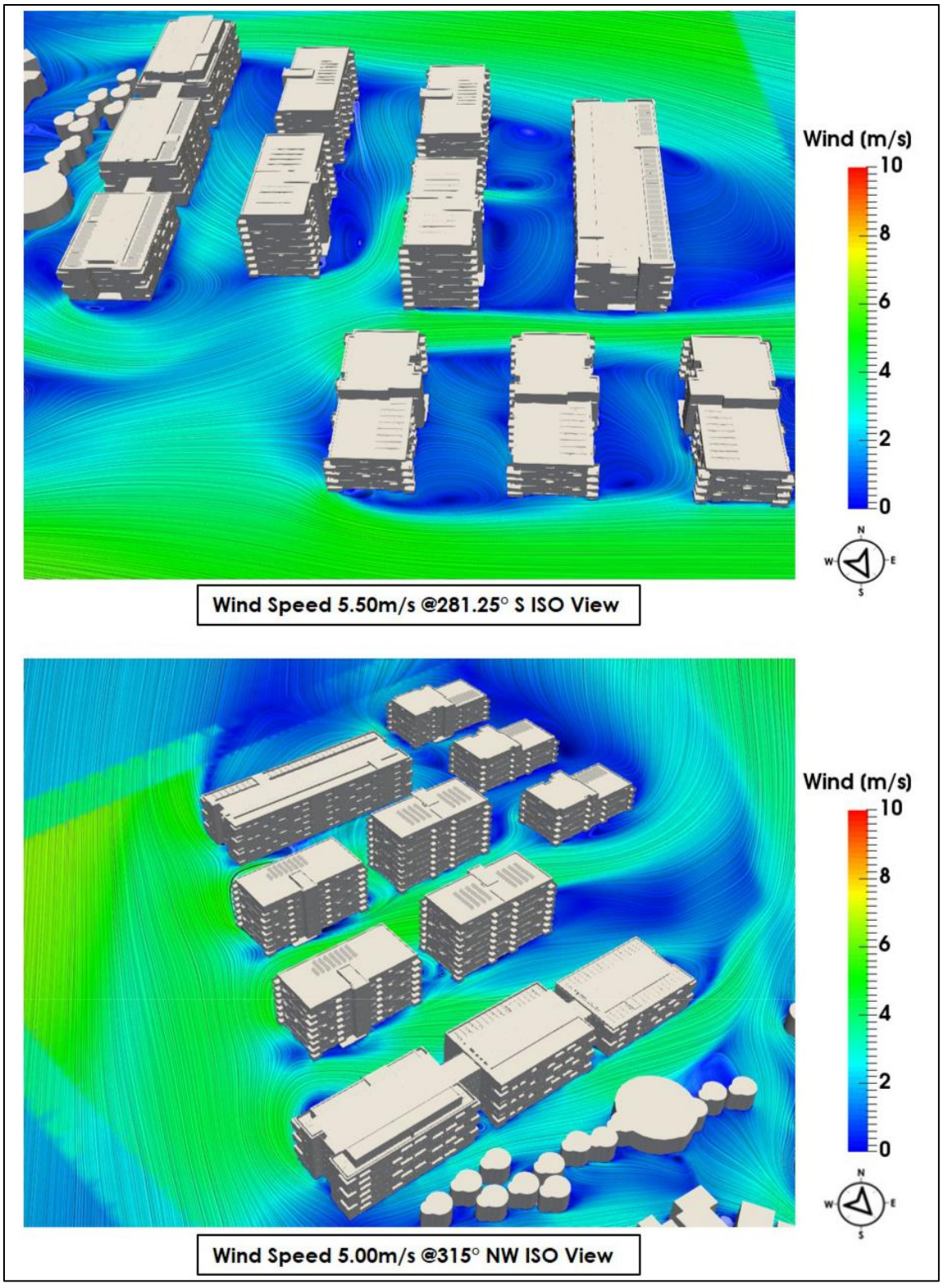

Figure 8-44: Wind Speed Results at 1.5m above Development Ground-Isometric View, 281.25°, 315°

Flow Velocity Results - Balconies

Results of wind speeds and their circulations at balconies within the Proposed Development are presented in Figures 8-45 to 8-48 below in order to assess wind flows at balconies within the Proposed Development. Wind flow speeds at balconies show to be at comfortable levels.

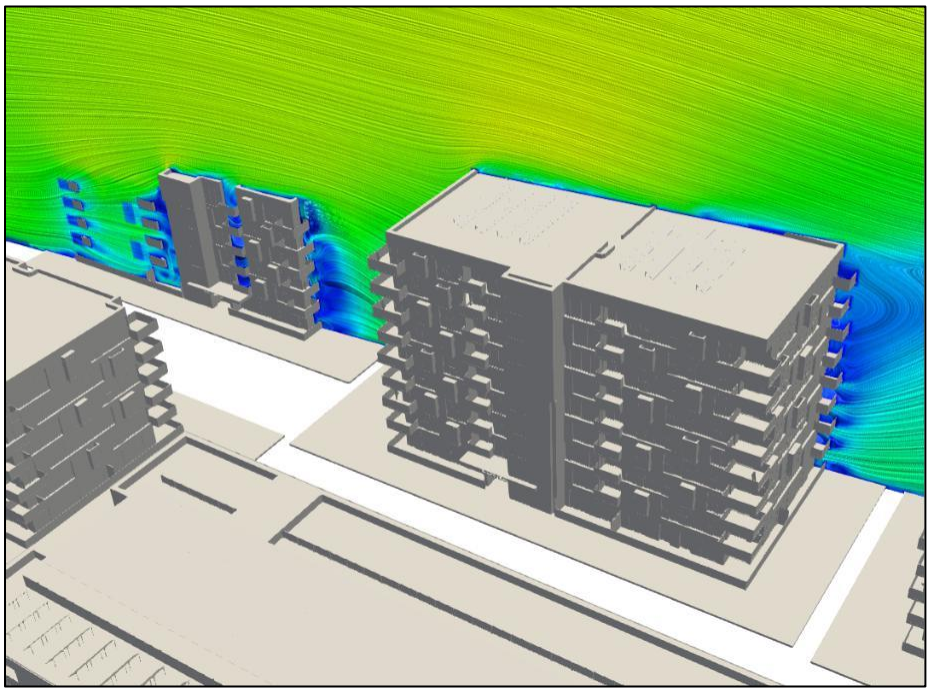

Figure 8-45: Balcony Wind Speed for 135°: Blocks 5 and 7

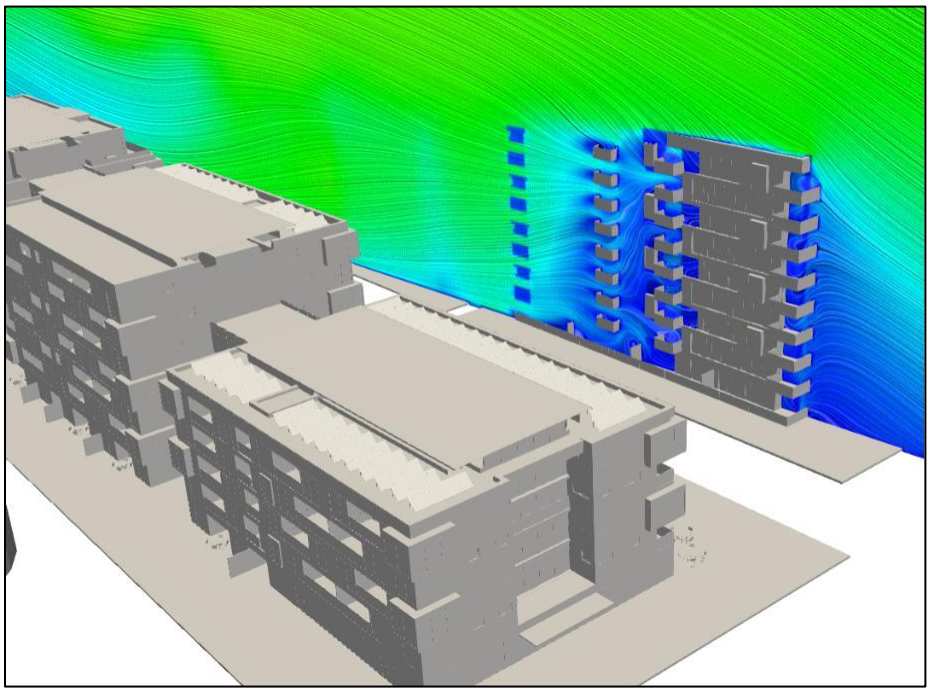

Figure 8-46: Balcony Wind Speed for 225°: Block 3

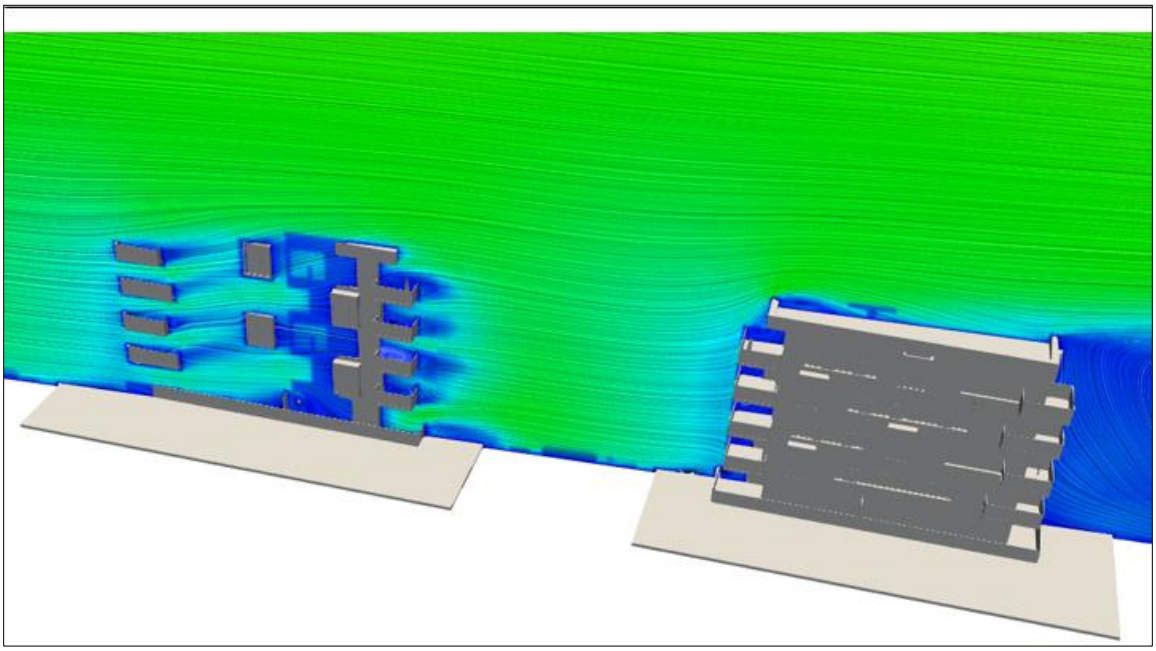

Figure 8-47: Balcony Wind Speed for 258.75°: Blocks 8 and 9

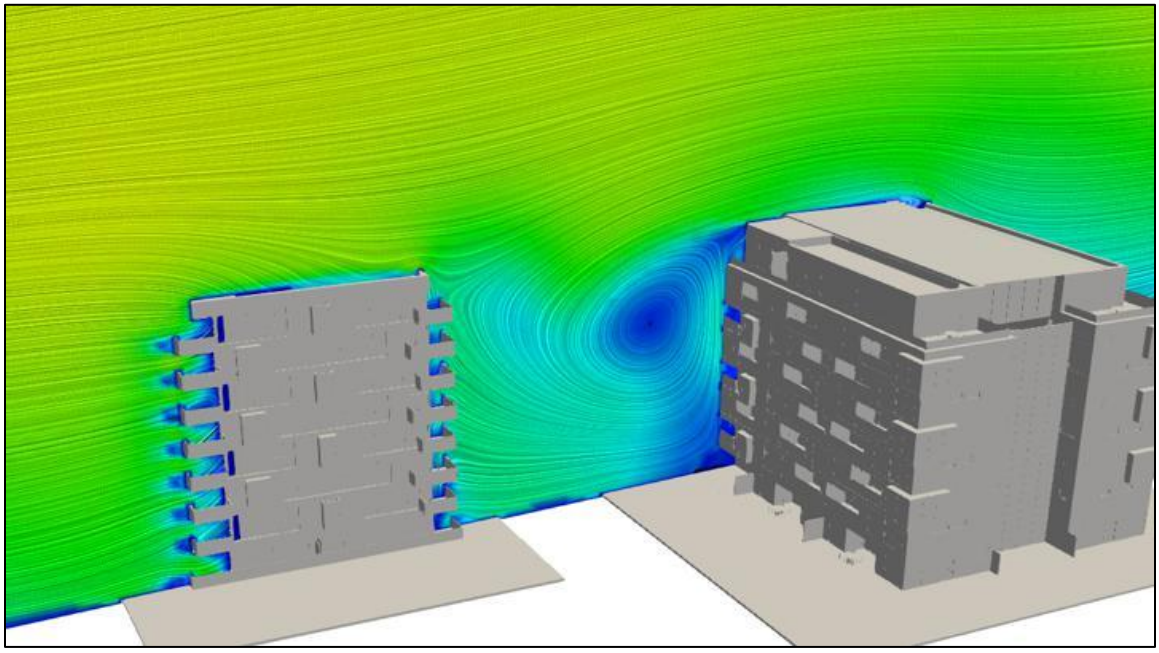

Figure 8-48: Balcony Wind Speed for 315°: Block 2

8.1.6 *Risk to Human Health-Discomfort Criteria*

This section aims to identify areas of the Proposed Development where the pedestrian safety and comfort could be compromised (in accordance with the Lawson Acceptance Criteria). Pedestrian comfort criteria are assessed at 1.5mAGL

8.1.6.1 *Construction Phase*

Not Applicable

8.1.6.2 *Operational Phase*

Figures 8-50 to 8-54 shows the Lawson comfort categories over the ground floor area around the Proposed Development during its Operational Phase. In all cases, the scale used is set out in Figure 8-49.

Thus, depending on the wind direction, the suitability of the different areas is assessed using these maps. It can be seen from the results that the wind conditions range from “suitable for long term sitting” to “suitable for walking and strolling” and rarely are only suitable for “business walking” or “unacceptable for pedestrian comfort”.

Figure 8-49: Lawson Comfort Categories

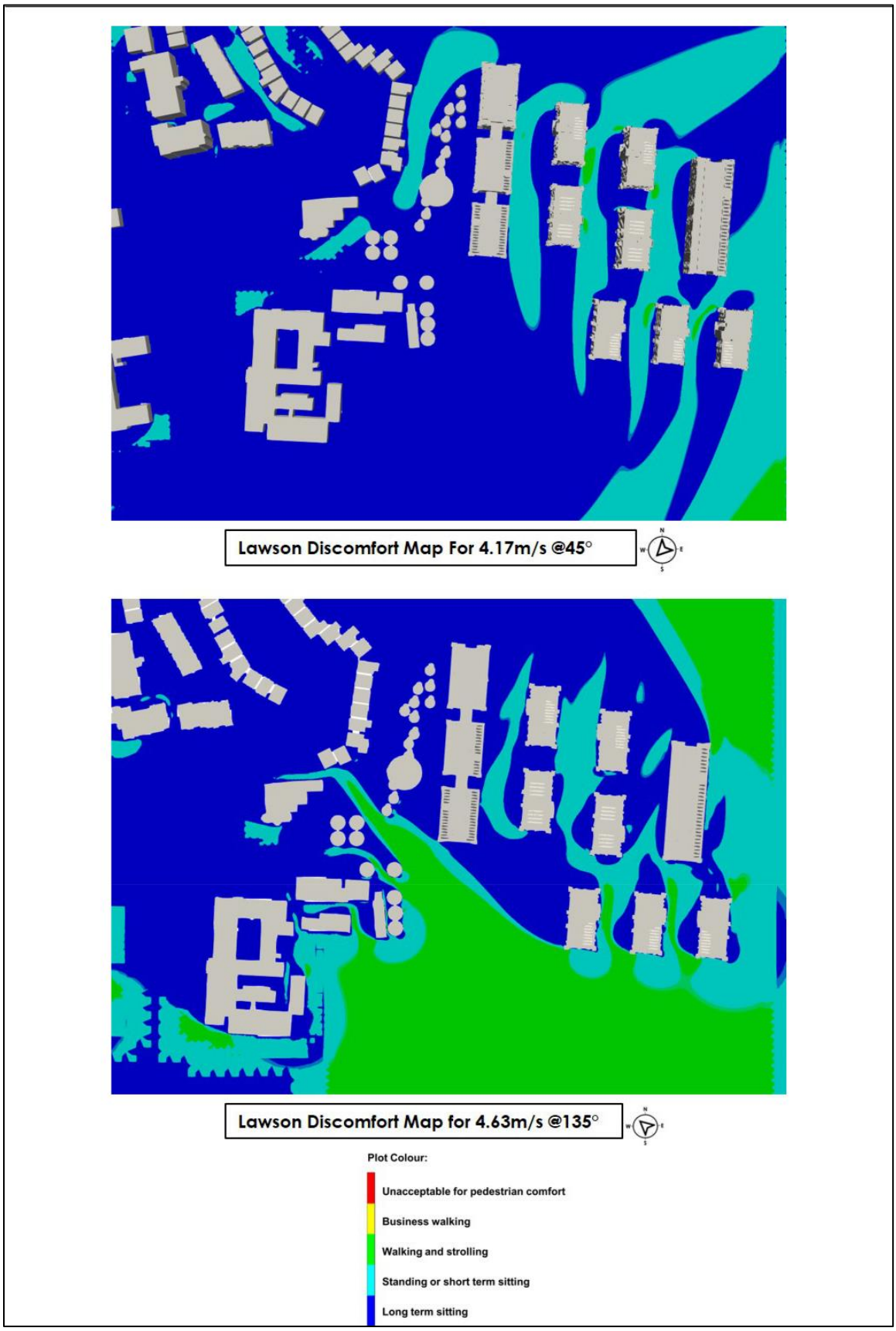

Figure 8-50: Ground Floor - Lawson Discomfort Map - Cardinal Directions

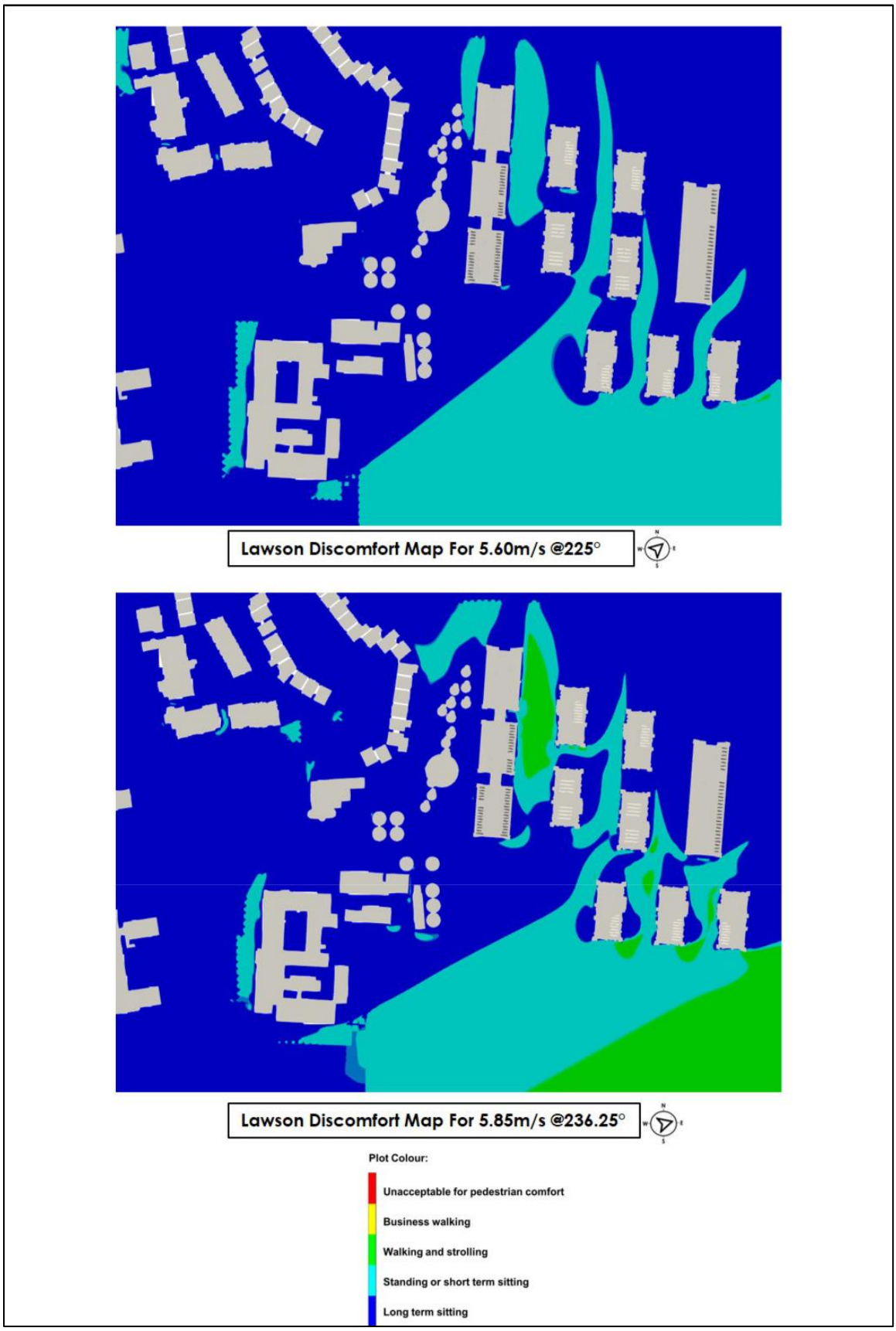

Figure 8-51: Ground Floor - Lawson Discomfort Map - Cardinal Directions

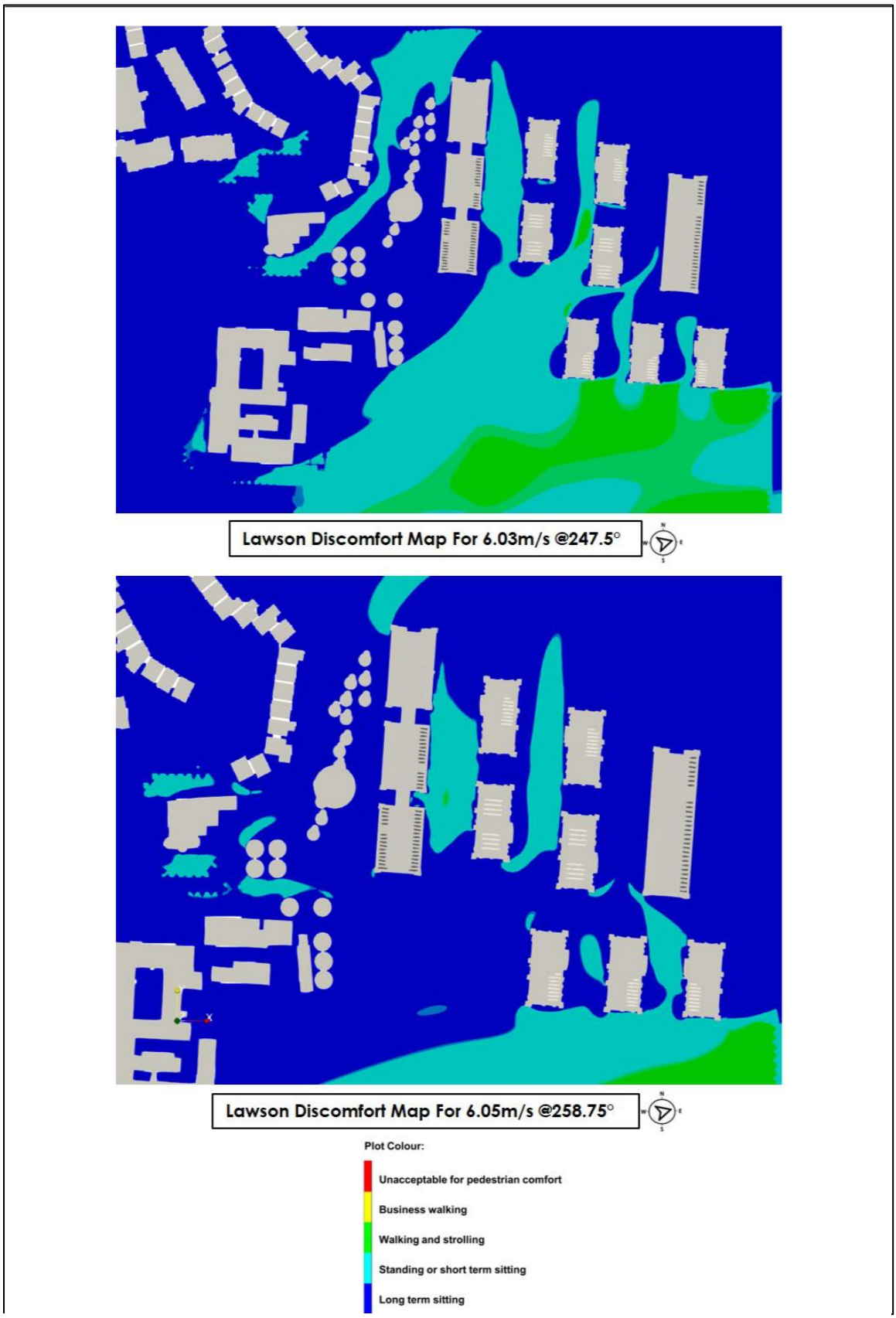

Figure 8-52: Ground Floor - Lawson Discomfort Map - Cardinal Directions

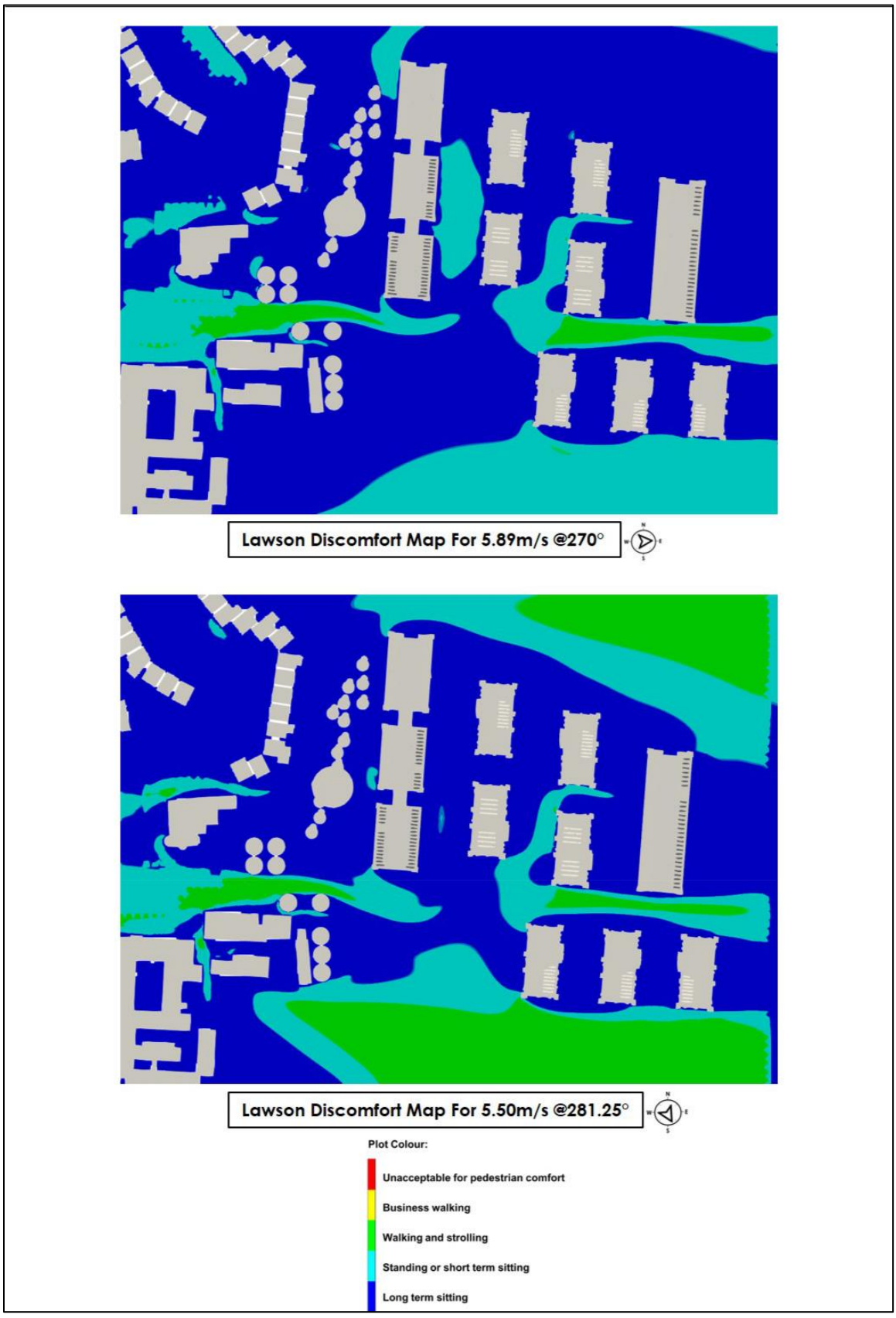

Figure 8-53: Ground Floor - Lawson Discomfort Map - Cardinal Directions

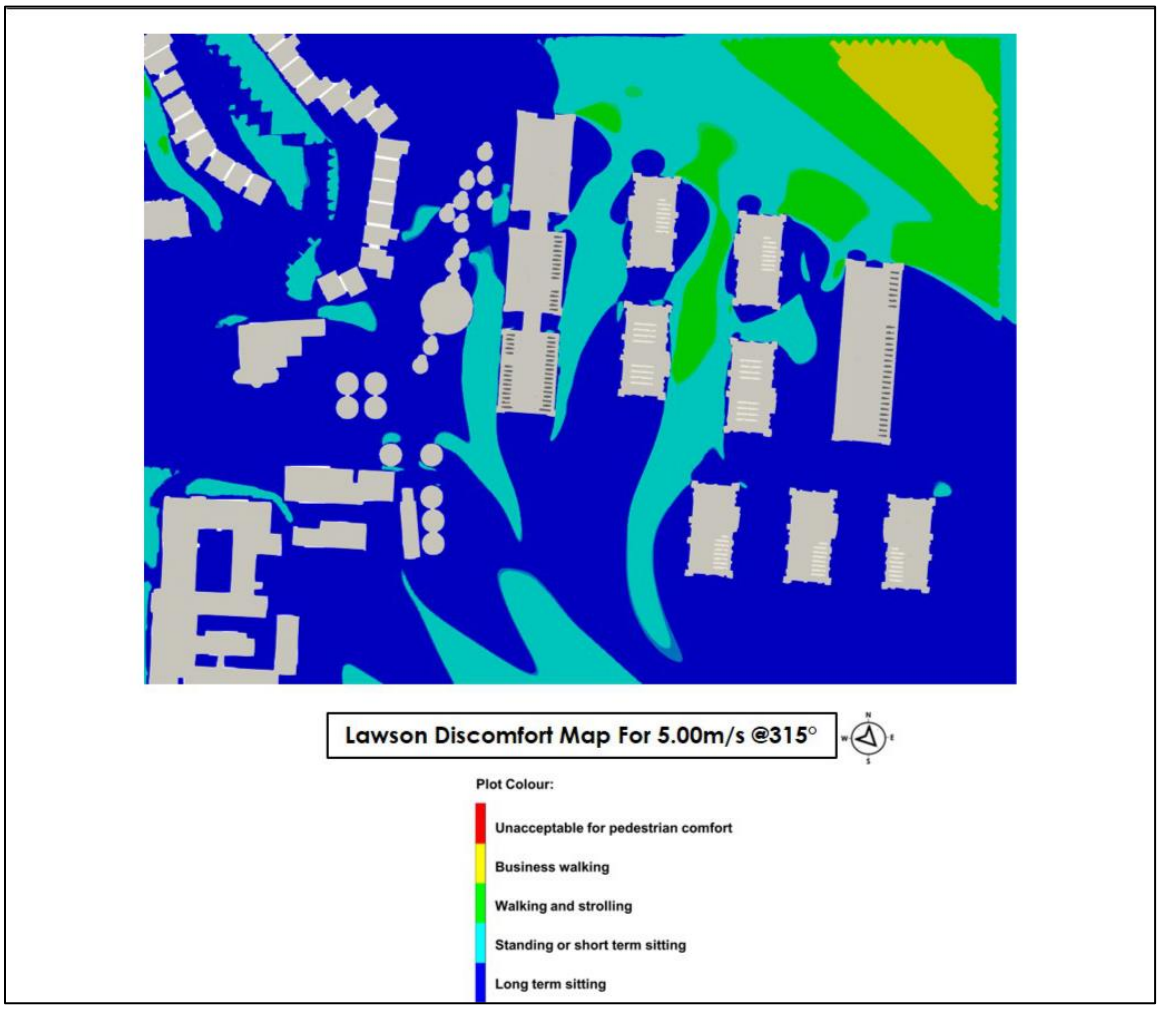

Figure 8-54: Ground Floor - Lawson Discomfort Map - Ordinal Directions

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. However, the results shown in these maps 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.

Figure 8-56 below shows the areas where the measured wind speeds are potentially above 15 m/s in all directions. Figure 8-55 shows the scale used in this case. In all these cases, there is no or little risk of attaining critical wind levels in terms of distress.

Figure 8-55: Lawson Distress Categories - Frail Person or Cyclist

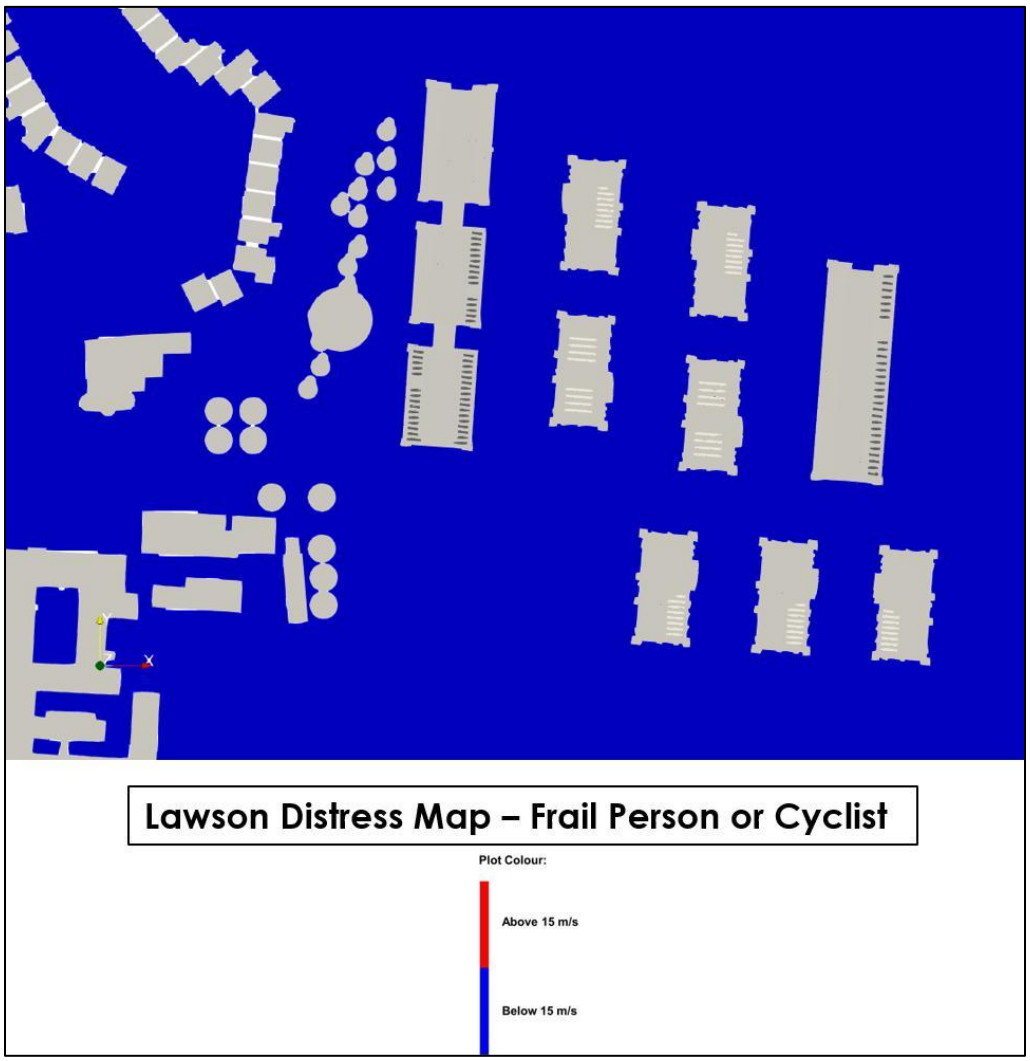

Figure 8-56: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - All Directions

The criteria for distress for a member of the general population is 20m/s wind occurring for more than two hours per year. In this case, a gust velocity of 20m/s is never exceeded neither at pedestrian ground floor level nor at terraces level for more than 2 hours per year. Therefore, there are not distress conditions for the general public.

8.1.6.3 *Potential Cumulative Impacts*

There are other significant developments in the vicinity of the Proposed Development which have been granted planning permission. The wind microclimate assessment performed in this EIAR Chapter have included for developments in the vicinity and included cumulative impacts of these in the modelling.

From the wind modelling results shown in Section 8.5.2, the Proposed Development will have no negative wind effect on adjacent, nearby or future phase developments within its vicinity. All adverse wind impacts have been considered and this shows the potential cumulative impact to be not significant.

8.1.6.4 *'Do-Nothing' Impact*

In order to provide a qualitative and equitable assessment of the Proposed Development, the 'do-nothing' impact considers the Proposed Development in the context of the likely impacts upon the receiving environment should the Proposed Development not take place.

Based on statistical wind data related to the existing environment, and the wind microclimate assessment performed, the Proposed Development introduces no critical or negative wind microclimate conditions unto the existing environments pedestrian path, side-walks, buildings or environment, therefore a 'do-nothing' Impact is regarded as imperceptible.

8.1.7 *Mitigation Measures*

8.1.7.1 *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 Development progresses the wind conditions at the Site would gradually adjust to those of the completed Proposed Development, and the proposed mitigation measures as shown in Figure 8-59 are suggested to be implemented before completion and operation.

8.1.7.2 *Operational Phase*

The proposed mitigation measures for this development is landscaping using tree plantings as shown in Figure 8-59, which creates a further reduced vorticity, making it possible to reduce incoming velocities, thus further 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 8-57. These introduce a pressure

drop in the model and therefore causes the wind to reduce its speed when passing through the trees, as expected. The CFD plot shown in Figure 8-58 demonstrate this effect.

This proposed tree planting mitigation measures are needed to be implemented within the site for the Proposed Development, particularly at the south, south-west, and west corners of the Proposed Development, and also to mitigate some funnelling effects as noticed in Figure 8-53 of the Proposed Development.

Figure 8-59 shows the proposed mitigation measures for the Proposed Development.

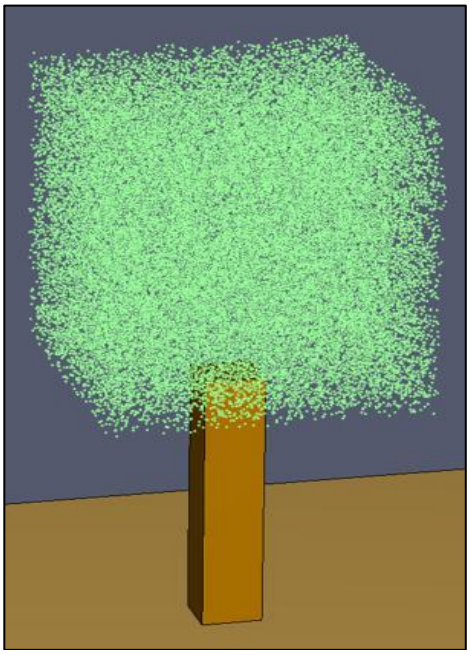

Figure 8-57: CFD Modelleling of a tree

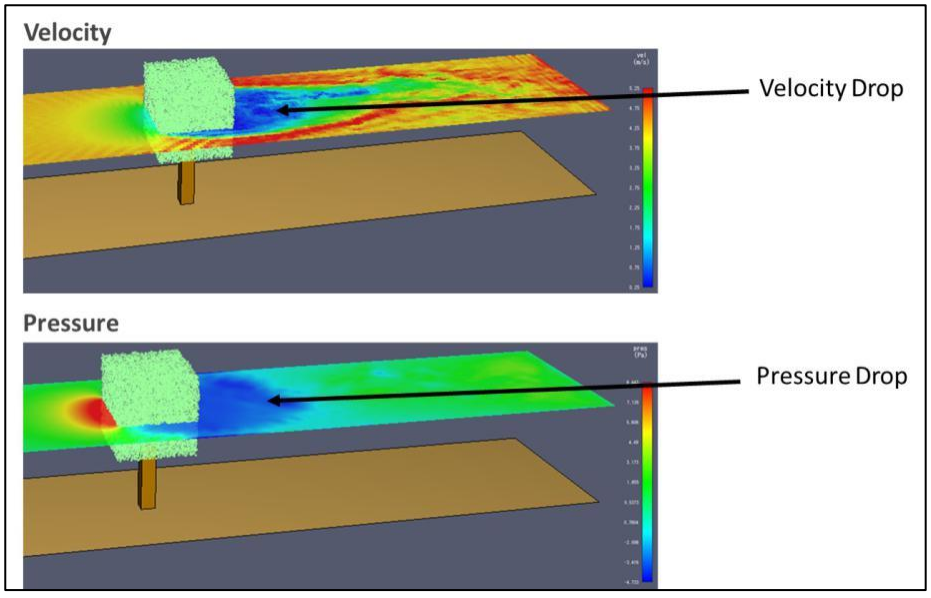

Figure 8-58: Generic Result of Wind Impact on a Tree

Figure 8-59: Proposed Mitigation Measures for Development

8.1.8 *Residual Impacts*

The impacts of implementing mitigation measures such as tree planting will result in further shielding of public open spaces and pedestrian footpaths from wind. This impact is a positive effect.

8.1.9 *Monitoring*

8.1.9.1 *Construction Phase*

There is no requirement to monitor wind impact during the Construction Phase as the designated amenity areas will not be in use during this phase of the Proposed Development. The Construction Environmental Management Plan (CEMP) sets out the overarching vision of how the Construction Phase of the Proposed Development will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. The CEMP does not currently require monitoring of wind during construction.

8.1.9.2 *Operational Phase*

There is no requirement to monitor wind impact during the Proposed Development Operational Phase.

8.1.10 *Interactions*

Wind microclimate interacts with risks to human health. Results of wind microclimate has shown this interaction to be not significant based on wind conditions prevalent in Dublin.

8.1.11 *Difficulties Encountered in Compiling*

No difficulties were encountered during the assessment of wind microclimate impacts on the Proposed Development or its existing environments.

8.1.12 *References*

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8.2 Air Quality and Climate

8.2.1 *Introduction and Methodology*

AWN Consulting Limited (**AWN**) has been commissioned to conduct an assessment of the likely impact on air quality and climate associated with the Proposed Development located east of the R808 Sybil Hill Road, in Raheny, Dublin 5. The EIAR Chapter outlines the methodology to be used to assess the air quality & climate impacts of the Proposed Development. A review of current EPA monitoring data has been completed as part of the desktop study for this Chapter. No air monitoring was conducted as part of the assessment due to the availability of EPA data.

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River.

Dr. Avril Challoner completed this Chapter, she is a Senior Consultant in the Air Quality section of AWN Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin. She is a Chartered Scientist (CSci), Member of the Institute of Air Quality Management (**IAQM**) and specialises in the fields of air quality, EIA and air dispersion modelling.

8.2.1.1 *Ambient Air Quality Standards*

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 8-5 below).

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 *European Commission Directive 2008/50/EC* which has set limit values for the pollutants SO_2, NO_2, PM_{10}, benzene and CO (see Table 8-5). *Council Directive 2008/50/EC* combines the previous *Air Quality Framework Directive (96/62/EC)* and

its subsequent daughter directives (including *1999/30/EC* and *2000/69/EC*). Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$ (see Appendix 8-1).

Table 8-5: Air Quality Standards Regulations 2011 (Source: Based on EU Council Directive 2008/50/EC)

Pollutant	**Regulation** Note 1	**Limit Type**	**Value**
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3 NO_2
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Annual limit for protection of vegetation	30 µg/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	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$ (Phase 1)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$
$PM_{2.5}$ (Phase 2)	-	Annual limit for protection of human health	20 µg/m^3 $PM_{2.5}$
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m^3 (8.6 ppm)
Dust Deposition	German TA-Luft	Annual average guideline for dust nuisance and human health impacts	350 mg/(m^2*day)

Note 1 EU 2008/50/EC – Clean Air For Europe (**CAFE**) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Note 2 EU 2008/50/EC states - 'Phase 2 - indicative limit value to be reviewed by the Commission in 2013 in the light of further information on health and environmental effects, technical feasibility and experience of the target value in Member States'.

8.2.1.2 *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 8-5 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

Regarding 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 Development.

Regarding dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one-year period at any receptors outside the site boundary.

Recommendations from the Department of the Environment, Health & Local Government (**DEHLG,** 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from the construction of the Proposed Development.

8.2.1.3 *Climate Agreements*

Ireland ratified the United Nations Framework Convention on Climate Change (**UNFCCC**) in April 1994 and the Kyoto Protocol in principle in 1997, and formally in May 2002 (Framework Convention on Climate Change, 1999 and Framework Convention on Climate Change, 1997). For the purposes of the EU burden sharing agreement under Article 4 of the Doha Amendment to the Kyoto Protocol, in December 2012, Ireland agreed to limit the net growth of the six Greenhouse Gases (**GHGs**) under the Kyoto Protocol to 20% below the 2005 level over the period 2013 to 2020 (UNFCCC 2012).

The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties (**COP**) to the Convention (**COP24**) took place in Katowice, Poland from the 4th to 14th December 2018 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The Paris Agreement was agreed by over 200 nations and has a stated 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 on elevating adaption onto the same level as action to cut and curb emissions.

The EU, on the 23/24th October 2014, agreed the "*2030 Climate and Energy Policy Framework*" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in GHG emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the Emission Trading Scheme (**ETS**) and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 32% for the share of renewable energy consumed in the EU in 2030.

8.2.1.4 *Gothenburg Protocol*

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (**SO_2**), Nitrogen Oxides (**NO_X**), Volatile Organic Compounds (**VOCs**) and Ammonia (**NH_3**). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include National emission reduction commitments for the

main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (**NECD**) (DEHLG 2004) (DEHLG 2003), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG (2007a). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (EEA 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new National emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25.5 kt for SO_2 (65% on 2005 levels), 66.9 kt for NO_X (49% reduction on 2005 levels), 56.9 kt for NMVOCs (25% reduction on 2005 levels), 112 kt for NH_3 (1% reduction on 2005 levels) and 15.6 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 10.9 kt (85% below 2005 levels) for SO_2, 40.7 kt (69% reduction) for NO_x, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH_3 and 11.2 kt (41% reduction) for $PM_{2.5}$.

8.2.2 *Methodology - Local Air Quality Assessment*

The air quality assessment was carried out following best practice procedures described in the publications by the EPA and Transport Infrastructure Ireland (**TII**):

- Environmental Protection Agency (EPA) (2002) *Guidelines on Information To Be Contained in Environmental Impact Statements.*

- EPA (2003) *Advice Notes on Current Practice (In The Preparation Of Environmental Impact Statements).*

- EPA (2015) *Revised Guidelines on the Information to be contained in an Environmental Impact Statements (Draft).*

- EPA (2017) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft).*

TII (2011) "*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*" and using the methodology outlined in the policy and technical guidance notes, LAQM.PG (16) and LAQM.TG (16), issued by UK Department for Environment, Food and Rural Affairs (**DEFRA**) on which TII Guidance for impacts, due to traffic, on Air Quality was based:

- UK DEFRA (2018) Part IV of the Environment Act 1995: *Local Air Quality Management,* LAQM.TG (16).

- UK DEFRA (2016b) Part IV of the Environment Act 1995: *Local Air Quality Management,* LAQM. PG (16).

- UK Department of the Environment, Transport and Roads (UK DETR) (1998) *Preparation of Environmental Statements for Planning Projects That Require Environmental Assessment - A Good Practice Guide,* Appendix 8 - Air & Climate.

- UK Highways Agency (2007) *Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1* - HA207/07 (Document & Calculation Spreadsheet).

The assessment of air quality was carried out using a phased approach as recommended by the the UK DEFRA (UK DEFRA 2018). This phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards.

In the current assessment, an initial desktop scoping of key pollutants was carried out at sensitive receptors (i.e. residential properties, schools, hospitals and crèches etc.). These sensitive receptors have the potential to experience an impact on the concentration of key pollutants due to the Proposed Development.

An examination of recent EPA and Local Authority data in Ireland (EPA 2018 & 2019), has indicated that SO_2, smoke and carbon monoxide (CO) are unlikely to be exceeded at the majority of locations within Ireland and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis did indicate potential problems with nitrogen dioxide (**NO_2**) and PM_{10} at busy junctions in urban centres (EPA 2018 & 2019). Benzene, although previously reported at quite high levels in urban centres (EPA 2018 & 2019), has recently been measured at several city centre locations to be well below the EU limit value (EPA 2018 & 2019). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (EPA 2018 & 2019). The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

The assessment methodology involved air dispersion modelling using the UK Design Manual for Roads and Bridges (**DMRB**) Screening Model (UK Highways Agency 2007) (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (UK DEFRA, 2017) (Version 6.1), and following guidance issued by TII (TII 2011), UK Highways Agency (UK Highways Agency 2007), UK DEFRA (UK DEFRA 2016, 2018) and the EPA (EPA 2002, 2003, 2015).

TII guidance 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 Design Manual for Roads and Bridges guidance (UK Highways Agency 2007), on which TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed project and should be included in the local air quality assessment:

- Road alignment change of 5m or more;
- Daily traffic flow changes by 1,000 annual average daily traffic movements (**AADT**) or more;
- Heavy Goods Vehicles (**HGVs**) flows change by 200 vehicles per day or more;
- Daily average speed changes by 10km/h or more; or
- Peak hour speed changes by 20km/h or more.

Concentrations of key pollutants are calculated at sensitive receptors which have the potential to be affected by the Proposed Development. For road links which are deemed to be affected by the Proposed Development and within 200m of the chosen sensitive receptors, inputs to the air dispersion model consist of: road layouts, receptor locations, AADT, percentage heavy goods vehicles, annual average traffic speeds and background concentrations.

The UK *Design Manual for Roads and Bridges* (DMRB) guidance states that road links at a distance of greater than 200m from a sensitive receptor will not influence pollutant concentrations at the receptor. 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 predicted ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the Proposed Development with these ambient air quality standards. Appendix 8-1 sets out the impact criteria for assessment of potential impacts due to traffic emissions.

8.2.2.1 *Regional Air Quality and Climate Impact Assessment*

The impact of the Proposed Development at a National / international level has been determined using the procedures given by the TII (TII, 2011) and the methodology provided in Annex 2 in the UK DMRB (UK Highways Agency 2007). The assessment focused on determining the resulting change in emissions of VOCs, NO_x) and 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 development that causes a change in traffic flows. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds.

8.2.2.2 *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.

TII states the recommended method for the conversion of NO_x to NO_2 in *"Guidelines for* the *Treatment of Air Quality during the Planning and Construction of National Road Schemes"* (TII, 2011). The TII guidelines recommend the use of DEFRAs NO_x to NO_2 calculator (UK DEFRA, 2016c) which was originally published in 2009 and is currently on version 6.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O_3 and proportion of NO_x emitted as NO for each local authority across the UK. O_3 is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO_2 or PM_{10}.

The calculator includes Local Authorities in Northern Ireland and the TII guidance recommends the use of Craigavon as the choice for local authority when using the calculator. The choice of "Armagh Banbridge and Craigavon" provides the most suitable relationship between NO_2 and NO_x for Ireland. The "All other Urban UK Traffic" traffic mix option was used.

8.2.2.3 *Ecological Sites*

For routes which pass within 2km of a designated area of conservation (either Irish or European designation) TII requires consultation with an ecologist (TII, 2011). However, in practice the potential for impact to an ecological site is highest within 200m of the Proposed Development and when significant changes in AADT (>5%) occur.

TII Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev. 2, Transport Infrastructure Ireland, 2009) and Appropriate Assessment (**AA**) of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

The assessment criteria states that if a designated area of conservation is within 200m of the Proposed Development and a significant change in AADT flows occurs, an assessment of the potential for impact due to nitrogen deposition should be assessed.

Where the Proposed Development is predicted to adversely impact concentrations by 2µg/m^3 or more and cause overall concentrations to be within 10% of the 30µg/m^3 limit, then the sensitivity of the habitat to NO_x should be assessed by the project ecologist. There are no ecological sites within 200m of the Proposed Development, therefore an assessment of NO_x sensitivity is not required.

8.2.2.4 *Dust Impacts*

The greatest potential impact on air quality during the Construction Phase is from construction dust emissions, PM_{10} / $PM_{2.5}$ emissions and the potential for nuisance dust. Dust is characterised as encompassing particulate matter with a particle size of between 1 and 75 microns (1- 75µm); it therefore includes both PM_{10} and $PM_{2.5}$. Deposition typically occurs in close proximity to each site and potential impacts generally occur within 500m of the dust generating activity, as dust particles fall out of suspension in the air. Sensitivity to dust

depends on the duration of the dust deposition, the dust generating activity, and the nature of the deposit. Therefore, a higher tolerance of dust deposition is likely to be shown if only short periods of dust deposition are expected and the dust generating activity is either expected to stop or move on.

An appraisal has been carried out to assess the risk to sensitive receptors of dust soiling and health impacts due to the Construction Phase in accordance with the Institute of Air Quality Management's (IAQM) publication *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014). Prior to assessing the impact from dust emissions, the sensitivity of the area must be established. The guidance outlines the criteria for establishing the sensitivity of an area to dust soiling and human health impacts. The receptor sensitivity, number of receptors and their distance from the works area are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend most of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are less than 10 no. high sensitivity receptors (i.e. residential dwellings) which are less than 20m from the boundary of the Proposed Development. As a result, the sensitivity of the area to dust soiling effects on people and property is medium according to the IAQM guidance, as outlined in Table 8-6 below (IAQM, 2014).

Table 8-6: Sensitivity of the Area to Dust Soiling Effects on people and Property (IAQM, 2014)

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, the IAQM guidelines also outline the criteria for assessing the human health impact from PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected. An estimate of the current PM_{10} concentration in the region of the Proposed Development (see Paragraph 42 of this Chapter) is 17µg/m^3. As shown in Table 8-7 belo the worst-case sensitivity of the area to human health impacts from PM_{10} (high sensitivity, distance of less than 20m to construction boundary and with receptor numbers 1 - 10) is considered low under this guidance.

Table 8-7: Sensitivity of the Area to Human Health Impacts (IAQM, 2014)

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from source (m)			
			<20	<50	<100	<350
High	< 24µg/m³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24µg/m³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24µg/m³	>1	Low	Low	Low	Low

8.2.3 *Baseline Environment*

8.2.3.1 *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) (World Health Organisation (**WHO**), 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, which is located circa (**c.**) 6.5km north-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 (see Figure 8-60). For data collated during five representative years (2014 - 2018), the predominant wind direction is south-westerly. The average wind speed over the period 1981-2010 is c. 5.3m/s.

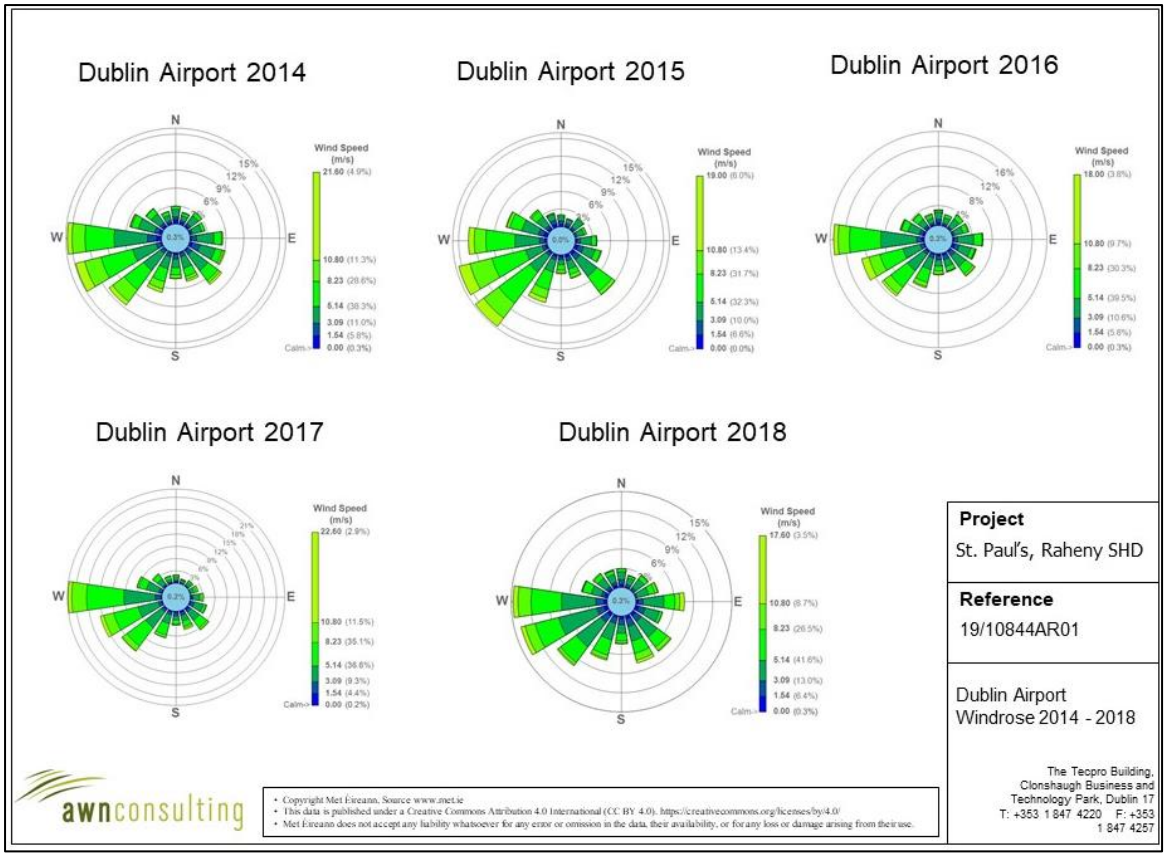

Figure 8-60: Dublin Airport Windroses 2014-2018

8.2.3.2 *Trends in Air Quality*

Air quality is variable and subject to both significant spatial and temporal variation. In relation to spatial variations in air quality, concentrations generally fall significantly with distance from major road sources (UK Highways Agency, 2007). Thus, residential exposure is determined by the location of sensitive receptors relative to major roads sources in the area. Temporally, air quality can vary significantly by orders of magnitude due to changes in traffic volumes, meteorological conditions and wind direction.

In 2011 the UK DEFRA published research (UK DEFRA, 2011) on the long-term trends in NO_2 and NO_x for roadside monitoring sites in the UK. This study found a marked 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 study 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 for 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.

8.2.3.3 *Baseline Air Quality - EPA Monitoring Data*

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality Monitoring Annual Report 2017*" (EPA, 2018), details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2019).

- Zone A: Dublin Region
- Zone B: Cork Region
- Zone C: is composed of 23 towns with a population of greater than 15,000.
- Zone D: is the remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000.

In terms of air monitoring and assessment, Raheny is within the Zone A, Dublin region (EPA, 2019). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the Proposed Development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

Long-term NO_2 monitoring was carried out at the Zone A roadside location of Winetavern Street and the urban background locations of Rathmines, Dún Laoighaire, Swords and Ballyfermot for the period 2013 - 2017 (EPA, 2018). The NO_2 annual average for this five-year period suggests an upper average limit of no more than 20µg/m^3 and a lower limit of no less than 14.3µg/m^3 (Table 8.4) for the suburban background locations. A new monitoring station was installed in 2013 to 2015 at St Anne's Park. This suburban background monitoring site is located less that 1km from the site of the Proposed Development and therefore is highly representative of background concentrations in the vicinity of the Proposed Development. The annual average concentrations during this period at St Anne's was 13.3µg/m^3. Long-term average concentrations are significantly below the annual average limit of 40µg/m^3.

Based on the above information and having regard to the distance from the City centre, a conservative estimate of the current background NO_2 concentration for the region of the Proposed Development is 17µg/m^3.

Table 8-8: Trends in Zone A Air Quality - Nitrogen Dioxide (NO_2)

Year	Rathmines	Dún Laoghaire	Swords	Ballyfermot
2013	19	16	15	16
2014	17	15	14	16
2015	18	16	13	16
2016	20	19	16	17
2017	27	17	14	17
Average	**20.2**	**16.5**	**14.3**	**16.4**

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Continuous PM_{10} monitoring was carried out at five no. Zone A locations between 2013 - 2017, Rathmines, Dún Laoghaire, Tallaght and Phoenix Park. These showed an upper average limit of no more than 15µg/m^3, see Table 8-9 below. Levels range from 9 - 17µg/m^3 over the five-year period with at most 5 no. exceedances (in Rathmines) of the 24-hour limit value of 50µg/m^3 in 2017 (35 no. exceedances are permitted per year) (EPA, 2018). A new monitoring station was installed in 2013 to 2015 at St Anne's Park. The annual average PM_{10} concentrations during this period at St Anne's was 17µg/m^3. Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the Proposed Development is 17µg/m^3.

Table 8-9: Trends in Zone A Air Quality - PM_{10}

Year	Rathmines	Dún Laoghaire	Tallaght	Phoenix Park
2013	17	17	17	14
2014	14	14	15	12
2015	15	13	14	12
2016	15	13	14	11
2017	13	12	12	9
Average	**14.8**	**13.8**	**14.4**	**11.5**

Note1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Both **PM_{10} and $PM_{2.5}$** were monitored at the EPA Zone A station in Rathmines. Average $PM_{2.5}$ levels in Rathmines over the period 2013 - 2017 ranged from 9 - 11µg/m^3, with a $PM_{2.5}$ / PM_{10} ratio ranging from 0.64-0.68 (EPA, 2018). Based on this information, a conservative ratio of 0.7 was used to generate an existing $PM_{2.5}$ concentration in the region of the Proposed Development of 12µg/m^3.

In terms of **benzene,** the annual mean concentration in the Zone A monitoring location of Rathmines for 2017 was 0.92µg/m^3. This is well below the limit value of 5µg/m^3. Between 2013-2017 annual mean concentrations at the Zone A site ranged from 0.92 - 1.01µg/m^3. Based on this EPA data a conservative estimate of the current background benzene concentration in the region of the Proposed Development is 1.0µg/m^3.

With regard to **CO,** annual averages at the Zone A, locations of Winetavern Street and Coleraine Street over the 2013-2017 period are low, peaking at 5% of the limit value of 10 mg/m^3 (EPA, 2018). Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the Proposed Development is 0.5mg/m^3.

8.2.3.4 *Baseline Air Quality at Proposed Development*

Table 8-10 below outlines the conservative estimates for the current background concentrations of these pollutants in the region of the Proposed Development. It is clear from a review of the EPA data that concentrations of key pollutants are well below their respective limit values indicating a relatively good level of air quality in the area.

Table 8-10: Estimated Background Concentrations at Proposed Development

NO_2	PM_{10}	$PM_{2.5}$	Benzene	Carbon Monoxide
17 µg/m^3	17 µg/m^3	12 µg/m^3	1.0 µg/m^3	0.5 mg/m^3

Background concentrations for opening year 2021 and design year 2036 were calculated for the EIAR assessment. These use predicted using 2019 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 and UK DEFRA's LAQM.TG (16).

8.2.4 *Characteristics of the Proposed Development*

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of the existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River.

When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct phases:

A. Construction Phase; and
B. Operational Phase.

During the Construction Phase the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. Emissions from construction vehicles and machinery have the potential to impact climate. The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the increased traffic flows in the local area which are associated with the development.

8.2.5 *Potential Impacts of the Proposed Development*

8.2.5.1 *Construction Phase*

8.2.5.1.1 *Construction Dust*

The greatest potential impact on air quality during the Construction Phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust.

The Institute of Air Quality Management *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on local air quality, dust being the exception to this. The greatest potential impact on air quality during the Construction Phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, most of the deposition occurs within the first 50m. Most importantly, when the dust minimisation measures detailed in the Construction Environment Management Plan (**CEMP**) and Appendix 8-1 are implemented, fugitive emissions of dust from the Site will be insignificant and pose no nuisance at nearby receptors.

The potential for dust to be emitted will depend on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction. As indicated, dust generation rates depend on the site activity, particle size (in particular the silt content, defined as particles smaller than 75 microns in size), the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred, due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2mm has fallen. Information collected from Dublin Airport Meteorological Station (1981 - 2010) identified that typically 191 no. days per annum are “wet” which would indicate that for over half of the year conditions are favourable to dust suppression.

Large particle sizes (greater than 75 microns) fall rapidly out of atmospheric suspension and are subsequently deposited in close proximity to the source. Particle sizes of less than 75 microns are of interest as they can remain airborne for greater distances and can give rise to the potential dust nuisance at the sensitive receptors. This size range is broadly described as silt. Emission rates are normally predicted on a site-specific particle size distribution for each dust emission source.

Whilst Construction Phase activities are likely to produce some level of dust during earth moving and excavating phases of the Proposed Development, these activities will mainly be confined to particles of dust greater than 10 microns. Particles of dust greater than 10 microns are considered a nuisance but do not have the potential to cause significant health impacts.

The following paragraphs use the appraisal method as discussed in Section 8.2.9 of this Chapter to assess the risk to sensitive receptors of dust soiling and health impacts due to the Construction Phase in accordance to the Institute of Air Quality Management’s publication *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014).

A. Demolition

Dust emission magnitude from demolition can be classified as small, medium or large and is described below.

- **Large:** Total building volume >50,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 mABL.
- **Medium:** Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10-20 mAGL.
- **Small:** Total building volume 20,000m^3, construction material with low potential for dust release, demolition activities <10mAGL, demolition occurring during wetter months.

The dust emission magnitude for the proposed demolition activities can be classified as small, due to the volume involved. This will result in an overall low risk of temporary dust soiling impacts (as it is medium sensitivity area in terms of dust soiling) and an overall negligible risk of temporary human health impacts (as it is a low sensitivity area in terms of human health) as a result of the proposed demolition activities as outlined in Table 8-11.

Table 8-11: Risk of Dust Impacts - Demolition

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

B. Earthworks

Earthworks will primarily involve excavating material for basements, haulage, tipping and stockpiling. This may also involve levelling the Site and landscaping. Dust emission magnitude from earthworks can be classified as small, medium or large and are described as follows:

- **Large**: Total site area >10,000m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 – 100,000 tonnes; and
- **Small**: Total site area < 2,500m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The dust emission magnitude for the proposed earthwork activities can be classified as large due to the bulk excavation required by the Proposed Development. Combining this classification with the previously established sensitivity of the area to dust soiling and human health impacts (medium and low sensitivity respectively) this results in an overall medium risk of temporary dust soiling impacts and low risk of temporary human health impacts as a result of the proposed earthworks activities as outlined in Table 8-12 below.

Table 8-12: Risk of Dust Impacts - Earthworks

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

C. Construction Phase

Dust emission magnitudes from the Construction Phase activities can be classified as small, medium or large and are described as follows.

- **Large**: Total building volume >100,000m^3, on-site concrete batching, sandblasting;
- **Medium**: Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching; and
- **Small**: Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the Construction Phase activities can be classified as large. This results in a medium risk of temporary dust soiling impacts and an overall low risk of temporary human health impacts as a result of the Construction Phase as outlined in Table 8-13 below.

Table 8-13: Risk of Dust Impacts – Construction Phase

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

D. Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. Dust emission magnitude from trackout can be classified as

small, medium or large and are described as follows.

- **Large**: > 50 HGV (> 3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium**: 10 - 50 HGV (> 3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100m; and
- **Small:** < 10 HGV (> 3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

The trackout activities can be classified as large due to the number of HGVs that will be required for the construction of the Proposed Development. This results in an overall medium risk of temporary dust soiling impacts and an overall low risk of temporary human health impacts as a result of the proposed trackout activities as outlined in Table 8-14 below.

Table 8-14: Risk of Dust Impacts - Trackout

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

E. Summary of Dust Emission Risk

In order to minimise dust emissions during demolition, earthworks, construction and trackout as detailed in Table 8-15, a series of mitigation measures associated with a medium risk of dust soiling and human health impacts have been prepared in the form of a Dust Minimisation Plan as recommended by the Institute of Air Quality Management *Guidance on the Assessment of Dust from Demolition and Construction*. The Dust Minimisation Plan will be reviewed at regular intervals during the the Construction Phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

When the dust mitigation measures detailed in the mitigation section of this Chapter and Appendix 8-1 are implemented, fugitive emissions of dust from the Site will be imperceptible, short-term and localised, posing no nuisance at nearby receptors.

Table 8-15: Summary of Dust Risk to Define Site-Specific Mitigation

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Medium Risk	Medium Risk	Medium Risk
Human Health	Negligible Risk	Low Risk	Low Risk	Low Risk

8.2.5.1.2 *Traffic Impacts*

There is the potential for emissions to the atmosphere during the the Construction Phase of the Proposed Development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene, PM_{10} and $PM_{2.5}$.

Traffic flow information was obtained from the consulting engineers for the Proposed Development (ILTP Consulting) on 14/08/2019 and has been used to model pollutant levels under various traffic scenarios and under sufficient spatial resolution to assess whether any significant air quality impact on sensitive receptors may occur.

Cumulative effects have been assessed, as recommended in the EU Directive on EIA (Council Directive 97/11/EC) and using the methodology of the UK DEFRA (UK DEFRA (2016, 2018)). Firstly, background concentrations have been included in the modelling study. These background concentrations are year-specific and account for non-localised sources of the pollutants of concern. Appropriate background levels were selected based on the available monitoring data provided by the EPA (See Section 8.2.3.3).

The impact of the Proposed Development has been assessed by modelling emissions from the traffic generated as a result of the Proposed Development. The impact of CO, benzene, NO_2, PM_{10} and $PM_{2.5}$ for the baseline, and construction years was predicted at the nearest sensitive receptors to the Proposed Development. This assessment allows the significance of the Proposed Development, with respect to both relative and absolute impact, to be determined.

The receptors modelled will represent the worst-case locations close to the Proposed Development and were chosen due to their close proximity (within 200m) to the road links impacted by Proposed Development. The Construction Phase traffic data used in this assessment is shown in Table 8-16 below, with the percentage of HGV shown in parenthesis beside the AADT. Sensitive receptors in the vicinity of the Proposed Development are a school and a residential housing estate. Six no. sensitive receptors have been chosen as they have the potential to be adversely impacted by the development; these receptors are shown in Table 8-17.

Table 8-16: Traffic Data Used in this Assessment

Link Number	Road Name	Base Year	Do-Nothing	Do-Something	Speed (kph)
		2019	2020	2020	
1	Howth Road West	12,030 (0.5%)	12,052 (0.5%)	12,055 (0.5%)	60
2	Brookwood Ave	10,078 (0.9%)	10,152 (0.9%)	10,399 (3.2%)	50
3	Howth Road east	13,369 (0.5%)	13,401 (0.5%)	13,408 (0.5%)	60
4	Sybil Hill Road North	6,690 (1%)	6,818 (1%)	7,075 (4.3%)	60
5	Sybil Hill Road South	6,317 (1.2%)	6,482 (1.2%)	6,505 (1.2%)	50
6	Vernon Ave West	4,321 (0.7%)	4,343 (0.7%)	4,346 (0.7%)	40
7	Vernon Ave South	8,312 (1.1%)	8,456 (1.1%)	8,476 (1.1%)	50

Table 8-17: Sensitive Receptors Used in Modelling Assessment

Name	Receptor Type	X	Y
R1	Nursing Home	686603	5917558
R2	Residential	686694	5917691
R3	Medical Centre	686661	5917041
R4	School	686700	5917405
R5	Residential	686564	5917722
R6	Residential	686554	5917852

Note: UTM Co-ordinates Zone 29N, approximate to nearest 5m

A. "Do-Nothing" Modelling Construction Phase Assessment

CO and Benzene

The results of the "do-nothing" modelling assessment for CO and benzene in the construction year 2020 are shown in Table 8.18 and Table 8.19 below. Concentrations are well within the limit values at all worst-case receptors. Levels of both pollutants are at most 28% and 21% of the respective limit values in 2020.

PM_{10}

The results of the "do-nothing" modelling Construction Phase assessment for PM_{10} in the

opening and design years are shown in Table 8-16. Concentrations are well within the annual limit value at all worst-case receptors. In addition, the 24-hour PM_{10} concentration of 50µg/m^3, which can only be exceeded 35 times per year within the limit, is complied with at all receptors. There is predicted to be only one day of exceedance per year. Annual average PM_{10} concentrations are 44% of the limit value in 2020.

$PM_{2.5}$

The results of the "do-nothing" modelling Construction Phase assessment for $PM_{2.5}$ in the opening and design years are shown in Table 8.17. The predicted concentrations at all worst-case receptors are well below the $PM_{2.5}$ limit value of 25 µg/m^3. The annual average $PM_{2.5}$ concentration peaks at 46% of the limit value in 2020.

NO_2

The results of the "do-nothing" Construction Phase assessment of annual average NO_2 concentrations in the opening and design years are shown in Table 8-15 for the Highways Agency IAN 170/12 and Table 8-14 using the Defra technique respectively. The purpose of IAN 170/12 was to account for the conclusions of UK's DEFRA's advice on long-term trends is that there is now a gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality as previously published in DEFRA's technical guidance and observed trends. Hence the projections calculated via the IAN 170/12 technique show a slower than previously predicted reduction between the base year and future year predictions. The concentrations are below the limit value at all locations, with levels ranging up to 47% of the limit value in 2020, using the more conservative IAN prediction.

The hourly limit value for NO_2 is 200µg/m^3 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 concentrations for the "do-nothing" scenario is not predicted to be exceeded in 2020.

Summary of "Do-Nothing" Modelling Construction Phase Assessment

The results of the "do-nothing" modelling Construction Phase assessment for NO_2, PM_{10}, $PM_{2.5}$, CO an benzene in the do-nothing scenario are significantly below air quality standards.

B. "Do Something" Modelling Construction Phase Assessment

CO and Benzene

The results of the Construction Phase modelled impact of the development for CO and benzene are shown in Table 8-22 and Table 8-23 respectively. Predicted pollutant concentrations with the construction of the Proposed Development in place are below the ambient standards at all locations. Levels of both pollutants range from 21% to 28% of the respective limit values in 2020.

The impact of the Proposed Development can be assessed relative to "do nothing" levels in 2020. Relative to baseline levels, some imperceptible increases in pollutant levels at the worst-case receptors are predicted as a result of the construction of the Proposed Development. The greatest impact on CO and benzene concentrations in 2020 will be an increase of 0.043%

of their respective limit values at Receptor 6. Thus, using the assessment criteria for NO_2 and PM_{10} outlined in Appendix 8-1 and applying these criteria to CO and benzene, the impact of the Proposed Development in terms of CO and benzene is negligible.

PM_{10}

The results of the modelled Construction Phase impact of the Proposed Development for PM_{10} are shown in Table 8-20. Predicted annual average concentrations in the region of the Proposed Development are below the ambient standards at all worst-case receptors, levels are 44% of the limit value in 2020. In addition, the 24-hour PM_{10} concentration of 50µg/m^3, which can only be exceeded 35 times per year is complied with at all receptors. It is predicted all receptors will have a single day exceedance the 50µg/m^3 24-hour mean value in 2020. Future trends with the Proposed Development in place indicate similarly low levels of PM_{10}.

The impact of the Proposed Development can be assessed relative to "do-nothing" levels in 2020. Relative to baseline levels, some imperceptible increases in PM_{10} levels at the worst-case receptors are predicted as a result of the Proposed Development. With regard to impacts at individual receptors, none of the 6 no. receptors assessed will experience an increase in concentrations of over 0.11% of the limit value in 2020. Thus, the magnitude of the changes in air quality are imperceptible at all receptors based on the criteria outlined in Appendix 8-1.

$PM_{2.5}$

The results of the modelled Construction Phase impact of the Proposed Development for $PM_{2.5}$ are shown in Table 8-21. Predicted annual average concentrations in the region of the Proposed Development are below the ambient standards at all worst-case receptors, levels are 46% of the limit value in 2020. Future trends with the Proposed Development in place indicate similarly low levels of $PM_{2.5}$.

The impact of the Proposed Development can be assessed relative to "do-nothing" levels in 2020. Relative to baseline levels, imperceptible increases in $PM_{2.5}$ levels at the worst-case receptors are predicted as a result of the Proposed Development. None of the 6 no. receptors assessed will experience an increase or decrease in concentrations of over 0.12% of the limit value in 2020. Thus, the magnitude of the changes in air quality are negligible at all receptors based on the criteria outlined in Appendix 8-1.

NO_2

The results of the Construction Phase assessment of the impact of the Proposed Development for NO_2 are shown in Table 8-18 for the Highways Agency IAN 170/12 and Table 8.15 using the DEFRA technique respectively. The annual average concentration is within the limit value at all worst-case receptors using both the DEFRA and more conservative IAN technique. Levels of NO_2 are 48% of the annual limit value in 2020 using the IAN technique and concentrations are 43% of the annual limit value in 2020 using the DEFRA technique. Maximum one-hour NO_2 levels with the Proposed Development in place are not predicted to exceed using either technique. The impact of the Proposed Development on annual mean NO_2 levels can be assessed relative to "do-nothing" levels in 2020. Relative to baseline levels, some small increases in pollutant levels are predicted as a result of the Proposed Development. With regard to impacts at individual receptors, none of the 6 no. receptors

assessed will experience an increase in concentrations of over 1.4% of the limit value in 2020. Thus, using the assessment criteria outlined in Appendix 8-1, the impact of the Construction Phase of the Proposed Development in terms of NO_2 is negligible at all six no. receptors assessed.

C. Summary of Construction Phase Traffic Impacts on Local Air Quality

The overall impacts with respect to Construction Phase air quality can be described as likely, localised, imperceptible and short term and therefore not significant.

Table 8-18: Annual Mean NO_2 Concentrations ($\mu g/m^3$) (using IAN 170/12 V3 Long Term NO_2 Trend Projections)

Receptor	Impact Construction Phase (2020)				
	DM	DS	DS-DM	Magnitude	Description
1	15.9	16.2	0.37	Imperceptible	Negligible Increase
2	16.3	16.3	0.07	Imperceptible	Negligible Increase
3	16.6	16.6	0.01	Imperceptible	Negligible Increase
4	15.4	15.7	0.26	Imperceptible	Negligible Increase
5	18.6	19.2	0.52	Small	Negligible Increase
6	17.0	17.6	0.57	Small	Negligible Increase

Table 8-19: Annual Mean NO_2 Concentrations ($\mu g/m^3$) (using DEFRA's Technical Guidance)

Receptor	Impact Construction Phase (2020)				
	DM	DS	DS-DM	Magnitude	Description
1	14.9	15.2	0.35	Imperceptible	Negligible Increase
2	15.2	15.3	0.07	Imperceptible	Negligible Increase
3	15.6	15.6	0.01	Imperceptible	Negligible Increase
4	14.4	14.7	0.24	Imperceptible	Negligible Increase
5	17.6	18.1	0.49	Small	Negligible Increase
6	16.0	16.5	0.54	Small	Negligible Increase

Table 8-20: Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Impact Construction Phase (2020)				
	DM	DS	DS-DM	Magnitude	Description
1	17.0	17.0	0.03	Imperceptible	Negligible Increase
2	17.1	17.1	0.01	Imperceptible	Negligible Increase
3	17.2	17.2	0.00	Imperceptible	Negligible Increase
4	16.9	16.9	0.02	Imperceptible	Negligible Increase
5	17.6	17.7	0.04	Imperceptible	Negligible Increase
6	17.3	17.3	0.05	Imperceptible	Negligible Increase

Table 8-21: $PM_{2.5}$ Annual Mean $PM_{2.6}$ Concentrations ($\mu g/m^3$)

Receptor	Impact Construction Phase (2020)				
	DM	DS	DS-DM	Magnitude	Description
1	11.0	11.0	0.02	Imperceptible	Negligible Increase
2	11.1	11.1	0.00	Imperceptible	Negligible Increase
3	11.2	11.2	0.00	Imperceptible	Negligible Increase
4	11.0	11.0	0.01	Imperceptible	Negligible Increase
5	11.5	11.5	0.03	Imperceptible	Negligible Increase
6	11.2	11.2	0.03	Imperceptible	Negligible Increase

Table 8-22: Maximum 8-hour CO Concentrations (mg/m^3)

Receptor	Impact Construction Phase (2020)				
	DM	DS	DS-DM	Magnitude	Description
1	2.58	2.59	0.003	Imperceptible	Negligible Increase
2	2.61	2.62	0.001	Imperceptible	Negligible Increase
3	2.66	2.66	0.000	Imperceptible	Negligible Increase
4	2.55	2.56	0.002	Imperceptible	Negligible Increase
5	2.81	2.81	0.004	Imperceptible	Negligible Increase
6	2.69	2.69	0.004	Imperceptible	Negligible Increase

Table 8-23: Annual Mean Benzene Concentrations (µg/m³)

Receptor	Impact Construction Phase (2020)				
	DM	DS	DS-DM	Magnitude	Description
1	1.0196	1.0197	0.0001	Imperceptible	Negligible Increase
2	1.0268	1.0269	0.0000	Imperceptible	Negligible Increase
3	1.0378	1.0379	0.0001	Imperceptible	Negligible Increase
4	1.0124	1.0125	0.0001	Imperceptible	Negligible Increase
5	1.0724	1.0725	0.0001	Imperceptible	Negligible Increase
6	1.0446	1.0447	0.0001	Imperceptible	Negligible Increase

8.2.5.1.3 *Regional Air Quality Impacts*

The regional impact of the Proposed Development on emissions of NO_X and VOCs has been assessed using the procedures of TII (TII, 2011) and the UK DEFRA (UK DEFRA, 2018). The results (see Table 8.20) show that the likely impact of the Proposed Development on Ireland's obligations under the Targets set out by Directive EU 2016/2284 "*On the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC*" are imperceptible and therefore not significant.

For the year 2020, the predicted impact of the changes in AADT is to increase NOx levels by 0.000688% of the NOx emissions ceiling and increase VOC levels by 0.000121% of the VOC emissions ceiling to be complied with in 2020. The likely overall magnitude of the changes on air quality during the Construction Phase is imperceptible and short-term and therefore not significant.

8.2.5.1.4 *Climate Impacts*

The impact of the Proposed Development on emissions of CO_2 impacting climate were also assessed using the DMRB screening model (see Table 8-24). The results show that the impact of the Proposed Development in the year 2020 will be to increase CO_2 emissions by 0.00035% of Ireland's EU 2020 Target. Thus, the impact of the Proposed Development on National GHG emissions will be insignificant in terms of Ireland's obligations under the EU 2020 Target (EU 2017).

Therefore, the likely overall magnitude of the changes on climate during the Construction Phase is imperceptible and short-term and therefore not significant.

Table 8-24: Regional Air Quality Assessment

Year	Scenario	VOC	NO_X	CO_2
		(kg/annum)	(kg/annum)	(tonnes/annum)
2020	Do-Nothing	1067	3273	1987
	Do Something	1136	3728	2120
Increment in 2020		80 kg	247.3 kg	149.2 Tonnes
Emission Ceiling (kilo Tonnes) 2020		57 Note 1	66 Note 1	37,943 Note 2
Impact in 2020 (%)		0.0001212%	0.000688%	0.000351%

Note 1 Targets set out by Directive EU 2016/2284 "On the reduction of National emissions of certain atmospheric pollutants and amending Directive 2003/35/EC"

Note 2 20-20-20 Climate and Energy Package

8.2.5.1.5 *Construction Phase Human Health*

Air dispersion modelling of Construction Phase traffic emissions was undertaken to assess the impact of the Proposed Development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the Proposed Development are compliant with all National and EU ambient air quality limit values and, therefore, the impact on human health will be imperceptible and not significant.

8.2.5.2 ***Potential Impact of the Operational Phase***

8.2.5.2.1 *Traffic Impacts*

As with the Construction Phase there is the potential for a number of emissions to the atmosphere during the Operational Phase of the Proposed Development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene, PM_{10} and $PM_{2.5}$.

The receptors modelled will represent the worst-case locations close to the Proposed Development and were chosen due to their close proximity (within 200m) to the road links impacted by Proposed Development. The traffic data used in this assessment is shown in Table 8-25 below with the percentage of HGV shown in parenthesis below the AADT. Sensitive receptors in the vicinity of the Proposed Development are a school and a residential housing estate. Six no. sensitive receptors have been chosen as they have the potential to be adversely impacted by the Proposed Development; these receptors are shown in Table 8-17 above.

Table 8-25: Traffic Data Used in this Assessment

Link Number	Road Name	Base Year	Do-Nothing		Do-Something		Speed (kph)
		2019	2021	2036	2021	2036	
1	Howth Road West	12,030 (0.5%)	12,052 (0.5%)	12,185 (0.5%)	12,185 (0.5%)	12,185 (0.5%)	60
2	Brookwood Ave	10,078 (0.9%)	10,152 (0.9%)	10,499 (0.9%)	10,499 (0.9%)	10,499 (0.9%)	50
3	Howth Road East	13,369 (0.5%)	13,401 (0.5%)	13,636 (0.5%)	13,636 (0.5%)	13,636 (0.5%)	60
4	Sybil Hill Road North	6,690 (1%)	6,818 (1%)	7,533 (1%)	7,533 (1%)	7,533 (1%)	60
5	Sybil Hill Road South	6,317 (1.2%)	6,482 (1.2%)	7,346 (1.2%)	7,346 (1.2%)	7,346 (1.2%)	50
6	Vernon Ave West	4,,321 (0.7%)	4,343 (0.7%)	4,460 (0.7%)	4,460 (0.7%)	4,460 (0.7%)	40
7	Vernon Ave South	8,312 (1.1%)	8,456 (1.1%)	9,203 (1.1%)	9,203 (1.1%)	9,203 (1.1%)	50

A. "Do-Nothing" Modelling Operational Phase Assessment

CO and Benzene

The results of the "do-nothing" modelling assessment for CO and benzene in the opening and design years are shown in Table 8-30 and Table 8-31 Concentrations are well within the limit values at all worst-case receptors. Levels of both pollutants are at most 28% and 21% of the respective limit values in 2021 and 2036.

PM_{10}

The results of the "do-nothing" modelling assessment for PM_{10} in the opening and design years are shown in Table 8-27. Concentrations are well within the annual limit value at all worst-case receptors. In addition, the 24-hour PM_{10} limit of 50µg/m^3, which can only be exceeded 35 times per year, is complied with at all receptors. There is at most, one day of exceedance per year predicted. Annual average PM_{10} concentrations are 44% of the limit value in 2021 and 2036.

$PM_{2.5}$

The results of the "do-nothing" modelling assessment for $PM_{2.5}$ in the opening and design years are shown in Table 8-28. The predicted concentrations at all worst-case receptors are well below the $PM_{2.5}$ limit value of 25µg/m^3. The annual average $PM_{2.5}$ concentration peaks at 46% of the limit value in 2021 and 2036.

NO_2

The results of the "do-nothing" assessment of annual average NO_2 concentrations in the opening and design years are shown in Table 8-26 for the Highways Agency IAN 170/12 and Table 8-27 using the DEFRA technique respectively. The concentrations are below the limit value at all locations, with levels ranging up to 46% of the limit value in 2021 and 43% in 2036, using the more conservative IAN prediction.

The hourly limit value for NO_2 is 200µg/m^3 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 concentrations for the "do-nothing" scenario is not predicted to be exceeded in either 2021 or 2036.

Summary of Do-Nothing" Modelling Construction Phase Assessment

The results of the "do-nothing" modelling Construction Phase assessment for NO_2, PM_{10}, $PM_{2.5}$, CO and benzene in the do-nothing scenario are significantly below air quality standards.

B. "Do Something" Modelling Operational Phase Assessment

CO and Benzene

The results of the modelled impact of the Proposed Development for CO and benzene in the opening and design years are shown in Table 8-30 and Table 8-31 respectively. Predicted pollutant concentrations with the Proposed Development in place are below the ambient standards at all locations. Levels of both pollutants range from 21% to 28% of the respective limit values in 2021 and 2036. Future trends indicate similarly low levels of CO and benzene.

The impact of the Proposed Development can be assessed relative to "do-nothing" levels in 2021 and 2036. Relative to baseline levels, some imperceptible increases in pollutant levels at the worst-case receptors are predicted as a result of the Proposed Development. The greatest impact on CO and benzene concentrations in 2021 and 2036 will be an increase of 0.16% of their respective limit values at Receptor 3. Thus, using the assessment criteria outlined in Appendix 8-1 for NO_2 and PM_{10} and applying these criteria to CO and benzene, the impact of the Proposed Development in terms of CO and benzene is negligible.

PM_{10}

The results of the modelled impact of the Proposed Development for PM_{10} in the opening and design years are shown in Table 8-28. Predicted annual average concentrations in the region of the Proposed Development are below the ambient standards at all worst-case receptors, levels are 44% of the limit value in 2021. In addition, the 24-hour PM_{10} concentration of 50µg/m^3, which can only be exceeded 35 times per year is complied with at all receptors. It is predicted all receptors will have a single day exceedance the 50µg/m^3 24-hour mean limit value in 2021 and 2036. Future trends with the Proposed Development in place indicate similarly low levels of PM_{10}. Annual average PM_{10} concentrations are 44% of the limit in 2036.

The impact of the Proposed Development can be assessed relative to "do-nothing" levels in 2021 and 2036. Relative to baseline levels, some imperceptible increases in PM_{10} levels at the worst-case receptors are predicted as a result of the Proposed Development. With regard to impacts at individual receptors, none of the six no. receptors assessed will experience an

increase in concentrations of over 0.21% of the limit value in 2021 and 2036. Thus, the magnitude of the changes in air quality are imperceptible at all receptors based on the criteria outlined in Appendix 8-1.

$PM_{2.5}$

The results of the modelled impact of the Proposed Development for $PM_{2.5}$ in the opening and design years are shown in Table 8.25. Predicted annual average concentrations in the region of the Proposed Development are below the ambient standards at all worst-case receptors, levels are 46% of the limit value in 2021. Future trends with the Proposed Development in place indicate similarly low levels of $PM_{2.5}$. Annual average $PM_{2.5}$ concentrations are also 46% of the limit in 2036.

The impact of the Proposed Development can be assessed relative to "do-nothing" levels in 2021 and 2036. Relative to baseline levels, imperceptible increases in $PM_{2.5}$ levels at the worst-case receptors are predicted as a result of the Proposed Development. None of the six no. receptors assessed will experience an increase or decrease in concentrations of over 0.12% of the limit value in 2021 and 2036. Thus, the magnitude of the changes in air quality are negligible at all receptors based on the criteria outlined in Appendix 8-1.

NO_2

The results of the assessment of the impact of the Proposed Development for NO_2 in the opening and design years are shown in Table 8-26 for the Highways Agency IAN 170/12 and Table 8-27 using the DEFRA technique respectively. The annual average concentration is within the limit value at all worst-case receptors using both the DEFRA and more conservative IAN technique. Levels of NO_2 are 46% and 43% of the annual limit value in 2021 and 2036 using the IAN technique and concentrations are 43% and 37% of the annual limit value in 2021 and 2036 using the DEFRA technique. Maximum one-hour NO_2 levels with the Proposed Development in place are not predicted to be exceeded using either technique.

The impact of the Proposed Development on annual mean NO_2 levels can be assessed relative to "do-nothing" levels in 2021 and 236. Relative to baseline levels, some imperceptible increases in pollutant levels are predicted as a result of the Proposed Development. With regard to impacts at individual receptors, none of the six no. receptors assessed will experience an increase in concentrations of over 0.64% of the limit value in 2021 and 2036. Thus, using the assessment criteria outlined in Appendix 8-1, the impact of the Proposed Development in terms of NO_2 is negligible at all six no. receptors assessed.

C. Summary of Operational Phase Traffic Impacts on Local Air Quality

The overall impacts with respect to Operational Phase air quality can be described as likely, localised, imperceptible and longterm and therefore not significant.

Table 8-26: Annual Mean NO^2 Concentrations (µg/m^3) (using IAN 170/12 V3 Long Term NO_2 Trend Projections)

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	15.7	15.9	0.12	Imperceptible	Negligible Increase	14.7	14.8	0.15	Imperceptible	Negligible Increase
2	16.1	16.2	0.05	Imperceptible	Negligible Increase	15.0	15.1	0.06	Imperceptible	Negligible Increase
3	16.5	16.7	0.22	Imperceptible	Negligible Increase	15.4	15.6	0.26	Imperceptible	Negligible Increase
4	15.3	15.4	0.09	Imperceptible	Negligible Increase	14.3	14.4	0.10	Imperceptible	Negligible Increase
5	18.5	18.6	0.10	Imperceptible	Negligible Increase	17.3	17.4	0.11	Imperceptible	Negligible Increase
6	16.9	17.0	0.09	Imperceptible	Negligible Increase	15.8	15.8	0.10	Imperceptible	Negligible Increase

Table 8-27: Annual Mean NO_2 Concentrations (µg/m^3) (using Defra's Technical Guidance)

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	14.4	14.5	0.11	Imperceptible	**Negligible Increase**	**11.8**	**12.0**	**0.12**	**Imperceptible**	**Negligible Increase**
2	14.8	14.8	0.05	Imperceptible	**Negligible Increase**	**12.2**	**12.3**	**0.05**	**Imperceptible**	**Negligible Increase**
3	15.1	15.3	0.20	Imperceptible	Negligible Increase	12.6	12.8	0.21	Imperceptible	Negligible Increase
4	13.9	14.0	0.08	Imperceptible	Negligible Increase	11.4	11.5	0.08	Imperceptible	Negligible Increase

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
5	17.2	17.3	0.09	Imperceptible	Negligible Increase	14.6	14.6	0.09	Imperceptible	Negligible Increase
6	15.5	15.6	0.08	Imperceptible	Negligible Increase	13.0	13.0	0.08	Imperceptible	Negligible Increase

Table 8-28: Annual Mean PM^{10} Concentrations ($\mu g/m^3$).

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	17.0	17.0	0.03	Imperceptible	Negligible Increase	17.0	17.0	0.03	Imperceptible	Negligible Increase
2	17.1	17.1	0.01	Imperceptible	Negligible Increase	17.1	17.1	0.01	Imperceptible	Negligible Increase
3	17.2	17.2	0.05	Imperceptible	Negligible Increase	17.2	17.2	0.05	Imperceptible	Negligible Increase
4	16.9	16.9	0.02	Imperceptible	Negligible Increase	16.9	16.9	0.02	Imperceptible	Negligible Increase
5	17.6	17.6	0.02	Imperceptible	Negligible Increase	17.6	17.7	0.02	Imperceptible	Negligible Increase
6	17.3	17.3	0.02	Imperceptible	Negligible Increase	17.3	17.3	0.02	Imperceptible	Negligible Increase

Table 8-29: $PM_{2.5}$ Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$).

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	11.0	11.0	0.02	Imperceptible	Negligible Increase	11.0	11.0	0.02	Imperceptible	Negligible Increase
2	11.1	11.1	0.01	Imperceptible	Negligible Increase	11.1	11.1	0.01	Imperceptible	Negligible Increase
3	11.2	11.2	0.03	Imperceptible	Negligible Increase	11.2	11.2	0.03	Imperceptible	Negligible Increase
4	11.0	11.0	0.01	Imperceptible	Negligible Increase	11.0	11.0	0.01	Imperceptible	Negligible Increase
5	11.5	11.5	0.01	Imperceptible	Negligible Increase	11.5	11.5	0.01	Imperceptible	Negligible Increase
6	11.2	11.2	0.01	Imperceptible	Negligible Increase	11.2	11.2	0.01	Imperceptible	Negligible Increase

Table 8-30: Maximum 8-hour CO Concentrations (mg/m^3)

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	2.58	2.59	0.008	Imperceptible	Negligible Increase	2.58	2.59	0.008	Imperceptible	Negligible Increase
2	2.61	2.62	0.003	Imperceptible	Negligible Increase	2.61	2.62	0.003	Imperceptible	Negligible Increase
3	2.66	2.68	0.016	Imperceptible	Negligible Increase	2.66	2.68	0.016	Imperceptible	Negligible Increase
4	2.55	2.56	0.006	Imperceptible	Negligible Increase	2.55	2.56	0.006	Imperceptible	Negligible Increase
5	2.81	2.82	0.007	Imperceptible	Negligible Increase	2.81	2.81	0.007	Imperceptible	Negligible Increase

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
6	2.69	2.70	0.006	Imperceptible	Negligible Increase	2.69	2.69	0.006	Imperceptible	Negligible Increase

Table 8-31: Annual Mean Benzene Concentrations (µg/m³)

Receptor	Impact Opening Year (2021)					Impact Design Year (2036)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	1.02	1.02	0.002	Imperceptible	Negligible Increase	1.02	1.02	0.002	Imperceptible	Negligible Increase
2	1.03	1.03	0.001	Imperceptible	Negligible Increase	1.03	1.03	0.001	Imperceptible	Negligible Increase
3	1.04	1.04	0.004	Imperceptible	Negligible Increase	1.04	1.04	0.004	Imperceptible	Negligible Increase
4	1.01	1.01	0.001	Imperceptible	Negligible Increase	1.01	1.01	0.001	Imperceptible	Negligible Increase
5	1.07	1.07	0.002	Imperceptible	Negligible Increase	1.07	1.07	0.002	Imperceptible	Negligible Increase
6	1.04	1.05	0.002	Imperceptible	Negligible Increase	1.04	1.05	0.002	Imperceptible	Negligible Increase

8.2.5.2.2 *Regional Air Quality Impacts*

The regional impact of the Proposed Development on emissions of NO_X and VOCs has been assessed using the procedures of TII (TII 2011) and the UK DEFRA (UK DEFRA, 2018). The results (see Table 8-32) show that the likely impact of the Proposed Development on Ireland's obligations under the Targets set out by Directive EU 2016/2284 "*On the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC*" are imperceptible and long-term. For the year 2021, the predicted impact of the changes in AADT is to increase NOx levels by 0.00037% of the NOx emissions ceiling and increase VOC levels by 0.00014% of the VOC emissions ceiling to be complied with in 2020. Similarly low increases are predicted in 2036.

Therefore, the likely overall magnitude of the changes on air quality in the Operational Phase is imperceptible, long-term and therefore not significant.

8.2.5.2.3 *Climate Impacts*

The impact of the Proposed Development on emissions of CO_2 impacting climate were also assessed using the Design Manual for Roads and Bridges screening model (see Table 8-32). The results show that the impact of the Proposed Development in the year 2021 will be to increase CO_2 emissions by 0.00039% of Ireland's EU 2020 Target or 0.00055% of the 2030 target. Thus, the impact of the Proposed Development on national GHG emissions will be insignificant in terms of Ireland's obligations under the EU 2020 Target (EU 2017).

Therefore, the likely overall magnitude of the changes on climate in the Operational Phase is imperceptible, long-term and therefore not significant.

Table 8-32: Regional Air Quality Assessment

Year	**Scenario**	**VOC** (kg/annum)	**NO_X** (kg/annum)	**CO_2** (tonnes/annum)
2021	Do Nothing	1066	3267	1987
	Do Something	1146	3514	2136
2036	Do Nothing	1060	3265	1989
	Do Something	1140	3512	2139
Increment in 2021		80 kg	247.3 kg	149.2 Tonnes
Increment in 2036		79.6 kg	247.1 kg	149.3 Tonnes
Emission Ceiling (kilo Tonnes) 2020		57 Note 1	66 Note 1	37,943 Note 2
Emission Ceiling (kilo Tonnes) 2030		51 Note 1	40 Note 1	26,800 Note 2
Impact in 2021 (%)		0.00014%	0.00037%	0.00039%

Impact in 2036 (%)	0.00016%	0.00061%	0.00055%

Note 1 Targets set out by Directive EU 2016/2284 “On the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC”

Note 2 20-20-20 Climate and Energy Package

With respect to climate change impacts on the Proposed Development, the greatest impact is predicted to be due to flooding. Full details of this issue are contained in Chapter 7 (Hydrology, Water & Hydrogeology). This assessment found that the potential for flooding impacts on the Proposed Development has been reviewed by O’Connor Sutton Cronin Consulting Engineers (30/08/2019) in a Site-Specific Flood Risk Assessment (**SSFRA**) which is included as part of the planning application. The Proposed Development is mostly residential in nature and is therefore considered to be a highly vulnerable development, in accordance with the *Planning System and Flood Risk Management Guidelines for Planning Authorities.*

The Site is outside the areas of potential risk for fluvial and coastal flooding. The Site is therefore located within Flood Zone C and the Proposed Development is appropriate in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities Pluvial flooding and flooding arising from existing drainage infrastructure external to the Site will not enter the Site due to vertical constraints imposed by the existing and proposed topography. Pluvial flooding and flooding arising from failure of drainage systems within the Site will result in overland flow towards the adjacent lands to the immediate south west of the Site keeping with the original topography of the area. As the drainage system is designed in accordance with the relevant standards and regulations, the flood risks arising from the proposed drainage infrastructure is not significant and no further mitigation is required. The flood risk represented by ground water is not significant and no further mitigation is required.

8.2.5.2.4 *Operational Phase Human Health Impacts*

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the Proposed Development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the Proposed Development are compliant with all National and EU ambient air quality limit values and therefore, will result in an imperceptible, localised and long-term impact on human health and therefore not significant.

8.2.6 *Avoidance, Remedial & Mitigation Measures*

In order to sufficiently ameliorate the likely air quality impact, a schedule of air control measures has been formulated for both Construction and Operational Phases associated with the Proposed Development.

8.2.6.1 *Air Quality - Construction Phase*

The greatest potential impact on air quality during the Construction Phase is from construction dust emissions and the potential for nuisance dust. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust

minimisation plan. Provided the dust minimisation measures outlined in the plan (see Appendix 8-1) are adhered to, the air quality impacts during the Construction Phase will be not be significant. In summary, the mitigation measures, which will be incorporated into the CEMP and implemented, will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Furthermore, 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 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 20kph, and on hard surfaced roads as site management dictates.
- Public roads outside the Site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the Site boundary, movements of materials likely to emit dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

8.2.6.2 *Air Quality - Operational Phase*

Emissions of pollutants from road traffic can be controlled most effectively by either diverting traffic away from heavily congested areas or ensuring free flowing traffic through good traffic management plans and the use of automatic traffic control systems (UK DEFRA 2018). Accordingly, no site-specific mitigation measures are required during the Operational Phase.

8.2.6.3 *Climate - Construction Phase*

Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works the impact on climate will be not significant and no mitigation measures are proposed.

8.2.6.4 *Climate - Operational Phase*

Improvements in air quality are likely over the next few years as a result of the on-going comprehensive vehicle inspection and maintenance program, fiscal measures to encourage the use of alternatively fuelled vehicles and the introduction of cleaner fuels. No site-specific mitigation measures are required.

Regarding flooding from increased rainfall due to climate change, the drainage system is designed in accordance with the relevant standards and regulations, the flood risks arising

from the proposed drainage infrastructure will be not significant and no mitigation measures are required. The flood risk represented by ground water is not significant and no mitigation measures are required.

8.2.7 *Residual Impacts*

8.2.7.1 *Construction Phase*

When the dust minimisation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the Site will be short-term, localised, not significant and pose no nuisance at nearby receptors.

Due to the size and nature of the construction activities with appropriate mitigation measures, CO_2 and N_2O emissions during construction will be short-term, localised and imperceptible impact on climate, and therefore not significant.

8.2.7.2 *Operational Phase*

The results of the air dispersion modelling study indicate that the residual impacts of the Proposed Development on air quality and climate are predicted to be imperceptible and localised with respect to the Operational Phase for the long-term and therefore not significant.

Best practice mitigation measures are proposed for the Construction Phase of the Proposed Development, which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. These are addressed in the CEMP which is submitted as a separate document to this application. The mitigation measures that will be put in place during construction of the Proposed Development will ensure that the impact of the Proposed Development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the Proposed Development is likely to be negligible, short-term and imperceptible with respect to human health and therefore not significant.

8.2.8 *Monitoring*

Construction Phase dust monitoring will be put in place to ensure dust mitigation measures are controlling emissions. Dust monitoring will be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located c. 2m AGL. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period between 28-32 days.

There is no proposed monitoring for the Operational Phase of the Proposed Development with respect to air quality or climate.

8.2.9 *Cumulative Assessment*

There are other significant developments in the vicinity of the Proposed Development which have been granted planning permission. The cumulative developments which have been included in the traffic impact assessment which in-turn impacts the air quality impact which are based on traffic figures:

- A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal.

- The Ardilaun Court residential development (Reg. Ref. 3383/14) on the former St Paul's swimming pool site to the north-west of the subject site at 1 Sybil Hill Road is also in the process of being built-out and has also been considered and there is no impacts on review of the developments utilities and infrastructure in the area.

As the traffic impacts have been included in the modelling, therefore the cumulative impact of these developments has been included in the traffic numbers modelled.
Should the Construction Phases of the development and any localised permitted developments coincide, it is predicted that, once appropriate mitigations are put in place, during the construction for the above schemes, impacts will not be significant.

8.2.9.1 *"Do-Nothing" Impact*

Under the "do-nothing" Scenario no construction works will take place and the previously identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. The 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 new developments in the surrounding industrial estates, changes in road traffic, etc.). Therefore, this scenario can be considered neutral in terms of both air quality and climate.

8.2.10 *Interactions between Impacts on Different Factors*

Air Quality does not have a significant number of interactions with other Chapters. The most significant interactions are between Human Beings (Chapter 4, Population and Human Health) and Air Quality. A significant adverse impact due to air quality in either the Construction or Operational Phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the Proposed Development will ensure that the impact of the Proposed Development complies with all ambient air quality legislative limits and therefore the predicted effect is long-term, neutral effect with respect to human beings.

Interactions between Air Quality and Traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The Proposed Development impact on air quality is assessed by reviewing the change in annual average daily traffic on roads close to the Site. In this assessment, the impact of the interactions between traffic and air quality are localised, imperceptible and long-term for the Operational Phase, and therefore not significant.

The Construction and Operational Phases of the Proposed Development will lead to emissions to atmosphere which have the potential to impact on sensitive flora, fauna and water. However, the effect of these emissions is predicted to be neutral for both the Construction and Operational Phases. Construction Phase mitigation measures will minimise dust emissions which have the potential to impact on flora, fauna and water. In the Operational Phase, impacts meet the criteria set down for ecological sensitive site as discussed in Section 8.2.8 of this Chapter and therefore the effect of the interactions between air quality and flora and fauna is considered to be neutral for both the Construction and Operational Phases.

With the appropriate mitigation measures in place for the d Proposed Development, it is predicted that there are no interactions with Soil & Geology and Noise & Vibration. Interactions with the flood risk assessment occur as climate impacts have the potential to cause extreme weather events and heightened potential for flooding. As the drainage system is designed in accordance with the relevant standards and regulations, the flood risks arising from the proposed drainage infrastructure will be not significant and the flood risk represented by groundwater is also not significant.

8.2.11 *Difficulties in Compiling*

There were no difficulties in compiling this Section of the EIAR**.**

8.2.12 *References*

German VDI (2002) *Technical Guidelines on Air Quality Control* – TA Luft

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EU (2014) *EU 2030 Climate and Energy Framework*

Department of the Environment, Heritage and Local Government (DEHLG) (2003*) Strategy to Reduce Emissions of Trans-boundary Pollution by 2010 to Comply with National Emission Ceilings* - Discussion Document

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8.3 Microclimate (Daylight)

8.3.1 *Introduction*

This Chapter assesses the daylight impact of the Proposed Development located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School), Sybil Hill House (a protected structure) and 'The Meadows' residential estate, in Raheny, Dublin 5.

O'Connor Sutton Cronin (**OCSC**) Consulting Engineers have been appointed to assess this impact and have undertaken the analysis. The analysis presented in this Chapter has been completed by:

Carlota Álvarez, has a B.Eng. (Hons) in Marine Engineering and over 3 years' experience working as an Energy & Sustainability Engineer. She has worked on a range of projects from Part L, Overheating and now concentrates on leading the Daylight and Sunlight section of OCSC.

Dónal O'Connor, Chartered Engineer, has a M.Sc. in Sustainable Energy and over 8 years' experience working as an Energy & Sustainability Engineer. He has worked on a range of projects from Part L and LEED energy modelling to Daylight and Sunlight assessments.

The aim of this analysis is to record and analyse the following:

- The impact of the Proposed Development in relation to daylight within the Proposed Development and any likely significant effects on the environment; and
- The impact to the existing adjacent buildings external to the Site daylight, due to the Proposed Development and any likely significant effects on the environment.

A site visit took place on the 21st August 2019 in order to confirm information relevant to the assessment.

8.3.2 *Study Methodology*

In considering the Proposed Development potential and the quality of amenity for the surrounding properties as well as for the Proposed 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: A Guide to Good Practice, 2011* (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 numeral guidelines these should be interpreted flexibly because natural lighting [and sunlight] is only one of the many factors in site layout design."

The assessment of impacts on sunlight access referred to the Draft Environmental Protection Agency (**EPA**) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2017). The list of definitions given below is taken from Table 3-3 in this document. However, 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.

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.

8.3.2.1 *Daylight Assessment Methodology for Dwellings within the Proposed Development*

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 u*sed 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.*

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* (BS 8206-02)*".*

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 8-33 below is an excerpt from the BS 8206-02 outlining the ADF for different room types that should be achieved to ensure adequate daylight levels within dwellings.

Table 8-33: British Standard BS 8206-02 Minimum Daylight Factors

Minimum average daylight factor	
Room type	**Minimum average daylight factor** %
Bedrooms	1
Living rooms	1.5

In order to analyse the daylight requirements for Proposed Development a detailed three-dimensional (**3D**) model was constructed of the Proposed 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 Development.

An image of the Proposed Development taken from the model is illustrated in Figure 8-61 below.

The daylight impact analysis has been assessed for the entire Proposed Development including the impacts to the existing adjacent buildings external to the site of the Proposed Development.

Figure 8-61: IES VE Model of the Proposed Development

8.3.2.2 *Daylight Assessment Methodology for Existing Dwellings Adjacent to the Site*

8.3.2.2.1 *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 Guide sensitive receptors are described as:

- Windows to habitable rooms facing the Site where the occupants have a reasonable expectation of daylight; and
- Other sensitive receptors include gardens and open spaces on adjacent properties to a new scheme, excluding public footpaths, front gardens and car parks.

In accordance with the BRE Guide, windows are selected as sensitive receptors on the basis of being a habitable room facing the Proposed Development.

Similarly, amenities and open spaces are selected on the basis of being in the immediate vicinity of the Proposed Development. 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 Development.

Therefore, in this case, the Proposed Development is identified as the potential source of impact. The sensitive receptors identified for this study are windows of habitable rooms facing, and in close proximity to the Site where the occupants have a reasonable expectation of daylight.

8.3.2.2.2 *Assessment Criteria for Existing Adjacent Properties*

As per the BRE Guide it is important to safeguard the daylight to nearby buildings, from the Proposed Development, where a reasonable expectation of daylight is required. The flow matrix below outlines the criteria to be assessed, as per the BRE Guide, in order to ascertain any potential impact to adjacent buildings from the Proposed Development.

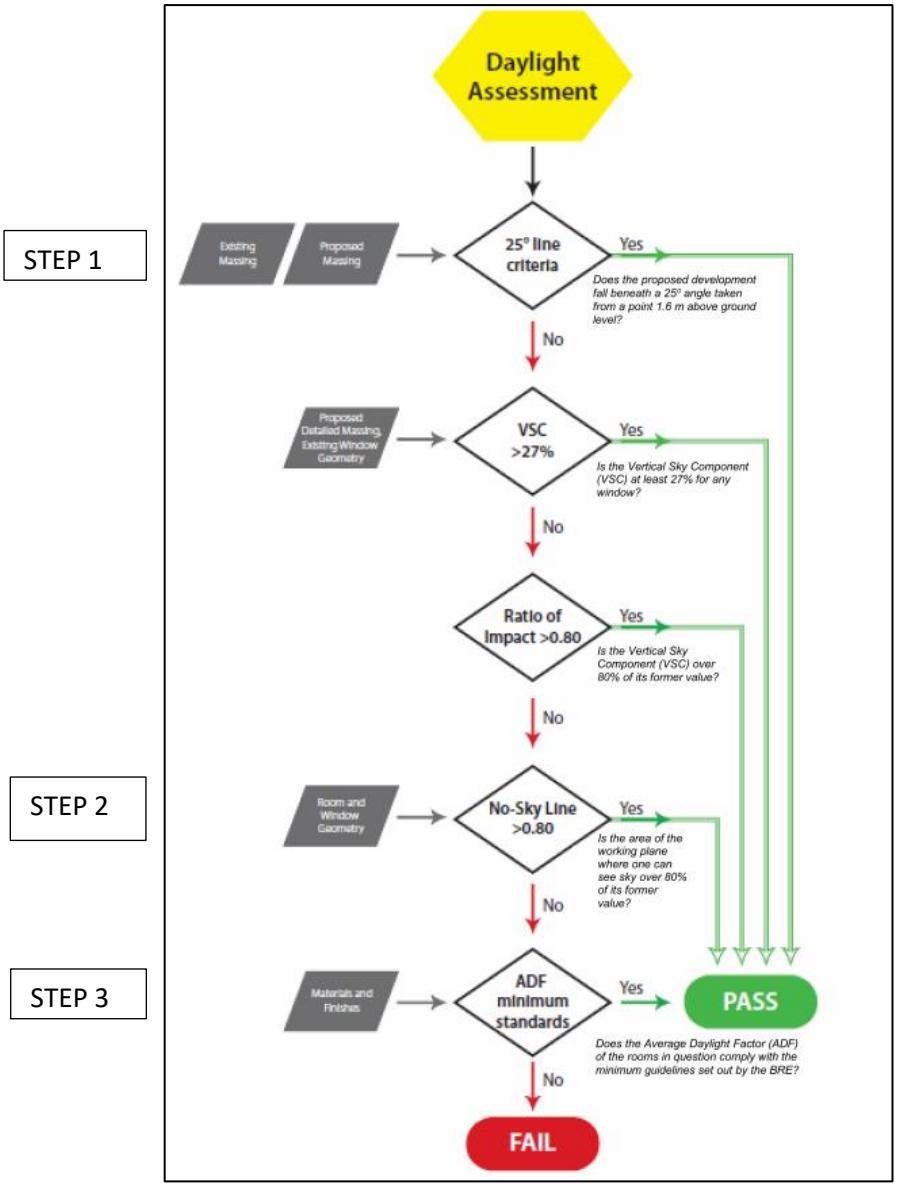

Figure 8-62: Daylight Assessment Methodology

As per the flow matrix, the BRE Guide and BS 8206-02 provide four main methods for assessing daylight availability.

8.3.2.2.2.1 Step 1 - 25° Line Criteria

In the first instance, if a development falls beneath a 25° angle taken from a point 1.6m above ground level (**AGL**) from any adjacent properties, then the BRE Guide say that no further analysis is required in relation to impact on surrounding properties as adequate skylight will still be available.

If a development extends beyond the 25° angle then further analysis is required (Step 2).

8.3.2.2.2.2 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 Guide sets 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 skylight 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 negligible.

It is important to note that the VSC is a simple geometrical calculation which provides an early indication of the potential for daylight entering the space. However, it does not assess or quantify the actual daylight levels inside the rooms. If the VSC standard is not met on any window, Step 3 is then followed.

8.3.2.2.2.3 Step 3 – No Skyline

The third method is the No Skyline or Daylight Distribution Method. This method assesses the change in position of the No Skyline between the existing and proposed situations. It does consider 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 4 is considered more appropriate.

8.3.2.2.2.4 Step 4 – Average Daylight Factor

Step 4 assesses the ADF levels. This is a more detailed and therefore more accurate method 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. It gives guidance as to the qualitative and quantitative change in daylight and is related to the BS 8206-02, see Table 8-34 in Section 8.3.2.1, for minimum ADF recommended.

8.3.3 *Characteristics of the Proposed Development*

8.3.3.1 *Proposed Development*

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche.

At basement level the site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road with from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River.

Figure 8-63 below illustrates the site of the Proposed Development.

Figure 8-63: Plan of the site of the Proposed Development

8.3.3.2 *Existing Adjacent Properties*

As part of the analysis, the impact to the existing adjoining properties to the site of the Proposed Development was analysed. Figure 8-64 below illustrates the adjoining buildings adajacent to the the proposed Development that were analysed and Table 8-34 below outlines these.

Figure 8-64: Adjoining Buildings Adjacent to the Proposed Development

Table 8-34: Sensitive Receptors

Development Ref.	Development name
Ref. 1	Properties at 'The Meadows' residential estate
Ref. 2	Vincentian Order Parochial House / Sybil Hill House
Ref. 3	St Paul's College

8.3.4 *The Existing Receiving Environment (Baseline Situation)*

The Proposed Development is located in the northern suburbs of Dublin City, c. 5km from the city centre, in an established residential area. The Site comprises open relatively flat rough grassland. The site is bordered to the West by St. Paul's college and The Meadows, to the East by Millennium Arboretum, to the South and North by the St. Anne's GAA Pitches, with the only established residential developments on The Meadows.

Figure 8-65 below outlines the proposed site location.

Figure 8-65: Aerial Image of the Proposed Development

8.3.5 *Potential Impact of the Proposed Development*

This section considers the potential impact of the Proposed Development under the following factors:

- Impacts to the Proposed Development in relation to daylight; and
- Impact to the existing adjacent buildings external to the Site, due to the Proposed Development.

8.3.5.1 *Construction Phase*

This analysis considers both the daylight impact to the future residents, and the impact to existing adjacent properties as a result of the Proposed Development. It is considered that during the Construction Phase there will be no impacts experienced in relation to daylight and sunlight to the Proposed Development, and the impact to the existing properties in the adjoining developments will be neutral with no short or long-term effects.

8.3.5.2 *Operational Phase*

As previously noted the performance targets set out in the BRE Guide, 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 numeral 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 that the Proposed Development has the potential to achieve high levels of daylight and sunlight given the Site layout and design. In addition, the absence of adjacent high-rise buildings that could overshadow the Proposed Development a positive for the Site.

In order to assess the potential impact of the Proposed Development during the Operational Phase, in terms of daylight access, for both the Proposed Development and the adjacent buildings, the methodology outlined in Section 8.3.2 of this Chapter has been followed.

8.3.5.2.1 *Daylight Impact Results for Apartments within the Proposed Development*

In order to fully assess the potential daylight impact to the apartments within the Proposed Development, apartment units considered 'worst-case' have been selected for analysis and deemed representative of the apartment units across the Proposed Development. 'Worst-case' units are those at lower levels with less access to daylight. If units at lower levels are compliant with the ADF criteria, units at upper levels with greater access to daylight will also comply.

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.

In summary, most units not only meet but in the majority of cases exceed the ADF criteria as outlined within the BRE Guide. Of the 1802 no. rooms that comprise the Proposed Development, only 42 no. fall slightly under the BRE Guide requirements, therefore a 97% compliance ratio is achieved across the Proposed Development.

In order to calculate the percentage of compliance, the following criteria has been followed.

Similar rooms on the same façade will have similar ADF results. As an example, Figure 8-66 below highlights rooms getting similar ADF results with the same colours. Based on this methodology, OCSC have analysed a number of rooms based on each colour type.

Figure 8-66: Block 1 Level 00 - Example of Room's Assunption

As an example for **bedrooms**, yellow rooms present similar results as they all have the same façade width, amount of glazing and orientation, without high buildings in front that could block daylight. Therefore if 1.0% ADF is experienced in one of these rooms, the remaining rooms will also achieve this result.

The same criteria is applied to the purple rooms, with the difference being Block 3 is located in front. Orange rooms have better access to daylight due to the wider façade while green rooms allow more daylight penetration due to their position and have better daylight access. Where rooms at lower levels have shown compliance with the ADF, analysis has not been required to the floors above on the basis that the upper levels will therefore comply.

The same philosophy applies to the **living rooms**, as an example, the rooms highlighted in blue will achieve similar results, as will the rooms highlighted in aqua.

An Area of Interest has been defined to the rooms tested, considered the functional area of the room – the extent of the Area of Interest can be seen in Figure 8-66 above.

Figures 8-67 to 8-78 illustrate the rooms tested and their subsequent results are shown in the accompanying tables.

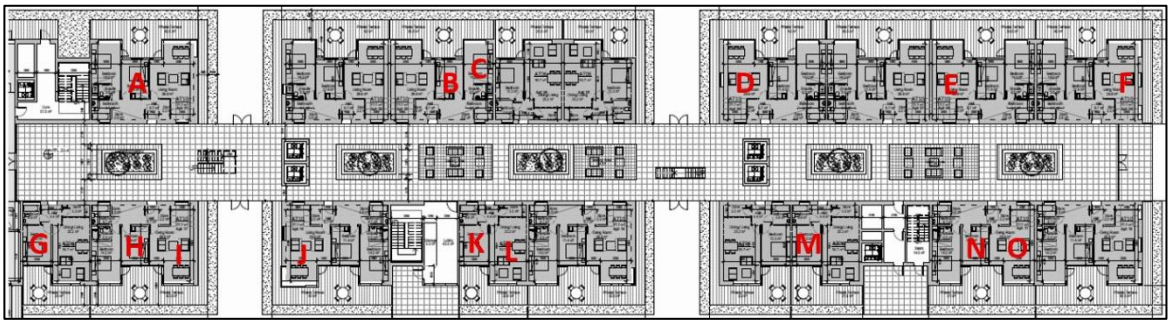

Figure 8-67: Block 1 Level 00 - Assessed Rooms

Table 8-35: Block 1 Level 00 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Bedroom	1.0	1.5	Y
B	Bedroom	1.0	1.7	Y
C	Bedroom	1.0	3.5	Y
D	Living Room	1.5	3.2	Y
E	Living Room	1.5	3.1	Y
F	Living Room	1.5	5.8	Y
G	Bedroom	1.0	0.8	N
H	Bedroom	1.0	0.8	N
I	Living Room	1.5	1.8	Y
J	Living Room	1.5	3.0	Y
K	Bedroom	1.0	0.8	N
L	Living Room	1.5	2.3	Y
M	Bedroom	1.0	1.0	Y

N	Bedroom	1.0	1.4	Y
O	Living Room	1.5	2.1	Y

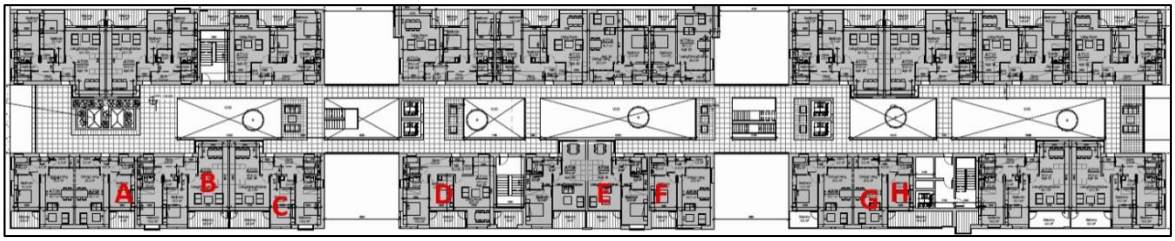

Figure 8-68: Block 1 Level 01 - Assessed Rooms

Table 8-36: Block 1 Level 01 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Bedroom	1.0	1.0	Y
B	Living Room	1.5	1.3	N
C	Bedroom	1.0	3.2	Y
D	Bedroom	1.0	1.1	Y
E	Living Room	1.5	1.0	N
F	Bedroom	1.0	1.0	Y
G	Living Room	1.5	2.9	Y
H	Bedroom	1.0	1.1	Y

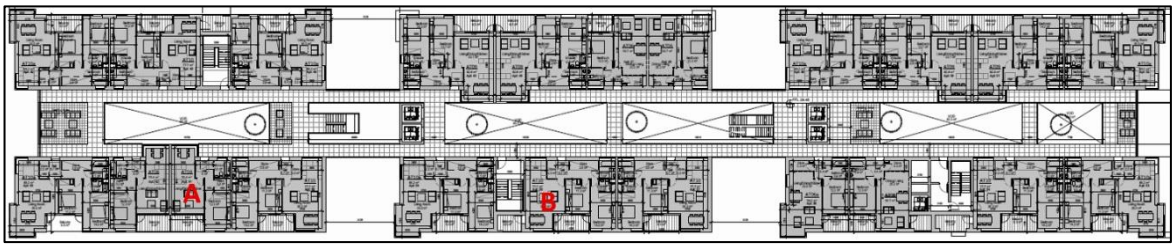

Figure 8-69: Block 1 Level 02 - Assessed Rooms

Table 8-37: Block 1 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Living Room	1.5	1.7	Y
B	Living Room	1.5	4.6	Y

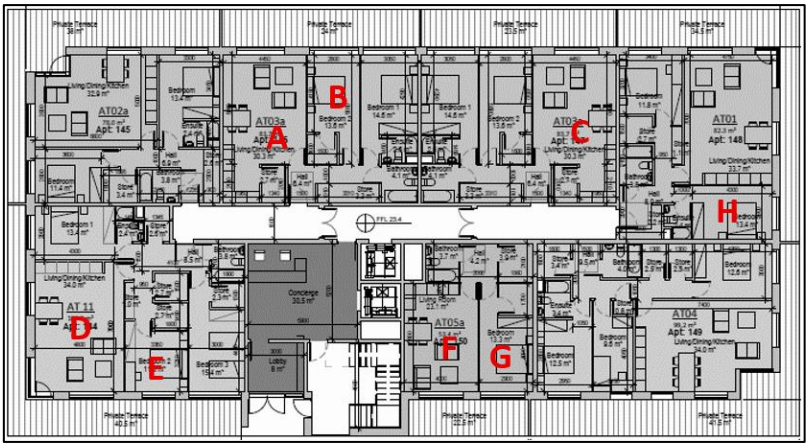

Figure 8-70: Block 2 Level 00 - Assessed Rooms

Table 8-38: Block 2 Level 00 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Living Room	1.5	2.5	Y
B	Bedroom	1.0	3.2	Y
C	Living Room	1.5	1.7	Y
D	Living Room	1.5	5.3	Y
E	Bedroom	1.0	4.0	Y
F	Living Room	1.5	2.5	Y
G	Bedroom	1.0	4.2	Y
H	Bedroom	1.0	2.5	Y

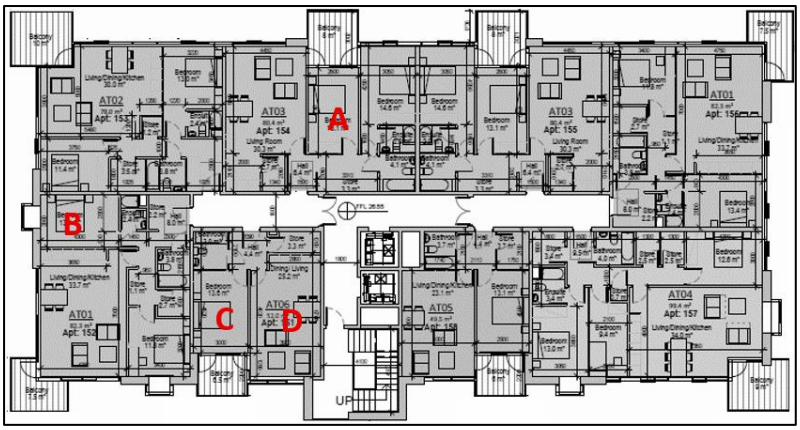

Figure 8-71: Block 2 Level 01 - Assessed Rooms

Table 8-39: Block 2 Level 01 - Assessed Rooms

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Bedroom	1.0	0.8	N
B	Bedroom	1.0	2.7	Y
C	Bedroom	1.0	0.8	N
D	Living Room	1.5	2.2	Y

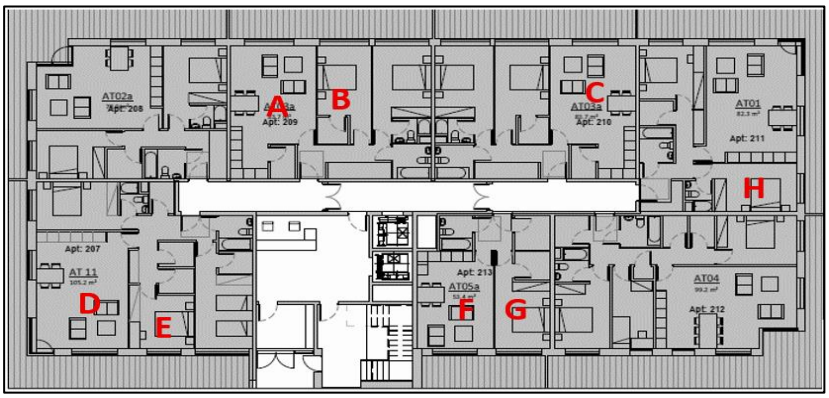

Figure 8-72: Block 2 Level 02 - Assessed Rooms

Table 8-40: Block 2 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Bedroom	1.0	1.0	Y
B	Bedroom	1.0	1.0	Y
C	Bedroom	1.0	1.0	Y

Table 8-41: Block 3 Level 00 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Living Room	1.5	2.6	Y
B	Bedroom	1.0	3.3	Y
C	Living Room	1.5	1.7	Y
D	Living Room	1.5	5.3	Y
E	Bedroom	1.0	3.9	Y
F	Living Room	1.5	2.6	Y
G	Bedroom	1.0	4.2	Y
H	Bedroom	1.0	2.6	Y

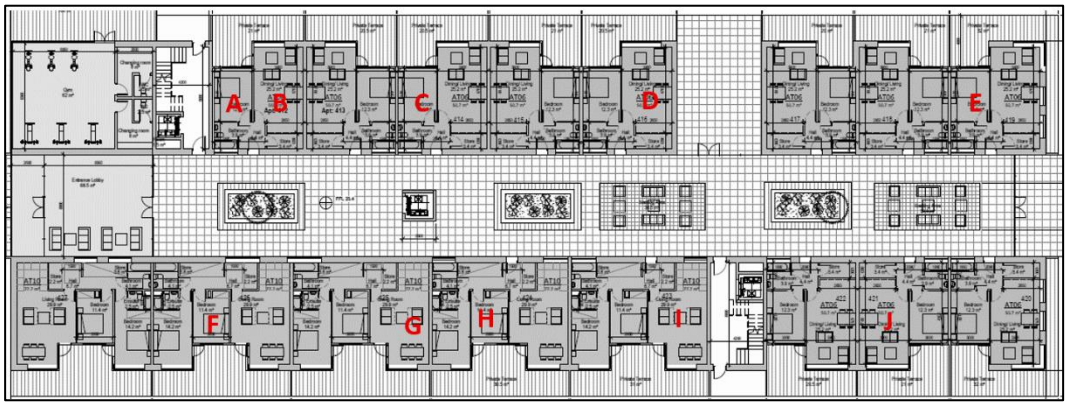

Figure 8-73: Block 6 Level 00 - Assessed Rooms

Table 8-42: Block 6 Level 00 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Bedroom	1.0	0.8	N
B	Living Room	1.5	2.7	Y
C	Bedroom	1.0	1.1	Y
D	Living Room	1.5	3.4	Y
E	Bedroom	1.0	1.0	Y
F	Bedroom	1.0	2.3	Y
G	Living Room	1.5	3.8	Y
H	Bedroom	1.0	1.8	Y
I	Living Room	1.5	3.5	Y
J	Living Room	1.5	5.2	Y

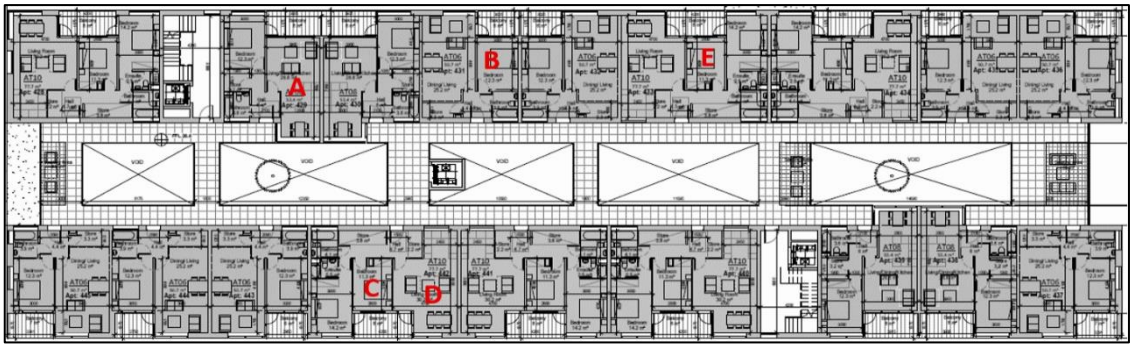

Figure 8-74: Block 6 Level 01 - Assessed Rooms

Table 8-43: Block 6 Level 01 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Living Room	1.5	1.1	N
B	Bedroom	1.0	1.1	Y
C	Bedroom	1.0	2.2	Y
D	Living Room	1.5	2.9	Y
E	Bedroom	1.0	1.1	Y

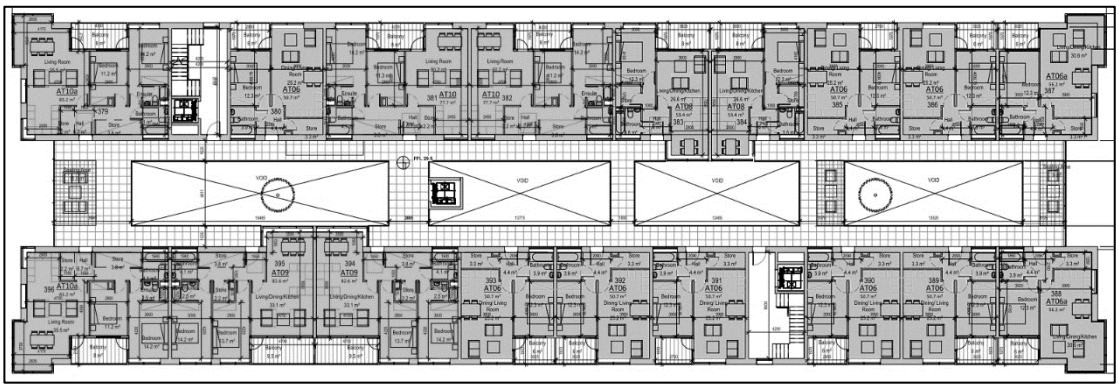

Figure 8-75: Block 6 Level 02 - Assessed Rooms

Table 8-44: Block 6 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Living Room	1.5	1.5	Y

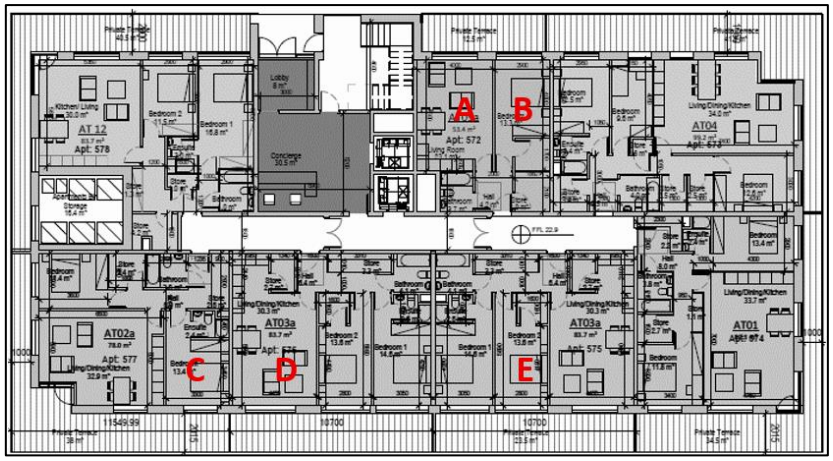

Figure 8-76: Block 8 Level 00 - Assessed Rooms

Table 8-45: Block 8 Level 00 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Living Room	1.5	1.9	Y
B	Bedroom	1.0	3.2	Y
C	Bedroom	1.0	3.5	Y
D	Living Room	1.5	2.9	Y
E	Bedroom	1.0	3.9	Y

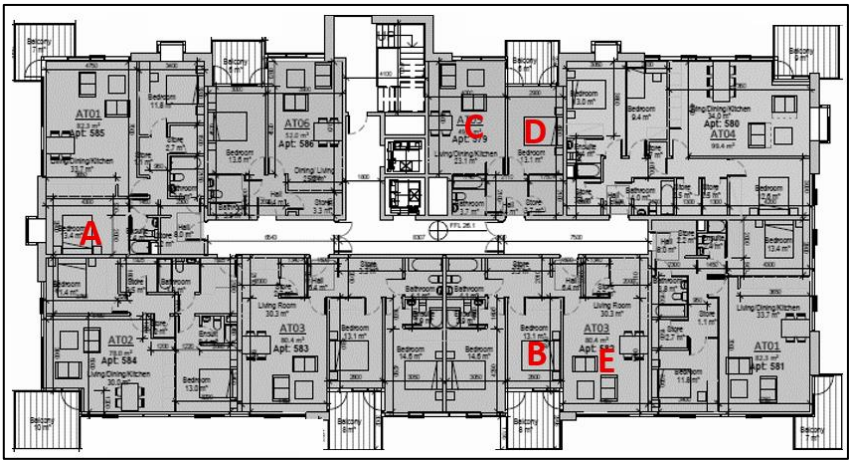

Figure 8-77: Block 8 Level 01 - Assessed Rooms

Table 8-46: Block 8 Level 01 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)			Daylight factor level expected (%)	Compliance
A	Bedroom	1.0			2.1	Y
B	Bedroom	1.0	0.8	N		
C	Living Room	1.5	2.3	Y		
D	Bedroom	1.0	0.8	N		
E	Living Room	1.5	2.5	Y		

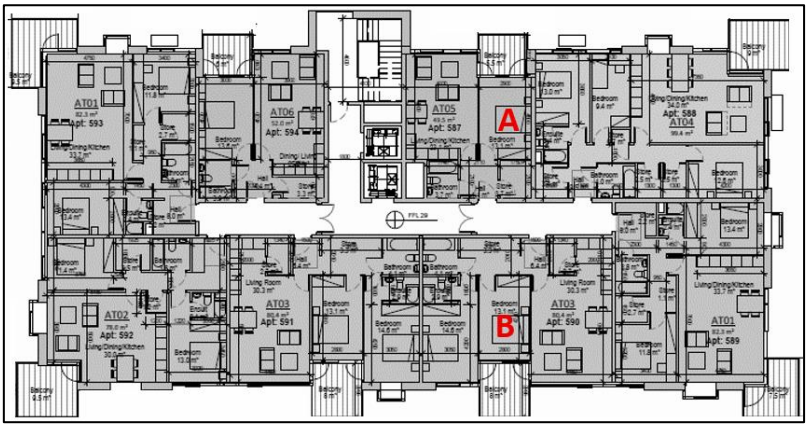

Figure 8-78: Block 8 Level 02 - Assessed Rooms

Table 8-47: Block 8 Level 02 - Average Daylight Factor Results

Room Ref.	Room Type	BS 8206 minimum standard (%)	Daylight factor level expected (%)	Compliance
A	Bedroom	1.0	1.0	Y
B	Bedroom	1.0	1.1	Y

As previously outlined, the vast majority of units not only meet the ADF, but in the majority of cases exceed the ADF criteria as outlined within the BRE Guide. Of the 1802 rooms that comprise the development, only 42 fall slightly under the BRE requirements, therefore a 97% compliance ratio is achieved across the Proposed Development.

8.3.5.2.2 *Impact to Adjacent Properties from the Proposed Development*

In addition to assessing the impacts to the future inhabitants of the Proposed Development, the impact on existing adjacent properties external to the site of the Proposed Development has also been analysed. Figure 8-64 and Table 8-34 in Section 8.3.3.2 & 8.3.4 identify the

properties that are considered to be in close proximity to the Proposed Development and require analysis.

25 ^{0} line criteria

In order to analyse any potential impact on the properties adjacent to the site of the Proposed Development, a line has been created which is reflective of a 25° angle taken from a horizontal level at 1.6m AGL to the highest point on the Proposed Development.

As illustrated in the Figure 8-79 below, the Sybil Hill House and St Paul's College fall outside the 25^{0} line criteria. Therefore, the distance to the Proposed Development is substantial and no further analysis is required, with the analysis for the properties at 'The Meadows' residential estate moving to VSC.

Figure 8-79: 25^{o} Line Adjacent Properties

Table 8-48: Summary of Daylight Impact to Sensitive Receptors

Development Ref.	Development name	Impact Perceived
Ref. 1	Properties at 'The Meadows' residential estate	Assessed using VSC method.
Ref. 2	Sybil Hill House	The distance is substantial from the Proposed Development and in compliance with the 25^{0} line criteria. Therefore, imperceptible impact.
Ref. 3	St Paul's College	The distance is substantial from the Proposed Development and in compliance with the 25^{0} line criteria. Therefore, imperceptible impact.

VSC > 27%

The analysis has shown that all the properties located at 'The Meadows' residential estate will achieve a VSC value above 27% once the Proposed Development takes place. Therefore, excellent levels of daylight will still be achieved with an imperceptible impact.

Figure 8-80: Sensitive Receptors at 'The Meadows' Residential Estate

Table 8-49: Vertical Sky Component Results

Window Ref.	VSC received once the proposed building is in place (%)	Meets BRE Guidelines VSC > 27%
1	30	Y
2	32	Y
3	29	Y
4	30	Y
5	30	Y
6	30	Y
7	29	Y

8.3.5.3 *Potential Cumulative Impacts*

In the context of daylight, the longer-term cumulative impacts are considered not significant as the daylight assessment has shown that most of the rooms within the Proposed Development comply with the BRE Guide for daylight. The daylight assessment has shown compliance with the BRE Guidelines in relation to the adjacent properties.

In relation to the future planning application lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands that was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal, it can be outlined that due to the distance from the proposed development and the south location, imperceptible impact will be received.

8.3.5.4 *"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 a neutral effect as the existing daylight levels will remain unchanged.

8.3.6 *Avoidance, Remedial and Mitigation Measures*

8.3.6.1 *Construction Phase*

Remedial measures during the Construction Phase in relation to daylight are not considered to be required.

8.3.6.2 *Operational Phase*

There will be an imperceptible impact with a neutral, long-term effect in relation to the daylight levels experienced by the future inhabitants of the Proposed Development and to the existing inhabitants of the adjoining sites, therefore no remedial or reductive measures are considered to be required.

8.3.6.3 *'Worst-Case' Scenario*

The apartments units considered for the 'worst-case' have been selected for analysis and deemed representative of the apartment units across the Proposed 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 the upper levels with greater access to daylight will also comply.

8.3.7 *Residual Impact*

There will be an imperceptible impact with a neutral long-term effect, if any, is expected in relation to the daylight levels experienced by the future inhabitants of the Proposed Development 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 daylight.

8.3.8 *Monitoring*

8.3.8.1 *Construction Phase*

No on-going monitoring is required in relation to daylight.

8.3.8.2 *Operational Phase*

No on-going monitoring is required in relation to daylight.

8.3.9 *Reinstatement*

8.3.9.1 *Construction Phase*

Reinstatement is not pertinent to the assessment of impacts on daylight in the case of the Proposed Development.

8.3.9.2 *Operational Phase*

Reinstatement is not pertinent to the assessment of impacts on daylight in the case of the Proposed Development.

8.3.10 *Difficulties encountered in compiling*

No difficulties were encountered in relation to the daylight impact. OCSC has confidence that the 3D model used in the assessment of the impact for the Proposed Development, on daylight access achieves a high degree of accuracy.

8.3.11 *References*

Building Research Establishment (BRE) *Guidelines on Site Layout Planning for Daylight and Sunlight*

British Standard BS 8206: Part 2: (BS 8206-02) *Lighting for Buildings. Code of practice for daylight*

Sustainable Urban Housing: *Design Standards for New Apartments Guidelines for Planning Authorities*

EPA 2017 *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*

8.4 Microclimate (Sunlight)

8.4.1 *Introduction*

This Chapter assesses the sunlight impact of the Proposed Development located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School), Sybil Hill House (a protected structure) and 'The Meadows' residential estate, in Raheny, Dublin 5.

O'Connor Sutton Cronin (**OCSC**) Consulting Engineers have been appointed to assess this impact and have undertaken the analysis.

The aim of the analysis is to record and analyse the following impacts:

- The sunlight impact to the proposed amenity spaces within the Proposed Development and any likely significant effects on the environment; and
- The sunlight impact to any amenity spaces adjacent to the Proposed Development, as a result of the Proposed Development and any likely significant effects on the environment.

A site visit took place on the 21st August 2019 in order to obtain information relevant to the assessment.

8.4.2 *Study Methodology*

In considering the Proposed Development potential and the quality of amenity for the surrounding properties as well as for the Proposed 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: A Guide to Good Practice, 2011* (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 numeral guidelines these should be interpreted flexibly because natural lighting [and sunlight] is only one of the many factors in site layout design*."

The assessment of impacts on sunlight access referred to the Draft Environmental Protection Agency (**EPA**) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2017). The list of definitions given below is taken from Table 3-3 in this document.

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 sunlight analysis.

8.4.2.1 *Sunlight Assessment Methodology*

In terms of amenity space, the BRE Guide recommends 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 being the date of the vernal equinox.

In order to analyse the daylight requirements for Proposed Development a detailed three-dimensional (**3D**) model was constructed of the Proposed 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 Development taken from the model is illustrated in Figure 8-81 below.

The sunlight impact analysis has been assessed on the entire Proposed Development including the impacts to existing adjacent amenity spaces external to the Proposed Development.

In order to analyse any potential impact on the properties adjacent to the site of the Proposed Development, a line has been created which is reflective of a 25° angle taken from a horizontal level at 1.6m above ground level to the highest point on the Proposed Development. The properties falling inside that line are the ones selected for analysis.

Figure 8-81: IES VE Model of the Proposed Development

8.4.3 *Characteristics of the Proposed Development*

8.4.3.1 *Proposed Development*

The development is described in detail in section 8.1

Figure 8-82 below illustrates the site of the Proposed Development.

Figure 8-82: Plan of the site of the Proposed Development

8.4.3.2 *Existing Adjacent Amenity Spaces*

As part of the analysis the impact to the existing adjoining properties to the site of the Proposed Development was also analysed. Figure 8-83 below illustrates the adjoining buildings to the Proposed Development that were analysed and Table 8-50 outlines these building types.

Table 8-50: Sensitive Receptors

Figure 8-83: Properties Adjacent to the St. Paul's Development

Development Ref.	Development name
Ref. 1	Properties at 'The Meadows' residential estate
Ref. 2	Vincentian Order Parochial House / Sybil Hill House
Ref. 3	St Paul's College

8.4.4 *The Existing Receiving Environment (Baseline Situation)*

The Proposed Development is located in the northern suburbs of Dublin City, c. 5km from the city centre, in an established residential area. The Site comprises open relatively flat rough grassland. The site is bordered to the West by St. Paul's college and The Meadows, to the East by Millennium Arboretum, to the South and North by the St. Anne's GAA Pitches, with the only established residential developments on The Meadows.

Figure 8-84: Aerial Image of the site of the Proposed Development

8.4.5 *Potential Impact of the Proposed Development*

This section considers the potential impact of the Proposed Development under the following factors:

- Impacts to the Proposed Development in relation to sunlight of amenity spaces; and
- Impact to the existing adjacent buildings external external to the Site, due to the Proposed Development.

8.4.5.1 *Construction Phase*

The analysis considers both the sunlight impact to amenity spaces within the Proposed Development and the impact to adjacent properties as a result of the Proposed Development. It is considered that during the Construction Phase there will be no impacts experienced in relation to sunlight to the Proposed Development, and therefore the impact to the existing properties in the adjoining developments will be imperceptible with a neutral long-term effect.

8.4.5.2 *Operational Phase*

It is considered that the Proposed Development has the potential to achieve high levels of sunlight given the Site layout and design and generous areas of amenity space (c. 1.6ha open

space to the south of the Site). In addition, the absence of adjacent high-rise buildings that could overshadow the Proposed Development is a positive for the Site.

In order to assess the potential impact of the Proposed Development 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 8.4.2 of this report has been followed.

8.4.5.2.1 *Sunlight Results for Amenity Spaces within the Proposed Development*

The sunlight analysis has been undertaken in the IES VE 3D modelling software package. The Proposed Development along with amenity spaces has been constructed within this software. The analysis undertaken for the semi-private open space is illustrated in Figure 8-86.

The red squares illustrated in the image represent the areas that are receiving 2 no. or more hours of sunlight on the 21st March. It is evident from the image that almost 100% of the public open space is receiving a minimum of 2 no. hours of sunlight on the 21st March, therefore compliance with the BRE Guide is achieved.

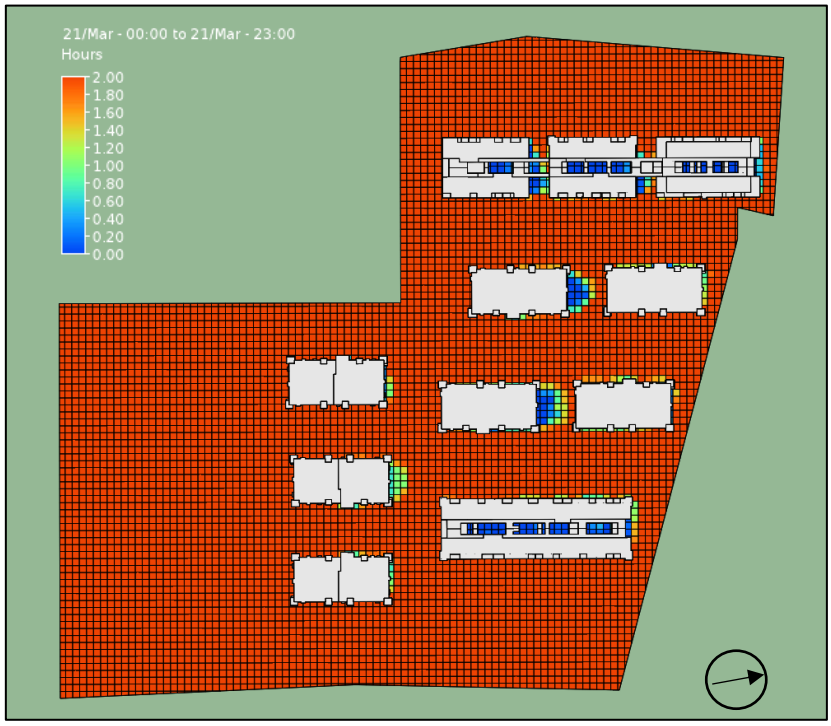

Figure 8-85: Amenity Space - 2 Hours Sunlight Analysis 21st March

8.4.5.2.2 *Sunlight Results for Amenity Spaces within the Surrounding Properties*

Figure 8-86 below identifies the adjacent properties to the site of the Proposed Development.

Figure 8-86: Properties Adjacent to the site of the Proposed Development

As outlined in the Table 8-51 below Sybil Hill House and St Paul's College are located a substantial distance away from the Proposed Development and comply with the 25^0line criteria as outlined in the BRE Guide. Therefore, no impact is perceived, and the only properties selected for the overshadowing analysis are 'The Meadows' residential estate.

Table 8-51: Sensitive Receptors

Development Ref.	Development name	Impact Perceived
Ref. 1	Properties at 'The Meadows' residential estate	Properties selected for overshadowing analysis.
Ref. 2	Vincentian Order Parochial House / Sybil Hill House	The distance is substantial from the Proposed Development and in compliance with the 25^0 line criteria. Therefore, imperceptible impact.
Ref. 3	St Paul's College	The distance is substantial from the Proposed Development and in compliance with the 25^0 line criteria. Therefore, imperceptible impact.

The overshadowing images illustrate the overshadowing impact on March 21st and June 21st (summer solstice) at 10.00, 12.00, 14.00 and 16.00. The analysis confirms that no overshadowing to any of the adjacent properties at 'The Meadows' residential estate is perceived when the Proposed Development will be in place.

Figure 8-87: Overshadowing Analysis on 21st March at 10.00 & 12.00

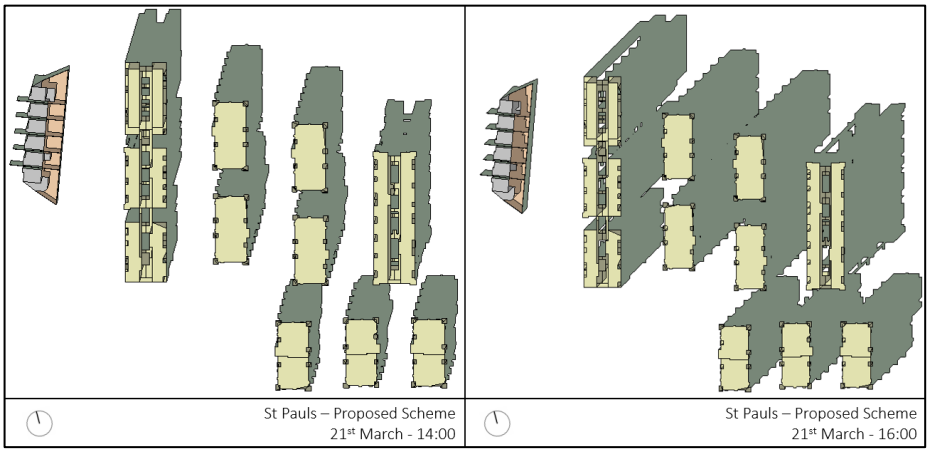

Figure 8-88: Overshadowing Analysis on 21st March at 14.00 & 16.00

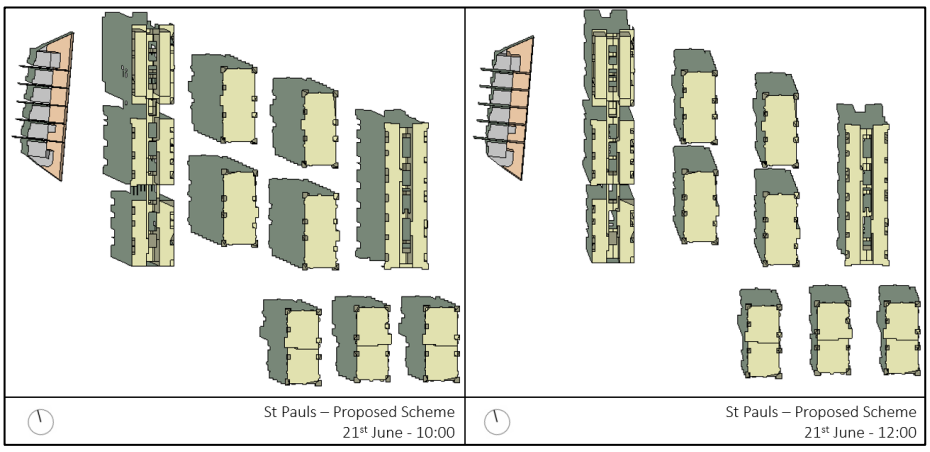

Figure 8-89: Overshadowing Analysis on 21st June at 10.00 & 12.00

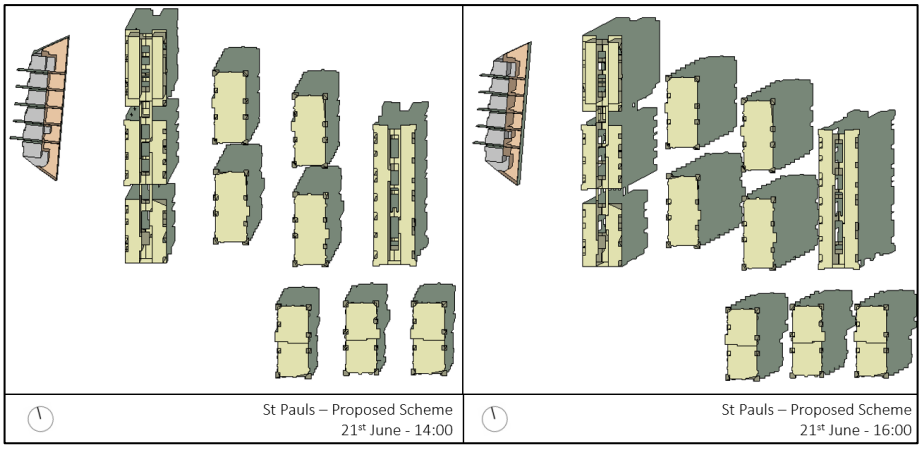

Figure 8-90: Overshadowing Analysis on 21st June at 14.00 & 16.00

Furthermore, the adjacent back gardens of 'The Meadows' residential estate have also been assessed for sunlight access. The red squares in Figure 8-90 below highlight the areas that receive a minimum of 2 no. hours of sunlight on the 21st March. This is based on the current scenario, i.e. the Proposed Development is not in place. It is evident that more than 50% of the back gardens achieve more than 2 no. hours of direct sunlight on March 21st.

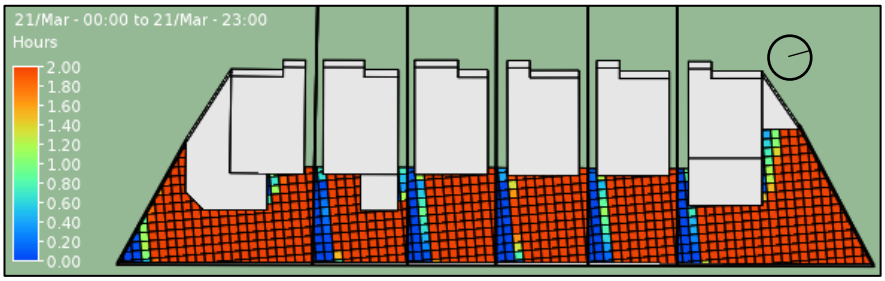

Figure 8-91: 'The Meadows' residential estate Sunlight received on 21st March (No Proposed Development in Place)

The red squares in Figure 8-92 below highlight the areas that receive a minimum of 2 no. hours of sunlight on the 21st March based on the proposed scenario, i.e. with the Proposed Development in place.

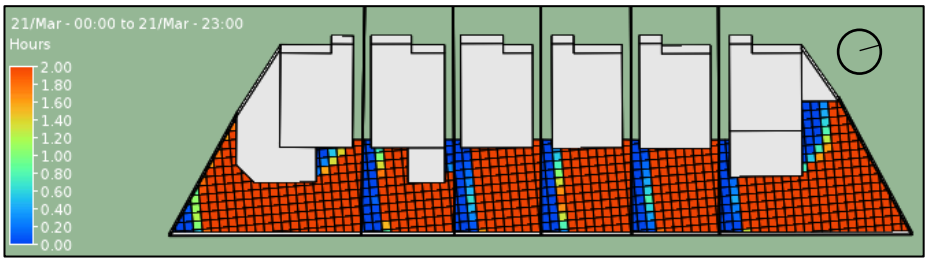

Figure 8-92: 'The Meadows' residential estate Sunlight received on 21st March (Proposed Development in Place)

Even with the Proposed Development in place, the adjacent back gardens at 'The Meadows' residential estate still achieve excellent levels of sunlight, with more than 50% of the gardens still achieving more than 2 no. hours of direct sunlight on March 21st resulting in minimal

change to the existing conditions. The shadow analysis confirms that no overshadowing is perceived to any of the adjacent properties.

8.4.5.3 *Potential Cumulative Impacts*

In the context of sunlight, the longer term cumulative impacts are considered not significant as the sunlight assessment has shown that the vast majority of open spaces provided as part of the Proposed Development comply with the BRE Guide for sunlight both within the Proposed Development and in relation to the adjacent properties.

In relation to the future planning application lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands that was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal, it can be outlined that due to the distance from the proposed development and the south location, imperceptible impact will be received.

8.4.5.4 *"Do-Nothing" Impact*

In a "Do-Nothing" scenario, the existing level of sunlight access to buildings will remain unchanged.

8.4.6 *Avoidance, Remedial and Mitigation Measures*

8.4.6.1 *Construction Phase*

Remedial measures during the Construction Phase in relation to sunlight are not considered to be required.

8.4.6.2 *Operational Phase*

There will be an imperceptible impact with a neutral, long-term effect is expected in relation to the sunlight levels experienced by the future inhabitants of the Proposed Development and to the existing inhabitants of the adjoining sites, therefore no remedial or reductive measures are considered to be required.

8.4.6.3 *'Worst-Case' Scenario*

All amenity areas have been assessed in respect to sunlight and therefore all 'worst-case' scenarios have been presented.

8.4.7 *Residual Impact*

There will be an imperceptible impact with a neutral long-term effects, if any, is expected in relation to the sunlight levels experienced by the future inhabitants of the Proposed Development and to the existing inhabitants of the adjoining sites. No remedial or reductive measures are considered to be required; therefore, it is considered there will be no residual impacts from the Construction Phase in respect of sunlight.

8.4.8 *Monitoring*

8.4.8.1 *Construction Phase*

No on-going monitoring is required in relation to sunlight.

8.4.8.2 *Operational Phase*

No on-going monitoring is required in relation to sunlight.

8.4.9 *Reinstatement*

8.4.9.1 *Construction Phase*

Reinstatement is not pertinent to the assessment of impacts on sunlight in the case of the Proposed Development.

8.4.9.2 *Operational Phase*

Reinstatement is not pertinent to the assessment of impacts on sunlight in the case of the Proposed Development.

8.4.10 *Difficulties encountered in compiling*

No difficulties were encountered in relation to compiling the sunlight impact. OCSC has confidence that the 3D model used in the sunlight assessment for the Proposed Development has a high degree of accuracy.

8.4.11 *References*

Building Research Establishment (BRE) *Guidelines on Site Layout Planning for Daylight and Sunlight*

British Standard BS 8206: Part 2: (BS 8206-02) *Lighting for Buildings. Code of practice for daylight*

Sustainable Urban Housing: *Design Standards for New Apartments Guidelines for Planning Authorities*

EPA 2017 *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports*

9 NOISE & VIBRATION

9.1 Introduction

This Chapter of the EIAR has been prepared by AWN Consulting Limited to identify and assess the potential noise and vibrational impacts associated with the Proposed Development located east of the R808 Sybil Hill Road, Raheny, Dublin 5, during both the Construction and Operational Phases. This Chapter was prepared by Jennifer Harmon BSc, MIOA, Principal Acoustic Consultant, who has over 18 years' experience as an environmental consultant specialising in Acoustics, Impact Assessment and Management.

This Chapter includes a description of the receiving ambient noise climate in the vicinity of the Site, an assessment of the potential noise and vibration impact associated with the Proposed Development during both the short-term Construction Phase and the long-term Operational Phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the Proposed Development is constructed and operated in an environmentally sustainable manner in order to ensure its minimal impact on the receiving noise climate (protected structure, religious institution, adjoining residential areas and, municipal park).

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this Chapter and included in the references section. In addition to specific noise guidance documents, the following guidelines were considered and consulted for the purposes of this Chapter:

- EPA *Guidelines on the Information to be contained in Environmental Impact Statements*, (EPA, 2002);
- EPA *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*, (EPA, 2003);
- EPA *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* Draft August 2017; and
- EPA *Advice Notes for Preparing Environmental Impact Statements*, (Draft, September 2015).

9.2 Study Methodology

The following methodology has been prepared based on the requirements of the Draft EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports,* (2017) and on our experience of preparing the noise & vibration Chapters for similar developments.

The assessment was be undertaken using the following methodology:

- Baseline noise monitoring has been undertaken in the vicinity of the site of the Proposed Development in order to characterise the existing noise environment;

- A review of the most applicable standards and guidelines was be carried out in order to set a range of acceptable noise and vibration criteria for the Construction and Operational Phases of the Proposed Development;

- Predictive calculations relating to Construction Phase impacts will be undertaken at the nearest sensitive locations to the Site in accordance with ISO 9613-2, 1996 *Acoustics – Attenuation of Sound During Propagation Outdoors* and BS 5228 2009 + A1 2014: *Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 1 – Noise & Part 2 – Vibration*;

- Predictive calculations will be performed to assess the potential impacts associated with the operation of the Proposed Development at the most sensitive locations surrounding the Site using guidance from ISO 9613-2, 1996, UK's *Calculation of Road Traffic Noise (CRTN), 1998;* and

- A schedule of mitigation measures and monitoring proposals will be incorporated where required, to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the Proposed Development.

9.2.1 *Significance of Impacts*

The significance of noise and vibration impacts has been assessed in accordance with the Draft EPA Guidelines (2017) and EPA Draft Advice Notes for EIS (2015) see Tables 9.1 to 9.3 below. As these guidelines do not quantify the impacts in decibel terms further reference has been made to the draft '*Guidelines for Noise Impact Assessment*' produced by the Institute of Acoustics / Institute of Environmental Management and Assessment Working Party.

With regard to the quality of the impact, ratings may have positive, neutral or negative applications where:

Table 9-1: Quality of Potential Impacts

Quality of Effects	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment

The significance of an effect on the receiving environment are described in Table 9-3.

Table 9-2: Significance of Effects

Significance of Effects	Description of Potential 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 significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

The duration of effects as described in the Draft EPA Guidelines are outlined in Table 9-3.

Table 9-3: Duration of Effects

Duration of Impact	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

9.2.2 *Relevant Criteria*

9.2.2.1 *Construction Phase – Noise*

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. Dublin City Council (**DCC**) typically controls construction activities by imposing limits on the hours of operation and consider noise limits at their discretion. The following guidance is provided by DCC with respect to construction hours of operation within the *Dublin Agglomeration Noise Action Plan. December 2018 - July 2023 - Volume 1 Dublin City Council*. Section 7.6.1.3 specifically states:

> *"On sites where noise generated by construction would seriously affect residential amenity, the site and building works must be carried out between 0700 and 1800 hours Monday to Friday only, and between 0800 and 1400 hours on Saturdays only. No works shall be carried out on Sundays or bank holidays. However, deviation from these times may be permitted in exceptional circumstances, where prior written approval has been received from Dublin City Council. Such approval may be given subject to conditions pertaining to the particular circumstances being set by Dublin City Council."*

In this instance, all works will be limited between the following periods:

- 07:00 to 18:00 Monday to Friday;
- 08:00 to 14:00 Saturdays; and
- With no activities permitted on Sundays or Bank Holidays.

Whilst no specific construction noise limits are set by DCC with respect to noise, guidance on appropriate construction noise limits and control measures within BS 5228 2009+A1 *2014 Code of practice for noise and vibration control on construction and open sites* – Part 1 *Noise* are the most commonly referred to by the local authority as part of its planning conditions. In this instance, appropriate criteria relating to permissible construction noise levels for the Proposed Development under consideration are taken from this standard.

This document suggests an absolute Construction Phase noise limits depending on the receiving environment. The documents states:

> *"Noise from construction and demolition sites should not exceed the level at which conversations in the nearest building would be difficult with windows shut…. Noise levels between 07:00 and 19:00hrs, outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> - *70dB in rural, suburban and urban areas away from main road traffic and industrial noise; and*
> - *75dB in urban areas near main roads in heavy industrial areas."*

Given the suburban location of the facility, a limit value of 70dB $L_{Aeq,T}$ for construction is considered to be reasonable in order to avoid significant impacts.

9.2.2.2 *Construction Phase – Vibration*

Building Response

In terms of vibration, BS 5228-2:2009+A1:2014 Part 2 *Vibration* recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (*i.e.* non-structural) damage should be taken as a peak component particle velocity (**PPV**) (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis, to use this lower value.

The standard notes 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 groundborne disturbance. Where adjacent buildings with the potential to be more vulnerable than other adjacent modern structures, on a precautionary basis, the guidance values for structurally sound buildings are reduced by 50% in line with the guidance documents referred to above.

Taking the above into consideration the vibration criteria in Table 9-4 below are recommended.

Table 9-4: Recommended Construction Vibration Threshold for Control of Building Damage

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:			
Structurally Sound Buildings	**Less than 15Hz**	**15 to 40Hz**	**40Hz and above**
	15mm/s	20mm/s	50mm/s
Protected Buildings	6mm/s	10mm/s	25mm/s

Source: BS 5228-2 2009 + A1 2014

Human Perception

People are sensitive to vibration stimuli at levels orders of magnitude below those which have the potential to cause any cosmetic damage to buildings. 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 and or the duration of vibration is known. For example, piling can typically be tolerated at vibration levels up to 2.5mm/s if adequate public relations are in place and timeframes are known. These values refer to the day-time periods only.

9.2.2.3 *Operational Phase*

The main potential source of outward noise impact associated with the Proposed Development relates to additional traffic flows on the surrounding road network. Given that traffic from the Proposed Development 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 Development.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 9.5 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source: Design Manual for Roads and Bridges (**DMRB**), 2011).

Table 9-5: Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level (dB A)	Subjective Reaction	DMRB Magnitude of Impact	Impact Guidelines on the Information to be contained in EIAR (EPA)
0	Inaudible	No Impact	Imperceptible
0.1 – 2.9	Barely Perceptible	Negligible	Not Significant
3 – 4.9	Perceptible	Minor	Slight, Moderate
5 – 9.9	Up to a doubling of loudness	Moderate	Significant
10+	Doubling of loudness and above	Major	Very Significant

Source: (DMRB, Volume 11, 2011)

Table 9-5 presents the DMRB (2011) likely impacts associated with change in traffic noise level. The corresponding significance of impact presented in the '*EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EIAR), Draft, August 2017 is presented for consistency in wording and terminology for the assessment of impact significance.

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within BS 8233: 2014: *Guidance on Sound Insulation and Noise Reduction for Buildings.* This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as summarised in Table 9-6 below.

Table 9-6: Recommended Indoor Ambient Noise Levels

Typical situations	Design Range, $L_{Aeq,T}$ dB	
	Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	**Night-time $L_{Aeq,8hr}$ (23:00 to 07:00hrs)**
Living / Dining Rooms	35 / 40	n/a
Bedrooms	35	30

Source: (BS 8233 2014)

For the purposes of this study, it is appropriate to derive external limits based on the internal criteria noted in the paragraph above. This is done by factoring in the degree of noise reduction afforded by a partially open window and typical 15dB attenuation is noted in this British Standard. Using this correction value across an open window, the following external noise levels would achieve the internal noise levels noted in Table 9-6 above.

- Daytime / Evening (07:00 to 23:00 hours) 50 - 55dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00 hours) 45dB $L_{Aeq,15min}$

There are no expected sources of vibration associated with the Operational Phase, therefore, vibration criteria have not been specified for this Phase.

Assessment of Significance

The draft '*Guidelines for Noise Impact Assessment*' produced by the Institute of Acoustics / Institute of Environmental Management and Assessment Working Party have been referenced in relation to the potential impact of changes in the ambient noise levels during the Construction and the Operational Phases of the Proposed Development.

The findings of the Working Party are in draft form at present although they are of some assistance in this assessment. The draft guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise.

The draft '*Guidelines for Noise Impact Assessment'* impact scale adopted in this assessment is shown in Table 9-7 below. The corresponding significance of impact presented in the EPA *Draft Guidelines on Information to be contained in Environmental Impact Statements'* (2017) is also presented.

Table 9-7: Noise Impact Scale

Noise Level Change dB(A)	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIA Report's (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant

Noise Level Change dB(A)	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIA Report's (EPA)
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Very Significant, Profound

Source: (IoA IEMA Guidelines for Noise Impact Assessment)

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise level.

9.3 Characteristics of the Proposed Development

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River. A full description of the Proposed Development is included in Chapter 2 (Project Description & Description of Alternatives).

When considering a development of this nature, the potential noise and vibration impacts on the surroundings are considered for each of two distinct phases, the short-term Construction Phase and the long-term Operational Phase.

During the Construction Phase the main site activities will include, site clearance, demolition of existing buildings, building construction, road works, and landscaping. This phase has the

greatest potential noise and vibration impacts on its surrounding environment, however this phase will be of short-term impact.

During the Operational Phase of the Proposed Development, no significant sources of noise or vibration are expected with the Site. The primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network and any operational plant noise used to serve the ancillary elements within the apartment buildings. Each phase is discussed in turn in the following sections.

9.4 The Existing Receiving Environment (Baseline Situation)

The of the Proposed Development is located off Sybil Hill Road, immediately east of St Paul's College (Secondary School) and Sybil Hill House (a protected structure), in Raheny, Dublin 5. The Site is bound by playing fields and residential dwellings to the north, by St Anne's Park to the south and east and by St Paul's College, Sybil House (a protected structure) and the 'Ardilaun Court' estate to the west. 'The Meadows' residential estate lies to the north-west. The closest noise sensitive locations to the Proposed Development are located along the western boundary including the aforementioned 'The Meadows' residential estate at distance of circa (**c.**) 70m, St Paul's College and Sybil House and St Anne's Park at distances of c. 20-30m.

9.4.1 *Environmental Noise Survey*

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.

Choice of Measurement Locations

Three no. measurement locations were selected as shown in Figure 9.1 and described below.

- **Location N1** is located north-west of the Proposed Development within a green area of the 'The Meadows' residential estate.

- **Location N2** is located north-west of the Proposed Development, on a green area between Sybil Hill House and the recently completed residential apartment building off Sybil Hill Road.

- **Location N3** is located along the south-western boundary of the Proposed Development within the ground of St Paul's College.

Figure 9-1: Baseline Noise Monitoring Locations N1-N3

Survey Periods and Instrumentation

Attended noise measurements were conducted at Locations N1 to N3 between 12:46 to 17:00 on 26 June 2019.

The measurements were made using a Brüel and Kjær Type 2250 Sound Level Meter. Sample periods were 15-minutes. Before and after the survey the measurement instruments were check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

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_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

Survey Results and Discussion

The results of the surveys at the three no. monitoring locations are summarised below.

Location N1

Table 9-8 below presents a summary of noise levels measured at Location N1.

Table 9-8: Baseline Noise Monitoring Results at Location N1

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
13:34	50	73	51	47
14:43	54	67	57	47
16:42	50	70	52	45

During the noise survey, the dominant noise sources were noted to be from road traffic along Sybil Hill Road and from leaf rustle and bird song. Ambient noise levels were measured in the range of 50 to 54dB $L_{Aeq,}$ the higher value being attributed to dog barking in a nearby garden. The background noise was measured in the range of 45 to 47dB L_{A90} with distant traffic being the dominant source noted.

Location N2

Table 9-9 below presents a summary of noise levels measured at Location N2.

Table 9-9: Baseline Noise Monitoring Results at Location N2

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
13:09	47	63	50	44
15:14	49	65	51	45
15:58	47	62	50	42

During the noise survey, the dominant noise sources were noted to be from road traffic along Sybil Hill Road, conversations, aircraft and distant construction activity. Ambient noise levels were measured in the range of 47 to 49dB L_{Aeq}. The background noise was measured in the range of 42 to 45dB L_{A90} with distant traffic being the dominant source noted.

Location N3

Table 9-10 below presents a summary of noise levels measured at Location N3.

Table 9-10: Baseline Noise Monitoring Results at Location N3

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
12:46	50	76	52	45
15:37	57	66	62	48
16:19	50	66	53	46

During the noise survey, the dominant noise sources were noted to be from road traffic along Sybil Hill Road, construction activity within adjacent site, aircraft and bird song. Ambient noise levels were measured in the range of 50 to 57dB $L_{Aeq.}$ The background noise was measured in the range of 45 to 48dB L_{A90} with distant traffic being the dominant source noted.

Baseline Summary

The baseline environment in the vicinity of the Site of the Proposed Development is found to be typical of a suburban environment where road traffic, localised vehicle and pedestrian activities and environmental sources including bird song and leaf rustle are the main contributors to the prevailing noise environment. Whilst an element of construction noise was audible at the monitoring locations from nearby construction works, the contribution of this source to the overall noise levels was minor with road traffic noise being the main continual noise source.

The survey is considered typical of the environment under consideration and the survey undertaken for the duration and periods are a reliable representation of the baseline environment.

9.5 Potential Impact of the Proposed Development

9.5.1 *Construction Phase*

9.5.1.1 *Construction Noise*

A variety of items of plant will be in use for the purposes of Site clearance works. The type and number of equipment will vary between the varying Construction Phases depending on the phasing of the works. There will be vehicular movements to and from the Site that will make use of existing roads. Due to the nature of these activities, there is potential for the generation of elevated levels of noise. The overall Construction Phase will take c. 48 months.

During demolition works of the existing pre-fab buildings, the closest noise sensitive buildings are those within the school campus which are c. 20m - 30m from the closest works. The closest residential dwellings are some 70m from these works. Reference to BS 5288-1 indicates that equipment types used for demolition works (breakers, crushers, excavators etc.) are typically in the range of 80 to 90dB L_{Aeq} at distances of 10m.

The closest noise sensitive locations to the main building works are residential dwellings within ‘The Meadows’ residential estate and ‘Ardilaun Court’ apartment buildings which are at

distances of c. 50m to 150m respectively from Block 1 apartment building. The remainder of works will take place across the Site at varying distances of up to 250m. For site clearance, building construction works and landscaping works (excavators, loaders, dozers, concreting works, mobile cranes, and generators), noise source levels are quoted in the range of 70 to 80dB L_{Aeq} at distances of 10m within BS 5228-1.

Given, the type and number of construction equipment will vary over the course of the Construction Phase, noise levels have been calculated at the closest noise sensitive locations assuming the numbers of plant items and reference noise levels at 10m detailed in Table 9-11 below. For the purpose of the assessment, the existing boundary wall along the western Site boundary has been included in the calculations. The calculations also assume that the equipment will operate for 66% of the working time on any given day.

Table 9-11: Indicative Construction Noise Levels at Nearest Noise Sensitive Locations

Construction Phase	**Items of Construction Plant**	**L_{Aeq} at 10m**	**L_{Aeq} at 20m**	**L_{Aeq} at 70m**
Demolition Works	4	85	76	67
	2	85	73	64
	1	85	70	61
Site Clearance General Construction Landscaping Road Works	**Items of Construction Plant**	**L_{Aeq} at 10m**	**L_{Aeq} at 50m**	**L_{Aeq} at 100m**
	5	80	61	55

The predicted noise levels detailed in Table 9-11 above indicate that during the main Construction Phase including Site clearance, building construction works etc. assuming up to 5 no. items of plant with a sound pressure level of 80dB L_{Aeq} at 10m are operating simultaneously at the closest noise sensitive boundaries, the works can operate within the relevant noise criterion. The potential impact during the Construction Phase will be moderate, with negative short-term effects on a small number of noise sensitive locations.

Given the nature of any construction site, the level of activity will vary depending on the specific Construction Phase, however, the assessment has indicated that with typical levels of site activities during the main Construction Phases, the works can be undertaken within the recommended criterion.

There is potential for the adopted criteria to be exceeded when demolition works are taking place immediately adjacent to St Paul's College with up to 2 no. items of high noise generating plant is operating simultaneously. Given the specific items of plant at any one time is not known in detail at this phase, it is possible for this occur. This phase of the construction works will be undertaken during the enabling works phase which will take place over a period of c. 7months. In the event that demolition works are scheduled during normal school terms and school during hours, there are potential for significant impacts of short-term, intermittent and negative effect in the absence of mitigation measures.

9.5.1.2 *Construction Traffic*

Forecast traffic flows during the Construction Phase have been prepared by ILTP Consulting Engineers as part of the Traffic & Transport Assessment (**TTA**) and Mobility Management Plan which accompanies this planning application. The forecast flows have been used to calculate the potential noise impact on the surrounding road network during the worst-case phase which relates to the bulk earthworks excavation phase. During the remainder of the Construction Phase traffic volumes will be reduced. A total of 7 no. link roads have been assessed as illustrated in Figure 9-2.

The increase in traffic along the surrounding road network during the peak Construction Phase has been used to calculate the change in noise level. Table 9.12 below summarises the calculated increase in noise levels along the link roads assessed using the annual average daily traffic (**AADT**) and percentage of HGV's for the year 2020 with and without construction traffic.

Table 9-12: Construction Traffic Noise Assessment

Location	2020 Do Minimum		2020 Base Plus Construction		Calculated Change in Noise Levels
	Total Vehicles (AADT)	%HGV	Total Vehicles (AADT)	%HGV	
Location 1	12,052	0.5	12,055	0.5	0.0
Location 2	10,152	0.9	10,399	3.2	+2.0
Location 3	13401	0.5	13,408	0.5	0.0
Location 4	6,818	1.0	7,075	4.3	+2.6
Location 5	6,482	1.2	6,505	1.2	0.0
Location 6	4,343	0.7	4,346	0.7	0.0
Location 7	8,456	1.1	8,476	1.1	0.0

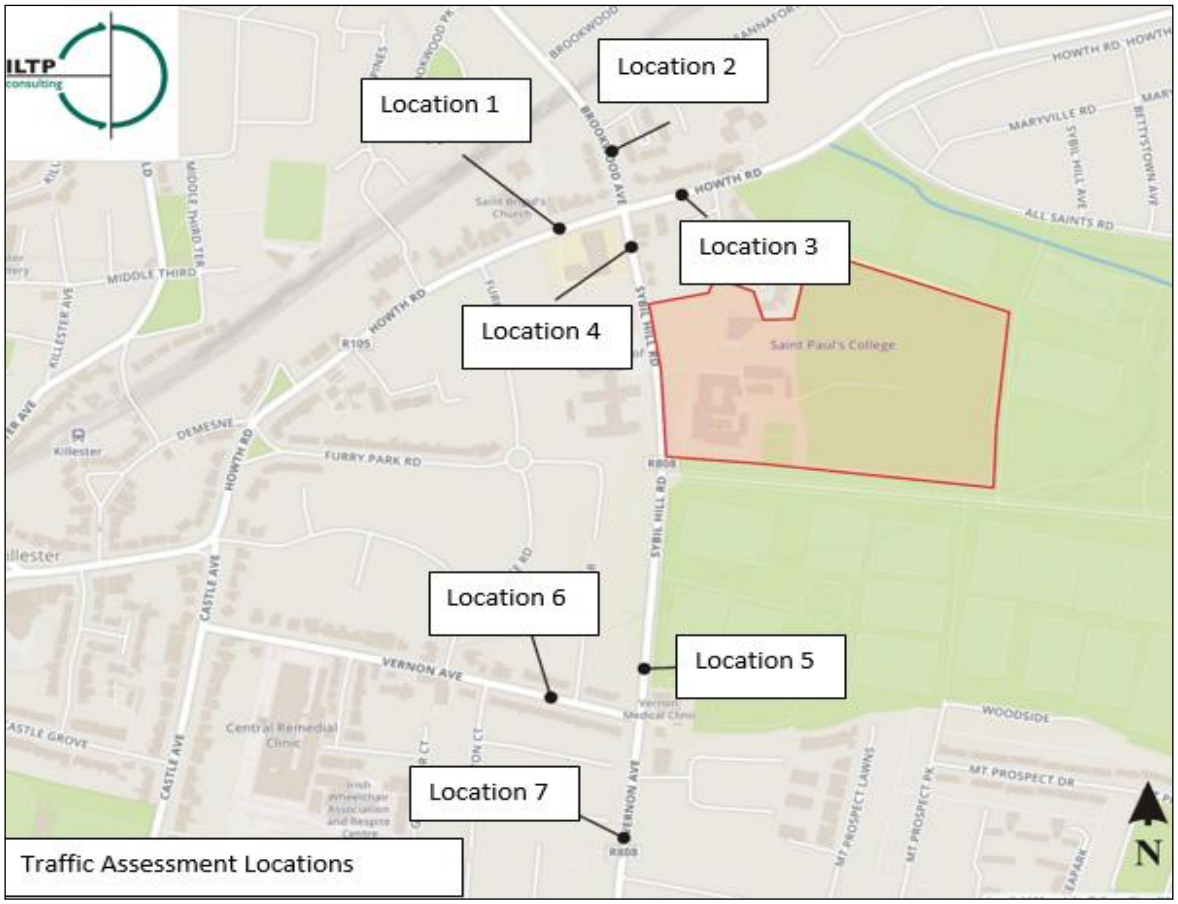

Figure 9-2: Traffic Link Assessment Locations

The assessment has indicated that traffic volume increases will be greatest along Sybil Hill Road turning north and along Brookwood Avenue. The calculated increase in traffic noise along these roads will up to 2.6dB(A) from current levels.

Reference to Table 9-5 confirms that the likely impacts caused by change in noise levels of this magnitude is negligible and therefore not significant, with short-term and neutral effect. During the remaining Construction Phase, HGV volumes will be further reduced and hence no additional noise impacts are predicted.

9.5.1.3 *Construction Vibration*

Potential for vibration impacts during the Construction Phase programme will be limited given the minimal level of ground breaking and excavations required. Piling will to be used for building and basement foundations. For the purposes of this assessment the expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2*: Vibration*, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;

- 0.42mm/s at a distance of 5m, for spinning off, and;
- 0.43mm/s at a distance of 5m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, vibration levels at the nearest buildings will not pose any significance in terms of cosmetic or structural damage. In addition, the range of vibration levels is below a level which would cause any disturbance to occupants of nearby buildings.

In this instance, taking account of the distance to the nearest sensitive off-site buildings, vibration levels at the closest neighbouring buildings will be orders of magnitude below the limits set out in Table 9-4, in Section 9.2.2.2, to avoid any cosmetic damage to buildings. The potential vibration impact during the Construction Phase is imperceptible, with short-term, neutral effects.

9.5.2 *Operational Phase*

During the Operational Phase of the Proposed Development, the potential noise impacts to the surrounding environment are minimal. Given the nature of the Proposed Development under consideration, the range of potential noise sources associated with the Operational Phase are similar to those which form part of the existing environment at neighbouring residential areas (estate vehicle movements, children playing etc.) and hence no significant impact are expected from this area of the Proposed Development.

The main potential noise impact associated with the Proposed Development will relate to the generation of additional traffic to and from the Site as a result of the Proposed Development. Potential noise impacts also relate to operational plant serving the apartment buildings.

Once operational, there are no vibration sources associated with the site of the Proposed Development.

9.5.2.1 *Additional Traffic along Surrounding Roads*

A TTA and Mobility Management Plan prepared by ILTP Consulting included as part of this planning application has been reviewed to inform the noise impact assessment on traffic noise. Information from this report has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding of the Proposed Development. The traffic links assessed are illustrated in Figure 9-2 above.

It should be noted that there is no baseline forecast traffic growth between the year of opening 2022 and the design year of 2039 along the surrounding road network, hence development related flows result in the same impact during both years. Both assessment years include traffic flows associated with the permitted Ardilaun development as part of the “do-nothing” scenario (*i.e.* without the Proposed Development). The Do Something scenario includes the Proposed Development in addition to the proposed St. Paul’s School Sports Hall and Pitches development.

Table 9-13 below summarises the calculated change in noise levels along the assessed road links associated with the addition of the Proposed Development related traffic.

Table 9-13: Operational Traffic Noise Assessment

Location	2022 / 2039 Do-Nothing		2022 / 2039 Base Plus Development		Calculated Change in Noise Levels
	Total Vehicles (AADT)	%HGV	Total Vehicles (AADT)	%HGV	
Location 1	12,052	0.5	12,185	0.5	0.0
Location 2	10,152	0.9	10,449	0.9	+0.1
Location 3	13401	0.5	13,636	0.5	+0.1
Location 4	6,818	1.0	7,533	1.0	+0.4
Location 5	6,482	1.2	7,346	1.2	+0.5
Location 6	4,343	0.7	4,460	0.7	+0.1
Location 7	8,456	1.1	9,203	1.1	+0.4

The assessment has indicated that traffic volume increases are negligible when added to the existing road network. The calculated change in traffic noise is less than 1dB(A) along all link roads in the immediate vicinity of the Proposed Development.

Reference to Table 9-5, in Section 9.2.2.3, confirms that a change in noise level of less than 1dB(A) is negligible and therefore not significant.

In summary, the predicted increase in noise levels associated with the addition of the Proposed Development related traffic along the surrounding road network is an imperceptible impact of long-term, neutral effect.

9.5.2.2 *Mechanical and Electrical Sources*

There are a small number of plant areas included within the Proposed Development within the apartment buildings. All plant rooms serving the apartment buildings are located at basement level adjacent to the car parking areas.

Due to the enclosed nature of the plant room areas below ground level, there are no potential noise impact to the external environment. During the detailed design phase of the Proposed Development, the key noise control considerations from this area of the building will relate to controlling airborne and structure borne noise transfer within the Proposed Development from plant areas. This will be undertaken as part of the building design.

Three no. substations are proposed within the site of the Proposed Development; two no. located to the south-west of Block 1 apartment building and one along the western boundary of Block 7. The closest noise sensitive locations to these structures are the proposed residential units within the site of the Proposed Development. Operational Phase noise levels from small residential sub-stations are low and are well controlled through the sub-station structure. Once the structure is well sealed and designed to control tonal noise emissions, Operational Phase noise levels from these structures are low and do not give rise to any significant noise levels beyond their immediate structure. Given the distance to the nearest noise sensitive properties and assuming the structures are well sealed, noise levels at the nearest noise sensitive locations will be well controlled. During the detailed design phase, Operational Phase noise levels associated with these units will be reviewed to ensure noise

levels at the nearest noise sensitive buildings do not exceed the internal noise levels within Table 9-6, in Section 9.2.2.3.

Considering the above factors, the likely impact from mechanical and electrical services serving the Proposed Development is not significant with long-term, neutral effects

9.5.2.3 *Tenant Amenity Areas*

The tenant amenity spaces will be located within the apartment buildings at ground floor level. There is no expected noise impact associated with these areas to noise sensitive locations outside the development boundary given these areas are internally located within the buildings and the low noise sources associated with these spaces. During the detailed design phase, sound insulation control measures will be suitably incorporated into the building design to control potential noise transfer from amenity areas to residential apartments within the Proposed Development.

Taking into account the above, the likely impact residential amenity areas serving the Proposed Development will be imperceptible, with long-term, neutral effects.

9.5.3 *Potential Cumulative Impacts*

Traffic volumes associated with the Operational Phase assessed within this Chapter take account of the operation of the Ardilaun residential development to the north-west of the development site off Sybil Hill Road (Reg. Ref. 3383/14, construction currently being completed) in addition to traffic associated with St. Paul's School Sports Hall and Pitches development to the south of the site on the adjoining St. Paul's lands which forms part of a separate planning application (Currently under appeal to An Bord Pleanála (DCC Ref. 3177/17, ABP-301482-18).

Cumulative noise impacts associated with the traffic generated from other developments in the surrounding environment have therefore been assessed within this Chapter. The impact has been determined to be negligible and not significant.

The St. Paul's School Sports Hall and Pitches development to the south of the site of the Proposed Development, referred to above will be used predominantly by St Paul's College. Whilst there will be sporting activity on these pitches, the closest noise sensitive receptor to the pitches is the school campus itself. Given the use of the adjacent St Anne's Park for regular sporting activities and informal playing pitches, the development and use of the proposed new playing pitches are not expected to generate any significant noise impact over and above those experienced in the surrounding environment.

The likely overall impact is deemed to be not significant, with long-term neutral effects.

9.5.4 *''Do-Nothing'' Impact*

In the absence of the Proposed Development being constructed, the noise environment at the nearest noise sensitive locations and within the site of the Proposed Development will remain unchanged. The noise levels recorded during the baseline noise environment are considered representative of the "do-nothing" scenario.

9.6 Avoidance, Remedial & Mitigation Measures

9.6.1 *Construction Phase*

Best practice noise and vibration control measures will be employed by the appointed Contractor during the Construction Phase in order to avoid significant impacts at the nearest sensitive buildings. The Construction Environmental Management Plan (**CEMP**) will set out the key control measures for noise and vibration during this phase. The best practice measures set out in BS 5228 (2009 + A1 2014) Parts 1 and 2 will be complied with which are set out below and also outlined in the CEMP. This 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.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring. This will be specifically required to protect during any high noise activities during demolition works in proximity to St Paul's College if works are occurring during term-time.

9.6.1.1 *Selection of Quiet Plant*

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the Site. The least noisy item should be selected wherever possible. Should a particular item of plant already on 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.

9.6.1.2 *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 key noise generating sources during the Construction Phase, the following best practice migration measures should be considered:

- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant should be switched off when not in use and not left

idling.

- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.

- For percussive tools such as concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.

- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.

- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.

- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.

- All items of plant should 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.

9.6.1.3 *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. Standard construction site hoarding with a mass per unit of surface area greater than 7kg/m^2 can provide adequate sound insulation. Construction site hoarding will be required around the Site boundary during demolition and excavation phases along the west, northern and southern boundaries.

9.6.1.4 *Liaison with the Public*

A designated noise liaison officer will be appointed to the Site during the Construction Phase. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

9.6.1.5 *Project Programme*

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling or breaking works are in progress on-site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities.

9.6.2 *Operational Phase*

During the Operational Phase of the Proposed Development, noise mitigation measures with respect to the outward impact of the Proposed Development are not deemed necessary.

9.6.3 *'Worst-Case' Scenario*

In terms of potential noise and vibration impacts, the assessment has considered a range of worst-case scenarios to determine the potential impacts of the Proposed Development.

During the Construction Phase, a range of worst-case scenarios have been assessed assuming all plant items are operating along the closest noise sensitive boundaries. The assessment has determined impacts associated with these scenarios can be controlled through the best practice measures outlined in Section 9.6.1. Construction traffic noise calculations have been undertaken for the worst-case peak Construction Phase (i.e. bulk excavation). The assessment has determined the resultant impact is not significant.

During the Operational Phase, traffic noise calculations along the surrounding road network incorporate a range of worst-case scenarios to include the various committed developments in the area. The assessment has determined the resultant impact is not significant.

9.7 Residual Impacts

9.7.1 *Construction Phase*

During the Construction Phase of the Proposed Development there is the potential for some minor to moderate impact on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum.

The residual likely impact of the Proposed Development during the Construction Phase will be of short-term minor to moderate impact[12], therefore of not significant to significant impact with short-term negative effects[13].

9.7.2 *Operational Phase*

The predicted noise level associated with additional traffic is predicted to be of insignificant impact along the existing road network. In the context of the existing noise environment, the overall contribution of traffic is not considered to pose any significant impact to nearby residential locations. It can be concluded that, once operational, noise levels associated with the Proposed Development will not contribute any significant noise impact to its surrounding environment.

The resulting likely impact of **traffic** additional along the surrounding road network is not significant with long-term neutral effects.

[12] Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)

[13] EPA Draft Guidelines 2017

The likely impact from **mechanical and electrical services** serving the Proposed Development will be not significant with long-term neutral effects.

The likely impact **tenant amenity** areas serving the Proposed Development will be imperceptible with long-term neutral effects.

9.8 Monitoring

9.8.1 *Construction Phase*

The appointed Contractor will be required to ensure construction activities operate within the noise limits set out in Section 9.2.1 of this EIAR. The appointed Contractor will be required to undertake regular noise 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*.

9.8.2 *Operational Phase*

Noise or vibration monitoring is not required once the Proposed Development is operational.

9.9 Reinstatement

9.9.1 *Construction Phase*

Not applicable

9.9.2 *Operational Phase*

Not applicable

9.10 Interactions

In compiling this impact assessment, reference has been made to the Proposed Development description provided by the project co-ordinators, project drawings provided by the project architects and traffic flow projections associated with the Proposed Development provided by the traffic consultants.

The Chapter 12 (Material Assets) has considered the impacts of human health including noise taking into account the various potential sources and effects set out in this EIAR.

9.11 Difficulties Encountered in Compiling

No difficulties were encountered in the preparation of this Chapter.

9.12 References

Dublin Agglomeration Noise Action Plan. December 2018 – July 2023 – Volume 1 Dublin City Council.

EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002);

EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003);

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017);

EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);

BS 5228-1:2009+A1:*2014 Code of practice for noise and vibration control on construction and open sites – Part 1 – Noise*.

BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration.*

BS 7385-2:1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration;*

BS 8233: 2014: *Guidance on Sound Insulation and Noise Reduction for Buildings.*

BS 4142: 2014: *Methods for Rating and Assessing Industrial and Commercial Sound*;

DMRB, *Volume 11 environmental assessment section 3 environmental assessment techniques Part 7 hD 213/11 – revision 1 noise and vibration*

ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise.*

ISO 9613-2: 1996: *Acoustics – Attenuation of sound during propagation outdoors.*

Transport Infrastructure Ireland. (TII). (2004) *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*.

TII. (2014) *Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes*.

UK`s Department of Transport. (1988) *Calculation of Road Traffic Noise (CRTN)*.

10 LANDSCAPE AND VISUAL ASSESSMENT

10.1 Introduction

This Chapter provides an assessment of the likely significant landscape and visual effects of the Proposed Development located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School), Sybil Hill House (a protected structure) and 'The Meadows' residential estate, in Raheny, Dublin 5. The R808 Sybil Hill Road runs north-south connecting the R105 Howth Road (north of the Proposed Development) with the R807 Clontarf Road (to the south).

This Chapter of the EIAR has been prepared by Thomas Burns, Partner and Landscape & Environmental Planner with Brady Shipman Martin. Thomas has over 30 years' experience in the preparation of landscape and environmental planning assessments.

10.2 Study Methodology

10.2.1 *Introduction*

The assessment has been undertaken with regard to the relevant guidelines for landscape and visual assessment, including:

- Draft Environmental Protection Agency (**EPA**) Guidelines on the *Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017).
- Draft EPA *Advice Notes for Preparing Environmental Impact Statements* (EPA, 2015).
- The *Landscape Institute / Institute of Environmental Management and Assessment* (2013). Guidelines for Landscape and Visual Impact Assessment (3rd Edition).

The assessment involved:

- A review of plans, sections, elevations of the Proposed Development;
- An analysis of survey mapping and aerial photography;
- Visits to the Site and surrounding areas to determine visibility to and from the Site;
- A review of landscape planning policies and objectives and other relevant documentation in order to ascertain the landscape and visual significance and sensitivity of the Site; and
- A review of other chapters of this Environmental Impact Assessment Report (**EIAR**).

Landscape impacts are associated with changes to the character of the landscape that arise from the insertion of the Proposed Development into the existing context, and have two distinct but closely related influences. The first influence, 'visual impact', relates to the degree to which a development impinges on a view with or without blocking it.

The second influence, is ‘impact on ‘character’ relates to the change in the structure of the landscape from the insertion of a Proposed Development into the environment.

10.2.2 *Sources of Information*

The primary sources of information are:

- Dublin City Development Plan 2016-2022 (**DCDP**): Written Statement and associated Appendices and Maps.
- Dublin City Parks Strategy.
- Ordnance Survey mapping and aerial photography.
- The landscape itself, as assessed visits to the Site and surrounding areas.
- Other Chapters of the EIAR, particularly Chapter 2 (Project Description & Description of Alternatives); Chapter 5 (Biodiversity); Chapter 7 (Hydrology, Water & Hydrogeology); and Chapter 11 (Archaeology, Cultural & Architectural Heritage).

10.2.3 *Field Monitoring / Review*

Site visits were undertaken (in February, April and July 2015, March, April and June 2016, November and December 2017 and in March, May and August 2019) to assess:

- the physical nature and condition of the Site and its surrounds;
- the extent and nature of views to and from the Site;
- the extent of visibility of the Site within its setting;
- the presence of screening topography and / or vegetation; and
- the general characteristics of the landscape.

The landscape and visual assessment also entailed:

- undertaking a desktop study of the location and context of the Site in 2019, with particular focus on its local and wider significance, reviewing the development plan for landscape and visual aspects, such as protected views, landscape features, trees, *etc*., and studying ordnance mapping and aerial photography of the area;
- reviewing architectural and engineering proposals on an on-going basis;
- reviewing the findings of the tree survey (refer to separate Arboricultural Assessment Report and Tree Constraints Plan, which accompanies this planning application); and
- reviewing the Photomontages prepared for the Proposed Development (Appendix 10.1 to this EIAR).

10.2.4 *Photomontages*

Photomontages (*i.e.* Accurate Visual Representations) have been prepared in order to represent the physical and visual nature of the Proposed Development and to assist in describing the likely visual impact. Thirteen locations in the surrounding area were selected as being representative of the views in the surrounding area toward the Site / the Proposed Development (refer to Figure 10.0 in Appendix 10.1 for location plan and views). The locations selected are from:

- **View 1:** Sybil Hill Road at proposed new site entrance;
- **View 2:** Open space opposite Sybil Hill Road entrance to St Anne's Park;
- **View 3:** Southern boundary of St Anne's Park at boundary with Mount Prospect Lawns;
- **View 4:** Southern boundary of St Anne's Park at boundary with Woodside;
- **View 5:** South eastern corner of flood-lit playing fields adjoining Mount Prospect Avenue;
- **View 6:** St Anne's Rose Garden;
- **View 7:** Playing fields adjacent to St Anne's Tennis Club and along the Naniken River;
- **View 8:** Public road at No. 40 All Saints Road;
- **View 9:** St Anne's Park Avenue looking east towards the Proposed Development;
- **View 10:** St Anne's Park Avenue looking north-west towards the Proposed Development;
- **View 11:** Open space at 'The Meadows';
- **View 12:** Entrance to Sybil Hill House; and
- **View 13:** Grounds of Sybil Hill House.

In each instance the '*As Existing'* and '*As Proposed'* version of the view is presented. The views include a selection of summer and winter-time views. Where the Proposed Development is not visible in the view, the outline of the Proposed Development is shown in a red line for reference.

The Accurate Visual Representations were generated by Brady Shipman Martin using a range of photography, topographical surveying, mapping and three-dimensional (3D) modelling and rendering procedures, including calibrated cameras and surveying equipment for on-site data collection, AutoCAD / Microstation CAD software for mapping, 3D modelling, and rendering images to match baseline photographs. Interim and final images are assembled in Adobe Photoshop using survey reference data. The process is ISO[14] accredited, is highly accurate,

[14] International Organisation for Standardisation

and incorporates self-checking routines which highlight any discrepancies, which are reviewed and resolved.

10.2.5 *Description of Effects*

The landscape and visual impact assessment for the Proposed Development takes account of the character and nature of the existing Site and its surrounds, the location of sensitive landscapes and visual receptors, the sensitivity and significance of the Site, and its vulnerability to change.

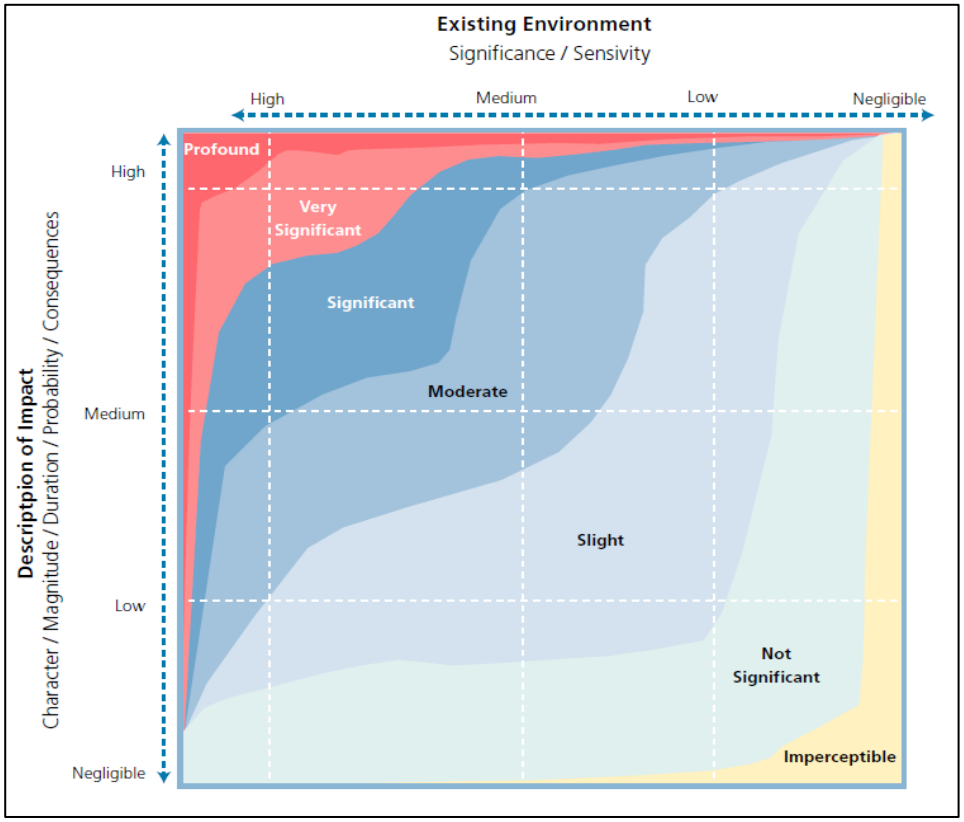

Figure 10-1: Classification of Significance of Effects (Impacts) (Source EPA, 2017)

The characteristics of the impact assessment utilised is based on the Draft *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017) as outlined in Figure 10-1 and Tables 10-1 to 10-3 below. Figure 10-1 shows how the comparison of the character of the predicted impact to the sensitivity of the receiving environment can determine the significance of the impact.

Table 10-1 below outlines the definitions of significance of effect of the Proposed Development on the environment ranging from imperceptible to profound.

Table 10-1: Definitions of Significance of Effects

Significance	Definition
Imperceptible	An effect capable of measurement but without significant consequences. *e.g. the proposal is either not visible or well-screened.*
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences. *e.g. the proposal may be partly visible but the changes will not negatively alter the existing landscape / view.*
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. e.g. *the proposal will be partly visible but the changes will not negative alter any sensitive aspect of the existing landscape / view.*
Moderate	An effect that alters the character of the environment in a manner that is consistent with the existing and emerging trends. e.g. *the proposal will be partly visible but changes to the landscape / view will be in-keeping with existing changes built or otherwise already occurring within the environment.*
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. e.g*. the proposal will be openly visible with little or no screening and will reduce the quality of the existing view and / or landscape.*
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. e.g*. the proposal will be openly visible with little or no screening and will substantially alter the sensitive quality of the existing view and / or landscape.*
Profound	An effect which obliterates sensitive characteristics. e.g. *the proposal will entirely dominate the view; obstruct the view or substantially alter a protected aspect, such as protected trees, designated views or prospects or an area of high amenity*.

Table 10-2 below defines the quality of effect of the Proposed Development on the environment ranging from positive to negative.

Table 10-2: Quality of Effect

Type of Effect	Quality of Effect
Positive	A change that improves the quality of the environment e.g. *will enhance the existing view / landscape.*
Neutral	A change that does not affect the quality of the environment e.g. *will neither detract from nor enhance the existing view / landscape.*
Negative	A change that reduces the quality of the environment

Type of Effect	Quality of Effect
	e.g. *will detract from the existing view / landscape.*

Table 10-3 below discusses the duration of effects. Temporary effects lasting from one year or less will often be less concerning than a long-term and permanent effects, depending on their severity.

Table 10-3: Duration of Effects

Duration	Description
Temporary	Lasting less than one year
Short-term	Lasting one to seven years
Medium-term	Lasting seven to fifteen years
Long-term	Lasting fifteen to sixty years
Permanent	Lasting over sixty years

10.3 Characteristics of the Proposed Development

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, residential tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas.

Landscape works will include extensive semi-private communal amenity areas, and a significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded access to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of the existing pedestrian bridge crossing in St Anne's Park with integral surface water discharge to Naniken River.

A full description of the Proposed Development is set out in Chapter 2 '*Project Description & Description of Alternatives'*.

The site of the Proposed Development is enclosed by:

(i) the grounds of St Anne's Park to the north, east and south;

(ii) the sportsgrounds of St Paul's College to the south; and

(iii) St Paul's College, Sybil Hill House and residential development at 'The Meadows' to the west.

The Convent building / grounds of the 'Little Sisters of the Poor' is located to the immediate west of Sybil Hill Road.

The principal characteristics of relevance to the landscape and visual assessment include:

- demolition an existing pre-fab building to the northeast of St Paul's College;
- removal of 25 no. trees and small areas of trees, as follows:
    - 1 no. tree in poor condition on Sybil Hill Road for the widening of the existing entrance;
    - 13 no. trees, and the southern end of a tree-line located between Sybil Hill House and St Paul's College, for the construction of the access road;
    - 7 no. trees located to the rear of 'The Meadows' residential estate, which are in very poor condition and recommended for removal in the Arboricultural Assessment Report;
    - 2 no. decapitated small tree stumps at the south-east corner of the Site (within St Anne's Park) to facilitate provision of a new access to the Park;
    - a small section of young Holm Oak planting (circa (**c**.) 4 / 5 trees) at the north-east corner of the Site (within St Anne's Park) to facilitate provision of a surface water outfall;
- widening and realignment of the existing vehicular access onto Sybil Hill Road, to facilitate the construction of an access road with footpaths, on-road cycle tracks and new boundary wall and railings. The new access will also serve Sybil Hill House to the north and St Paul's College to the south;
- a proposed pedestrian crossing on Sybil Hill Road; and a brick and railing boundary between the new road and Sybil Hill House to the north and St Paul's College to the south;
- 9 no. residential apartment blocks, ranging in height from 5 storeys to 9 storeys, accommodating 657 no. apartments;
- landscape podium over basement car parking spaces beneath Blocks 1 to 6;
- provision of associated tenant amenity spaces, a crèche, bike parking and visitor car parking spaces, sub-stations, lighting, *etc*. at surface level;
- provision of public open space adjoining St Anne's Park Avenue. The public open space is to be offered to DCC for taking-in-charge;

- provision of semi-private open space and other landscape areas as amenity and setting for the residential scheme;

- the landscape layout includes for potential pedestrian / cycle access points to St Anne's Park;

- provision of sports fencing along the boundary with St Paul's College sportsgrounds; and

- provision of surface water attenuation facilities, including the routing of the surface water discharge from the north-east corner of the Site via St Anne's Park to the Naniken River and the reconstruction of existing bridge crossing in St Anne's Park with integral surface water discharge to Naniken River.

10.4 The Existing Receiving Environment (Baseline Situation)

10.4.1 *Site Context*

The site of the Proposed Development is located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School) and Sybil Hill House (a protected structure), in Raheny, Dublin 5, see Figure 10-2 below. The site of the Proposed Development is enclosed by the grounds of St Anne's Park to the north, east, and south; by the sportsgrounds of St Paul's College to the south; and to the west by St Paul's College, Sybil Hill House and 'The Meadows' residential estate. A recently completed part 6-storey residential development 'Ardilaun Court' is located to the west of The Meadows. The 4 & 5 storey Convent building / grounds of the Little Sisters of the Poor is located to the immediate west of Sybil Hill Road.

10.4.1.1 *St Anne's Park*

At c.110 hectares (**ha**), St Anne's Park is an extensive high-quality parkland and a major amenity and public open space in the north-east of the Dublin City, see Figure 10-2. The Park extends from its entrance off Sybil Hill Road in the west to the coast at Dollymount in the east. Established residential estates lie to the north and south of the Park.

St Anne's Park sits on an earlier designed parkland landscape and its central tree-lined avenue is a key structural element in the landscape. On either side of the avenue, the Park is laid out in a series of large '*landscape rooms'* enclosed by mature tree belts. Some of these '*rooms*' are used as playing pitches (including some with floodlighting), while others include a Millennium Arboretum, the Rose Garden, a pitch and putt course, tennis club, an all-weather floodlit pitch as well as amenity parklands, a playground and a pond, see Figure 10-2 below. While the ruin of main house was demolished in 1968, retained structures at the eastern end of the Park, including the Red Stables, provide a central focus and location for activities, markets, gallery space, eating, *etc*.

10.4.1.2 *St Anne's Park - Avenue*

The c. 1.5km long, straight tree-lined avenue is a striking feature and the mature Holm Oak, Corsican and Monterey Pine trees are part of the distinctive character and identity of the Park,

see Photoview Plates 10.1, & 10.2 (Section 10.4.3). The western end of the avenue, part of which only dates from the 1950s, adjoins the southern boundary of the Site and of St Paul's College.

The majority of the Site boundary with St Anne's Park is defined by a 2.4m high steel mesh green fence, backed by a dense belt of planting (on the park side). This planting consists of young holm oak and mixed deciduous trees (5-8m high) on the eastern boundary and a substantial mixed deciduous woodland belt on the northern boundary. Part of the Park boundary of the wider open field is defined by a high wall – which may have formed one side of a former wall garden.

10.4.1.3 *Sybil Hill House*

Sybil Hill House, a protected structure, is located to the north of the proposed new access road and west of the Site of the Proposed Development, see Figure 10-2. Sybil Hill House has a defined landscape / garden front to the west with mature trees. Modern extensions and other buildings lie to the east (rear) of the house and the eastern boundary, with the Site, is defined by a high stone wall. A stone-faced 'Ha-Ha' style feature lies to the south of the house - beyond which are the grounds and parking areas associated with the red brick structure of St Paul's College, see Figure 10-2. 'The Meadows' residential estate, and a recently completed residential development 'Ardilaun Court', lie to the north of the Sybil Hill House, see Figure 10-2 below.

10.4.1.4 *St Paul's College*

St Paul's College (Secondary School) lies to the south of Sybil Hill House and north of western entrance gates to St Anne's Park Avenue, see Figure 10-2 and Photoview Plates 10.9 and 10.10, (Section 10.4.3). St Paul's College has a sportsgrounds / playing pitch east of the school buildings and within the south-eastern part of the large relatively square field. The remainder of the large field, which comprises the main area of the Site, is under rough grassland. An application for permission to further develop the St Paul's College sportsgrounds, which includes demolition of three (3) no. existing school structures and construction of a sports hall and all-weather floodlit pitches, is currently on appeal to An Bord Pleanála (Dublin City Council ref. no.: 3777/17; An Bord Pleanála ref. no.: ABP-301482-18).

10.4.1.5 *'The Meadows' and 'Ardilaun Court'*

'The Meadows' is an established residential estate of 26 no. two-storey houses located to the north of Sybil Hill House and the west of the Proposed Development (refer to Figure 10-2 and See Photoview Plate 10.5, (Section 10.4.3)). Houses No.9 to16 back onto the stone wall which defines their boundary with the site of the Proposed Development. A line of mature trees are located on the Site close to the boundary wall with 'The Meadows' residential estate, see Photoview Plate 10.4, (Section 10.4.3).

'Ardilaun Court' is a recently completed development of houses and apartments off Sybil Hill Road, see Figure 10-2. The development, which includes a part 6 storey apartment block, is located to the immediate west of 'The Meadows' residential estate and north-west of Sybil Hill House, see Photoview Plate 10.13 (Section 10.4.3).

10.4.2 *Site Description*

The Site of the Proposed Development is located to the immediate east of St Paul's College, Sybil Hill House and 'The Meadows' residential estate. The site also includes a narrow area of land between St Paul's College and Sybil Hill House across which it is to facilitate the construction of a new access road, see Photoview Plate 10.7 (Section 10.4.3). Works are also proposed along a short stretch of the tree-lined Sybil Hill Road and a c.110m long surface water outfall will cross open grassland in St Anne's Park to a discharge location on the Naniken River. There is a concrete pedestrian bridge crossing the river at the discharge location which is also enclosed by semi-mature trees, see Photoview Plate 10.6 (Section 10.4.3). It is proposed to reconstruct this existing bridge with an integral surface water discharge to Naniken River.

The site comprises an open rough grassland field located to the north and east of the sportsground at St Paul's College, see Photoview Plate 10.5 (Section 10.4.3). While the area appears relatively flat, there is a slight fall of around 4m from north-west to south-east. The western boundary of the Site is enclosed in part by the sportsgrounds / floodlit pitch of St Paul's College, and in part by the eastern rear boundary wall of Sybil Hill House and in part by the rear boundary wall at 'The Meadows' residential estate.

St Anne's Park lies to the north, east and south of the Site, however, it is physically and visually separated from St Anne's Park by boundary fencing and dense tree planting see Photoview Plate 10.5 (Section 10.4.3). A short section just north of the boundary of the field, within which the site is located, is defined by a high wall which is a possible remnant of a walled garden, associated with a former property known as Maryville. To the north and east the boundary fence is backed by a belt of semi-mature planting located within St Anne's Park. The planting is dense and effectively screens out views between the Site and the Park.

The southern boundary with St Anne's Park runs contiguous with part of the distinctive Holm Oak and Pine tree-lined Avenue, see Photoview Plates 10.1, & 10.2 (Section 10.4.3). While views are focused and aligned along the Avenue and its enclosure of mature trees, passing glimpsed views of the Site are available under, and occasionally between, the canopies of the evergreen trees, see Photoview Plate 10.3 (Section 10.4.3).

The boundary between St Paul's College and Sybil Hill House is partly defined by a semi-mature line of 7 no. cherry trees, see Photoview Plate 10.7 (Section 10.4.3). A 'Ha-Ha' style feature in the lawn, see Photoview Plate 10.8 (Section 10.4.3), defines a more distinct boundary in the landscape, as do groups of mature trees to the south and west of Sybil Hill House.

'Ardilaun Court', a recently completed residential development, lies to the immediate north of Sybil Hill House, see Photoview Plate 10.8 (Section 10.4.3), and to the west of 'The Meadows' residential estate.

As noted, the Site of the Proposed Development comprises an open relatively flat rough grassland field. In the north-west of the Site a stand of 20 no. mature trees form a prominent feature to the east / rear of 'The Meadows' residential estate, see Photoview Plate 10.4 (Section 10.4.3). The Arboricultural Assessment Report, which accompanies this planning application indicates that the trees are predominantly sycamore and pine, with some horse

chestnut and lime. The majority of the trees are in poor condition and 7 no. are recommended for removal, due to their very poor condition.

Otherwise, there are no other mature trees within the main development area, however, the area is surrounded and enclosed to the north, east and south, by mature plantings / trees within St Anne's Park, see Figure 10.2 and Photoview Plate 10.5 (Section 10.4.3).

The significant regional amenity and conservation area of St Anne's Park encircles the Site to the immediate north, east and south. The Park includes a distinctive tree-lined Avenue located directly south of the Site, see Photoview Plates 10.1, & 10.2 (Section 10.4.3), as well as a variety of open spaces enclosed by mature tree belts and laid out to sports pitches. Some of the pitches are floodlit and a new all-weather facility has been installed to the north of the Park. A Millennium Arboretum plantation is located immediately east of the Site and north of the Avenue. The central core of the Park, including the Rose Garden, the Red Stables and the playground are all located c. 500m to the east of the Site. There are no views to the Site from these areas due to distance, lower elevation and the extent and maturity of intervening, primarily evergreen tree planting.

Residential estates, including All Saints Road (see Photoview Plate 10.15 (Section 10.4.3)), Howth Road, Furry Park, Vernon, and Mount Pleasant lie to the immediate north, west and south of St Anne's Park / Sybil Hill Road. There are no views of the Site from these areas due to distance and the extent and maturity of intervening, tree and woodland planting.

The prominent 4 & 5 storey nursing home / Convent of the Little Sisters of the Poor is located immediately west of Sybil Hill Road, see Photoview Plate 10.11 (Section 10.4.3). While there are some views from here to the existing entrance (see Photoview Plate 10.12 (Section 10.4.3)), and to Sybil Hill House, there are no views of the main development area due to intervening built environment and mature planting.

The photograph plates (Photoviews) referenced above are provided in Section 10.4.3 and the location of the viewpoints are shown on Figure 10-3 below.

Figure 10-2: Site and Immediate Context (Source: annotated Google Map)

10.1.1 Photoview Plates (See Plate 10.3 for location of Views)

Plate 10.1 - Entrance from Sybil Hill Road to St Anne's Park and view along Avenue, looking east

Plate 10.2 - View east along Avenue with southern boundary of St Paul's College and site to left (north)

Plate 10.3 - Example of more open view under trees on the Avenue

Plate 10.4 - Mature trees on site to rear of 'The Meadows' residential estate

Plate 10.5 Site with mature dense tree planting on northern and eastern site boundaries with St Anne's Park

Plate 10.6 – Existing concrete and metal railing bridge over Naniken River

Plate 10.7 - View east along existing access to Sybil Hill House / St Paul's College. (New access road follows line of existing access road and passes through line of cherry trees in centre of image)

Plate 10.8 - Sybil Hill House with 'Ardilaun Court' to north

Plate 10.9 - St Paul's College

Plate 10.10 - Sybil Hill Road adjoining St Paul's College

Plate 10.11 - The Convent of the Little Sisters of the Poor

Plate 10.12 – Existing entrance to Sybil Hill House and St Paul's College

Plate 10.13 – ‘Ardilaun Court’ on Sybil Hill Road

Plate 10.14 – ‘The Meadows’ residential estate

Plate 10.15 – View along All Saints Road

10.4.3 *Landscape Planning Context*

10.4.3.1 *Dublin City Development Plan 2016-2022 (DCDP)*

The Site of the Proposed Development is located in the northern suburbs of Dublin City. The DCDP sets out policies and objectives in relation to proper planning and development of the City, including the area pertaining to the Site and its surrounds. References of relevance to the landscape and visual environment are set out in the following.

The Site of the Proposed Development, together with the lands of Sybil Hill House and of St Paul's College, all of which are located east of Sybil Hill Road, are zoned Z15 (see Figure 10-3): "*To protect and provide for institutional and community uses and to ensure that existing amenities are protected*."

Lands associated with the Convent of the Little Sisters of the Poor and St. Brigid's School, located west of Sybil Hill Road, are also zoned Z15, see Figure 10-3.

The lands surrounding the Site include Z9 zoning at St Anne's Park to the immediate north, east and south of the Site (see Figure 10-3): *"To preserve, provide and improve recreational amenity and open space and green works."*

Objective Z1 residential zoned lands are located north and south of St Anne's Park and west of the Convent lands are zoned Z1: *"To protect, provide and improve residential amenities."*

Sybil Hill House, a protected structure, is identified as Reference No. 7910 in "*The Record of Protected Structures".*

St Anne's Park is designated as a Conservation Area and Policy CHC4 (Chapter 11, DCDP) sets out the planning authority's considerations in relation to enhancing and protecting such areas generally. Dublin City Council (**DCC**) has also published its Dublin City Parks Strategy and this document highlights St Anne's Park as a historic Flagship Park.

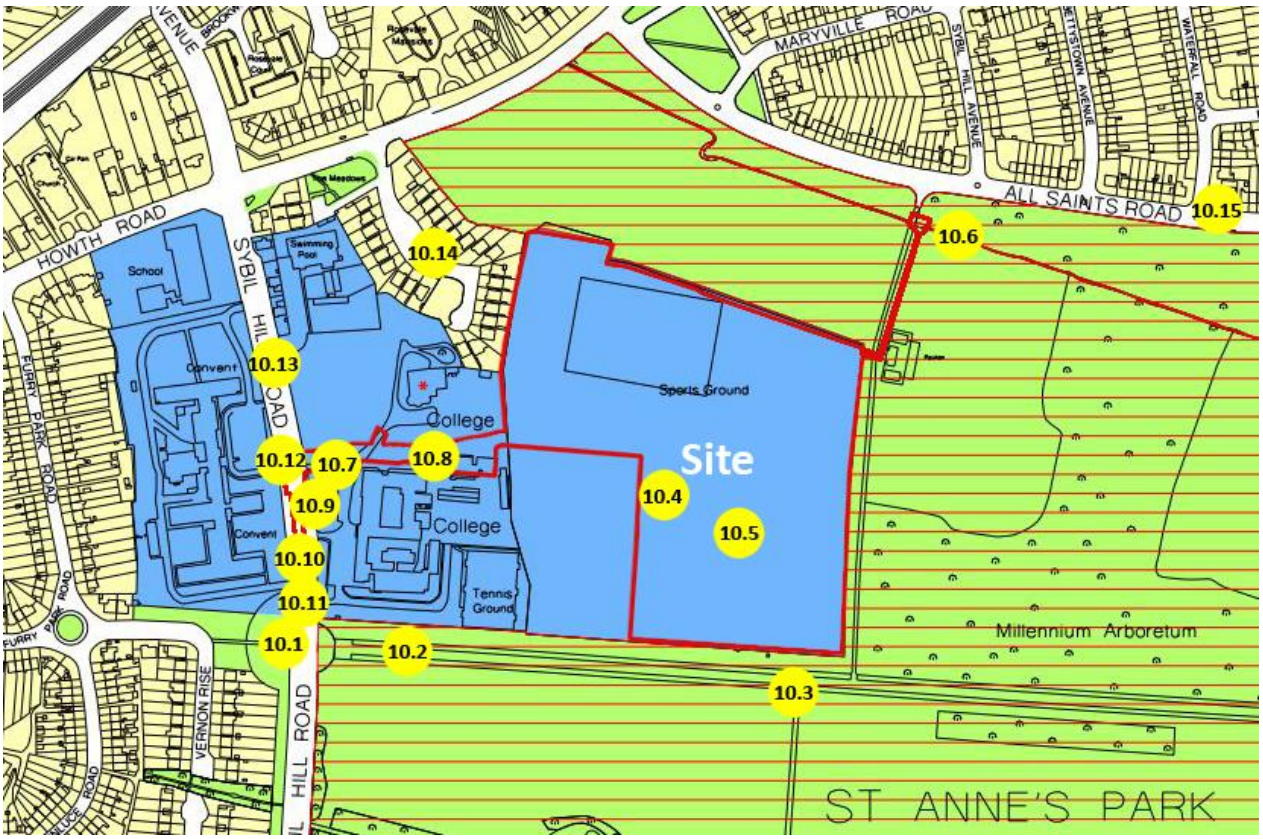

Figure 10-3: Land Use Zoning (Extract from Map B DCDP) (Site outlined in red and Photoview locations (see Section 10.4.3) are indicated by numbered yellow dots)

Other key landscape and visual-related policies and objectives (with references as noted in the DCDP) include:

Chapter 4: Shaping the City

SC15: To recognise and promote green infrastructure and landscape as an integral part of the form and structure of the city, including streets and public spaces.

Chapter 10: Green Infrastructure, Open Space and Recreation

10.5.2 Green Infrastructure

GI1: To develop a green infrastructure network through the city, thereby interconnecting strategic natural and semi-natural areas with other environmental features including green spaces, rivers, canals and other physical features in terrestrial (including coastal) and marine areas.

GI5: To promote permeability through our green infrastructure for pedestrians and cyclists.

GIO1: To integrate Green Infrastructure solutions into new developments and as part of the development of a Green Infrastructure Strategy for the city.

GIO2: To apply principles of Green Infrastructure development to inform the development management process in terms of design and layout of new residential areas, business/ industrial development and other significant projects.

GIO4: To improve pedestrian and cycle access routes to strategic level amenities while ensuring that ecosystem functions and existing amenity uses are not compromised and existing biodiversity and heritage is protected and enhanced.

10.5.2 Landscape

GI7: To continue to protect and enhance landscape, including existing green spaces through sustainable planning and design for both existing community and for future generations in accordance with the principles of the European Landscape Convention.

GIO9: To maximise managed access to key landscape and amenity areas of Dublin city.

10.5.3 Parks and Open Spaces

*The Development Plan includes a series of policies (GI9 to GI14) and objectives (GIO10 to **GIO16**) aimed at developing, enhancing, managing and protecting parks and open spaces within the city. The following policies are specifically noted:*

GI13: To ensure that in new residential developments, public open space is provided which is sufficient in quantity and distribution to meet the requirements of the projected population, including play facilities for children.

GI14: To promote the development of soft landscaping in public open spaces, where feasible, in accordance with the principles of Sustainable Urban Drainage Systems.

10.5.7 Trees

GI30: To encourage and promote tree planting in the planning and development of urban spaces, streets, roads and infrastructure projects.

GIO28: To identify opportunities for new tree planting to ensure continued regeneration of tree cover across the city, taking account of the context within which a tree is to be planted and planting appropriate tree species for the location.

10.5.8 Sport, Recreation and Play

GI33: To seek the provision of children's play facilities in new residential developments. To provide playgrounds to an appropriate standard of amenity, safety, and accessibility and to create safe and accessible places for socialising and informal play.

While views to and from St Anne's Park are of significance, there are no specifically identified protected views or scenic views pertaining to the Site. Likewise there are no tree preservation orders or specific amenity designations applying to the Site.

10.4.4 *Overall Landscape and Visual Significance and Sensitivity*

The Site is located at a transition between established residential and other development to the west, and the significant public amenity of St Anne's Park. Landscape significance and sensitivity derives from the setting of the Site:

- adjacent to the significant amenity and historic landscape of St Anne's Park, with its tree-lined avenue, mature plantings and parkland layout;

- adjacent to St Anne's Park Conservation Area;
- adjacent to Sybil Hill House, a protected structure;
- on an area of Z15 land use zoning; and
- and the open nature of the main Site area, and presence of some mature trees.

Views to and from the Site are restricted by boundary planting within St Anne's Park and by buildings and planting associated with St Paul's College and Sybil Hill House to the west. Therefore views to and from the Site are limited and the following are considered as sensitive visual receptors:

- views of users within St Anne's Park – specifically from the avenue and more generally from within the Park;
- views to and from Sybil Hill House, a protected structure;
- views from the 'The Meadows' and 'Ardilaun Court' residential areas;
- views from St Paul's College and associated grounds; and
- views of the generally dark nature of the Site at night-time.

10.5 Potential Impact of the Proposed Development

10.5.1 *Introduction*

The Proposed Development will involve the construction of a significant new residential development, including roads, open spaces and supporting infrastructure on currently undeveloped lands. Potential landscape and visual impacts will arise from:

- landscape disturbance and visual unfamiliarity and effects associated with initial site establishment, including the provision of site compound, provision of hoarding, construction access roads, *etc*.;
- visual effects associated with general construction activity and traffic movements on site;
- landscape and visual effects from the demolition works and from removal of trees;
- landscape effects from the loss of existing open landscape / visual character;
- landscape and visual effects from provision of new entrance and access road;
- visual effects from provision of services and infrastructure, including roads, sewers and surface water measures;
- landscape and visual effects from the phased emergence of a new residential development;
- visual effects from provision of lighting, footpaths and cycleways *etc*.;
- landscape and visual effects from provision of landscape measures and planting; and

- landscape and visual effects from completion and occupation of the new residential development on a progressive phased basis.

In terms of landscape and visual considerations it is noted that the planning application is accompanied by the following:

- A Tree Constraints Plan, a Tree Impacts Assessment Plan, a Tree Protection Plan, and an Arboricultural Assessment Report (separate drawings and report, which accompany this planning application);

- Landscape Masterplan and related Landscape Drawings (separate drawings, which accompany the planning application);

- A Landscape Design Rationale and Specification Report (separate report, which accompanies the planning application); and

- Photomontages, see Appendix 10.1 to this EIAR.

10.5.2 *Construction Phase*

The Site of the Proposed Development is well-screened and therefore construction effects will be limited to the Site and to immediately adjoining areas, including Sybil Hill Road, Sybil Hill House, St Paul's College, 'The Meadows' residential estate and St Anne's Park. Some other areas, (*e.g.* along sections of All Saints Road, and views from higher levels within 'Ardilaun Court' and within the Convent of the Little Sisters of the Poor), will have potential for viewing of parts of upper storeys of the Proposed Development.

10.5.2.1 *St Anne's Park & Avenue*

The Proposed Development is well-screened from St Anne's Park by mature and / or evergreen plantings. There is no potential for visual impact from the majority of the Park, including from the parklands south of the Avenue, the Avenue east of the Site; the Rose Garden, Red Stables, *etc*. or from the eastern and north-eastern end of the Park generally.

Nevertheless, views of the Site are possible between and under trees on the Avenue. While the main development will be setback from the avenue, by proposed public open space, potential for views of site development works and construction activity will be available, wherever these albeit restricted views exist.

The Proposed Development also includes for provision of potential pedestrian entrances into St Anne's Park (3 no. - at north-west, north-east and south-east corners of the Site) and for provision of an underground surface water pipe from the north-east corner of the Site to the Naniken River c.110m north-east of the Site. The outfall to the Naniken River is to be integrated into the reconstruction of an existing pedestrian footbridge over the river. A narrow section of existing grass within the Park will be excavated to provide the surface water pipe and reinstated to match existing.

An approximately 6m length of tree planting (from a 250m long planting) at the north-east corner of the Site, within St Anne's Park, is to be removed to allow for the surface water pipe and for the provision of a new entrance between the Proposed Development and the Park. No trees will be removed at the Naniken River for the reconstruction of the bridge / provision of the outfall.

As building works progress, the construction of aspects of upper floors of the blocks and the use of cranes will be visible from limited areas to the north of the Park. Site level and lower level construction will be fully-screened from all areas within St Anne's Park – except for glimpsed views from the Avenue as previously noted above.

Therefore, notwithstanding the significance and sensitivity of St Anne's Park, as a result of the maturity, density and evergreen content of existing planting on the Park boundary, the likely impact on the landscape and visual character of the Park will be slight, with short-term negative and localised effects. There is potential for significant landscape and visual impacts of a negative and temporary effect where limited open views allow, *i.e.* through or under Avenue trees; at the construction of proposed access points to the Park; and during the construction of the surface pipe / outfall to the Naniken River.

10.5.2.2 *Sybil Hill House, St Paul's College & 'The Meadows'*

Widening of the existing entrance, construction of the access road, removal of 13 no. trees and the southern end of a tree-line, provision of new boundary and railings have the potential to result in moderate, landscape and visual impact of temporary and localised negative effect for Sybil Hill House and St Paul's College.

Of the trees to be removed, 3 no. are in poor condition and 10 no. are in fair condition, and all are located between Sybil Hill House to the north and St Paul's College to the south. Seven (7) of the trees to be removed form a line of ornamental Japanese Cherry trees in fair condition. However, there is a substantial number of other trees along the proposed access road and the loss of the trees to be removed is not significant in the context of the setting. The landscape impact on the setting of Sybil Hill House or St Paul's College will be not significant, with negative short term-effects.

The new entrance and access road will be used for construction access to the main development area and activity and traffic associated with the Construction Phase will result in moderate visual impact of short-term and localised negative effect on Sybil Hill House and St Paul's College.

Site development and establishment works, earthworks, building works, including scaffolding and the use of cranes, installation of services, and general construction activity, and provision of a construction compound, will have a significant disruptive effect on the landscape and visual setting of the Site and views to the Site during the Construction Phase. Therefore, the Construction Phase of the main development area has the potential to result in significant, landscape and visual impact with short-term negative effect on Sybil Hill House, St Paul's College and sportsground and on 'The Meadows' residential estate.

Proposed Block 1, the most westerly apartment block, will be constructed in the first phase of development and therefore, while it is closest to Sybil Hill House, St Paul's College and 'The Meadows' residential estate, once constructed, it will have the effect of screening views of the remaining development / phases of development.

No trees within the main development area are to be removed to facilitate the Proposed Development. Seven (7) trees will be removed due to their very poor condition. The removal of these trees will result in a not significant landscape negative impact with short-term effect.

The Site is open to the adjoining sportsground at St Paul's College and therefore, the construction of all phases of the Proposed Development will likely have the potential for significant landscape and visual impacts of short-term negative effect for St Paul's College and associated sportsground.

10.5.2.3 *Sybil Hill Road*

Widening of the existing entrance, removal of 1 no. tree, construction of the new access and works along Sybil Hill Road (*i.e*. provision of pedestrian crossing and service connections) has the potential to result visual impact of localised negative temporary effect along Sybil Hill Road.

The new entrance and access road will also be used for construction access to the main development area and activity and traffic associated with the Construction Phase will result in slight visual impact of localised negative short-term effect in the vicinity of the entrance on Sybil Hill Road.

10.5.2.4 *Other*

The potential for landscape or visual impacts from areas other than those discussed above is very limited and where available, views of construction activity will form a small extent of view and be limited to the construction of upper floors of the Proposed Development and use of cranes on site. Such areas include:

- a short section of All Saints Road to the north-east of the Site (c. 300m to 400m distant), where the alignment facilitates long range views over trees to the works;
- upper floors of 'Ardilaun Court' to the west of 'The Meadows' residential estate, where the elevation will allow for views over 'The Meadows' to the construction works; and
- upper floors of the Convent of the Little Sisters of the Poor, where again elevation will allow for views over and north of St Paul's College to the construction works.

In such instances there is likelihood of slight landscape and visual impacts with short-term negative effects.

10.5.3 *Operational Phase*

The site of the Proposed Development is well-screened by mature plantings within St Anne's Park and overlooked by a limited number of properties: St Paul's College; Sybil Hill House; and 'The Meadows' residential estate. Where views are available the existing open character of the Site will be replaced, in part with a new residential development of 9 no. apartment blocks and open spaces, and in part by a large area of public open space, which is to be offered to DCC for taking-in-charge.

The overall landscape and visual impact will be significant with permanent effects on the existing landscape character of the Site and in the visual character of views of the Site, a change which will be accentuated at night, when the existing dark character of the Site will be permanently changed.

10.5.3.1 *St Anne's Park & Avenue*

The Proposed Development will not be visible from the vast majority of St Anne's Park, and proposed hedgerow planting in the new public open space (*i.e*. along the existing fence at the back of the Avenue) will further limit any already restricted views. However, open but albeit limited views will be available from the Park at the proposed new entrances to the Park from the north-east and south-east corners of the Site.

There is also potential for views of some parts of upper floors of the Proposed Development from limited areas to the north, north-east of the Park, however, these restricted views of the Proposed Development will not detract from the primary views of a 'landscape parkland'.

The likely landscape and visual impact of the Proposed Development on St Anne's Park will be slight to moderate negative effects in the short-term with slight, negative permanent effects.

10.5.3.2 *Sybil Hill House, St Paul's College & 'The Meadows'*

A new access road, with boundary walls and railings, will operate between Sybil Hill House to the north and St Paul's College to the south and a new residential development in a landscaped setting and an area of new public open space will lie to the east of Sybil Hill House, St Paul's College and 'The Meadows' residential estate.

The Proposed Development will be partly screened from Sybil Hill House, however, it will be openly visible from St Paul's College and sportsground and from the rear of properties No. 9 to 16 of the 'The Meadows' residential estate. While the Proposed Development will be setback from these properties, the existing views of open landscape will be permanently altered and the changed context will be prominent at night.

The likely landscape and visual impacts will be moderate to significant with negative effects in the short-term and likely neutral effects in the long-term.

10.5.3.3 *Sybil Hill Road*

With a widened entrance and new pedestrian crossing, the likely operational landscape and visual impact for Sybil Hill Road is imperceptible with neutral effects.

10.5.3.4 *Other*

The potential for Operational Phase landscape and visual impacts from areas other than those discussed above is very limited. Where available, the views of sections of upper floors will only form a small extent of the view. The Proposed Development may be more noticeable at night with the introduction of new illumination. Such areas include:

- a short section of All Saints Road to the north-east of the Site (c. 300m to 400m distant), where the alignment will allow for longer range views over trees;
- upper floors of 'Ardilaun Court' to the west of 'The Meadows' residential estate, where the elevation will allow for views of the Proposed Development over 'The Meadows' residential estate; and
- upper floors of the Convent of the Little Sisters of the Poor, where again elevation will allow for views of the Proposed Development over and between St Paul's College and Sybil Hill House.

In such instances there is a likelihood of slight landscape and visual impacts of negative short-term effects and neutral longer-term effects.

10.5.4 *Potential Cumulative Impacts*

In landscape and visual terms the Site is noticeably enclosed by the mature trees and woodlands of St Anne's Park and as such there is limited potential for cumulative landscape or visual impacts with other planned developments.

An application for permission to further develop the St Paul's College sportsgrounds, which includes the demolition of three (3) no. existing school structures and construction of a sports hall and all-weather

floodlit pitches, is currently on appeal to An Bord Pleanála (Dublin City Council ref. no.: 3777/17; An Bord Pleanála ref. no.: ABP-301482-18). The development comprises and redevelopment / development of the existing sportsground at St Paul's College for sports-related use by the College.

This development would be adjacent to the Proposed Development and entails the demolition of a small classroom and changing block, the removal of 15 no. trees, the provision of a new sports hall, and the replacement of the existing grass sportsground with all-weather floodlit pitches. In landscape and visual terms, these developments are consistent with, and complementary to, the existing school use at St Paul's College.

While the school development would further reinforce the change to the open character of the Site of the Proposed Development, it would not result in significant cumulative landscape and visual impacts with the Proposed Development.

10.5.5 *''Do-Nothing'' Impact*

In the do-nothing scenario the Site would continue with no impact under existing rough grassland use. Even in such instance some limited landscape and visual impacts may arise should the St Paul's College planning application be permitted. In addition, given the Z15 zoning, which pertains to the area, it is possible that even if the Proposed Development did not proceed, another alternative development proposal may be considered in the future.

10.6 Avoidance, Remedial & Mitigation Measures

Significant consideration has been given to avoiding significant landscape and visual effects in the design and layout of the scheme as a whole, including in the approach to the architectural, engineering and landscape layout of the Proposed Development. In this way the scheme includes for aspects of inherent landscape and visual mitigation in the design of the Proposed Development as follows:

- location of the taller apartment blocks at the centre of the Site, with step down to the west, south and east;
- provision of a large area of public open space as setback along the Avenue in St Anne's Park;
- provision of evergreen hedgerow planting along the boundary fence with the Avenue in St Anne's Park;
- provision of a large area of communal open space to the west of the apartment layout to provide 32m to 42m setback between Block 1 and the rear garden boundary wall of the properties at 'The Meadows' residential estate;
- retention of existing mature trees (other than those recommended for removal) in the open space at the rear of 'The Meadows' residential estate; and
- planting of a line new semi-mature trees in the open space at the rear of 'The Meadows' residential estate to enhance the screening provided by existing retained trees.

In overall terms mitigation in the design and layout of the Proposed Development includes for allocating c. 4.2ha (or c. 63% of the Site) to provision of public and communal open space (refer to Figure 10.4 Landscape Masterplan).

Landscape proposals include for the provision of a single large area public open space – equating to 25% of the area of Z15 zoning in the Site. The c.1.6ha of public open space is located adjacent to the avenue of St Anne's Park and will be offered to DCC for taking-in-charge. The final landscape layout of the public open space will be subject to the specific requirements of the local authority.

In addition to the public open space, c.2.6ha of the Site is laid out as semi-private open space in four main areas:

- a **western open space** of c.5,518sqm that allows for positive incorporation of existing mature trees. This open space also provides for setback of the Proposed Development, with additional planting, from the rear of 'The Meadows' residential estate;

- a **central open space** of c.11,356sqm which provides for 'landscape courtyards' and communal amenity between the residential blocks. The northern part of this semi-private open space is provided on podium over the basement carpark and open vents in the podium incorporate semi-mature tree planting rising from the basement below;

- an **eastern open space** of c.6,655sqm which incorporates surface water attenuation requirements to the north and a playground and 'landscape gardens' to the south. This open space also provides for setback of the Proposed Development from the eastern boundary with St Anne's Park; and

- a **northern landscape area** of c.2,253sqm, which allows for setback from the boundary with St Anne's Park and for circulation and permeability between the western and eastern open spaces.

The semi-private open spaces provide for formal playgrounds and natural play opportunities, for a kick-about area (over surface water attenuation) for landscape gardens, for seating, walks and visitor cycle parking *etc*.

The Proposed Development includes for a significant extent of new trees, hedgerow and shrub planting (see Figure 10.4 Landscape Masterplan), including:

- specific semi-mature tree planting for visual screening in the open space to the rear of 'The Meadows' residential estate;

- along the boundary between the proposed public open space and St Paul's sportsgrounds;

- between the proposed public open space and the Proposed Development;

- between the proposed public open space and St Anne's Park Avenue; and

- throughout the proposed landscape layout for the Site.

In courtyards, semi-mature tree planting is proposed as feature specimens within basement vents.

Works associated with the surface water outfall in St Anne's Park will also provide for reinstatement of any disturbed areas to match existing park conditions and for the replacement of an existing poor quality bridge over the Naniken River with a new stone-faced bridge with integral surface water outfall.

10.6.1 *Construction Phase*

The avoidance, remedial and mitigation measures during the Construction Phase include:

- Retention of trees on Sybil Hill Road, on the boundaries of the Site and retention of the majority of existing trees on site, which are incorporated into a western open space. All trees will be protected in accordance with BS: 5837:2012 *Trees in relation to design, demolition and construction. Recommendations*.

- A specific Arboricultural Method Statement shall be prepared for any works required within the root protection area of any tree to be retained. All such measures shall be prepared in consultation with the Project Arborist, who shall also supervise works for which an Arboricultural Method Statement is required.

- Provision of solid site hoarding, minimum 2.4m high along the access road boundary with Sybil Hill House, along the access road and site boundary with St Paul's College, and along the boundary with St Anne's Park Avenue.

- Existing boundaries will be retained and protected – other than where existing entrances are to be widened or new entrances provided.

- The 'Ha-Ha' style feature at Sybil Hill House shall be retained and protected by fencing prior to the construction of the new access road and new boundary wall / railing.

- Construction activities, other than for services or landscape works, shall be set back a minimum of 20m from the rear boundaries of 'The Meadows' residential estate.

- The remnant section of the former walled garden of Maryville, which lies close to part of the northern boundary of the Site, shall be protected and hoarded off.

- Construction works associated with the provision of new pedestrian accesses to St Anne's Park, will be fenced-off and protected from public access. These works shall be co-ordinated with the Parks Department of DCC.

- Construction works in St Anne's Park, associated with the installation of the outfall to the Naniken River and the replacement of the existing footbridge, shall be fenced off with solid hoarding and protected from public access. These works shall be co-ordinated with the Parks Department of DCC.

A Project Arborist and Project Landscape Architect will be retained for the duration of the Construction Phase to ensure that mitigation measures associated with existing trees and landscape proposals outlined above are put into effect and maintained.

10.6.2 *Operational Phase*

The landscape design and planting proposals include for specific mitigation measures to avoid and minimise impacts on significant and sensitive receptors including Sybil Hill House, St Paul's College, 'The Meadows' residential estate and St Anne's Park.

Operational Phase landscape and visual mitigation measures include:

- provision of a significant 1.6ha area of public open space to be offered for taking-in-charge to

DCC;

- provision of c.12,173sqm of semi-private open space parks to the west and east of the residential development:
- provision of a significant area of c.11,356sqm of central semi-private open space incorporating landscape courtyards, and amenity spaces;
- provision of a linear open space of c.2,253sqm along the northern boundary of the Site, which provides for setback from the boundary with St Anne's Park and for connectivity of open space;
- provision of an evergreen hedgerow and tree planting along the boundary between St Paul's College sportsground and the proposed public open space and the Proposed Development;
- provision of an evergreen hedgerow along the boundary of the public open space and the St Anne's Park Avenue; and
- incorporation of the 'Ha-Ha' style feature within the retained grounds of Sybil Hill House and provision of new tree planting.

A Project Arborist and Project Landscape Architect will be retained for a period of 12 months post-construction to ensure that landscape and visual mitigation measures outlined above are successfully established.

Figure 10-4: Landscape Masterplan

10.6.3 *'Worst Case' Scenario*

Given the depth, maturity and evergreen nature of the existing planting on the boundary with St Anne's Park, opportunity for viewing the Site is restricted even in its more immediate context. Therefore, in the scenario that proposed mitigation measures fail, it is considered that the likely significant landscape and visual impacts are limited to short-term negative effects on the setting of Sybil Hill House and to views from the rear of 'The Meadows' residential estate.

10.7 Residual Impacts

The following section provides an assessment of the residual impacts of the Proposed Development, taking account of the potential impacts set out in Section 10.5 and the avoidance, remedial and mitigation measures detailed in Section 10.6.

10.7.1 *St Anne's Park & Avenue*

Given the nature of the existing mature and mainly evergreen screening, taken with the proposed avoidance, remedial and mitigation measures, will ensure that there will be no likely significant landscape or visual impacts for St Anne's Park.

- **Photomontage View 3**: St Anne's Park – Southern Playing Fields / Mount Prospect Lawns (Figures 10.3A & 10.3B (Summer) and 10.3C & 10.3D (Winter)).
- **Photomontage View 4**: St Anne's Park – Southern Playing Fields / Woodside (Figures 10.4A & 10.4B (Summer) and 10.4C & 10.4D (Winter)).
- **Photomontage View 5**: St Anne's Park – Southern Playing Fields / Mount Prospect Avenue (Figures 10.5A & 10.5B (Summer) and 10.5C & 10.5D (Winter)).
- **Photomontage View 6**: St Anne's Park – Rose Garden (Figures 10.6A & 10.6B (Summer) and 10.6C & 10.6D (Winter)).
- **Photomontage View 7**: St Anne's Park – Northern Playing Fields / near St Anne's Tennis Club courts (Figures 10.7A & 10.7B (Summer) and 10.7C & 10.7D (Winter)).
- **Photomontage View 9**: St Anne's Park – Avenue (Figures 10.9A & 10.9B (Summer) and 10.9C & 10.9D (Winter)).
- **Photomontage View 10**: St Anne's Park – Avenue (Figures 10.10A & 10.10B (Summer) and 10.10C & 10.10D (Winter)).

The residual Construction Phase landscape and visual impact for St Anne's Park will be moderate, negative and short-term.

The residual Operational Phase landscape and visual impact for St Anne's Park will be slight, neutral and permanent.

10.7.2 *Sybil Hill House, St Paul's College & 'The Meadows'*

Specific avoidance, remedial and mitigation measures have been proposed to address the likely landscape and visual impacts which will arise for Sybil Hill House, for St Paul's College and 'The Meadows' residential estate. However, the key impact arises from the considerable change from an existing open character to a built residential development. While this impact is addressed in the Site layout, in the architectural treatment, and the specific landscape proposals, some degree of residual landscape and visual impact is unavoidable. This change in character will also have a residual night-time impact.

- **Photomontage View 11:** 'The Meadows' (Figures 10.11A & 10.11B (Summer)).
- **Photomontage View 12:** Sybil Hill House (Figures 10.12A & 10.12B (Summer)).
- **Photomontage View 13:** Sybil Hill House (Figures 10.13A & 10.13B (Summer)).

The residual Construction Phase landscape and visual impact for Sybil Hill House, St Paul's College and sportsground and for 'The Meadows' residential estate will be significant negative and short-term.

The residual Operational Phase landscape and visual impact for Sybil Hill House will be slight neutral and permanent effects.

The residual Operational Phase landscape and visual impact for St Paul's College and sportsground will be moderate neutral and permanent.

The residual Operational Phase landscape and visual impacts for 'The Meadows' residential estate will be significant neutral and permanent.

10.7.3 *Sybil Hill Road*

With the exception of 1 no. tree removed for the widening of the entrance, existing trees and boundaries on the road are to be retained and protected during construction. All footpaths, kerbs, and verges disturbed in the construction will be reinstated.

- **Photomontage View 1:** Sybil Hill Road (Figures 10.1A & 10.1B (Summer) and 10.1C & 10.1D (Winter)).
- **Photomontage View 2:** Sybil Hill Road / Entrance to St Anne's Park (Figures 10.2A & 10.2B (Summer) and 10.2C & 10.2D (Winter)).

The residual Construction Phase landscape and visual impact for Sybil Hill Road will be slight to moderate with very localised short-term effects.

The residual Operational Phase landscape and visual impact for Sybil Hill Road will be imperceptible neutral and permanent.

10.7.4 *Other*

Residual impacts for other areas, such as from All Saints Road, 'Ardilaun Court' and the Convent of the Little Sisters of the Poor are generally to aspects of the upper floors of the Proposed Development. As such, avoidance, remediation and mitigation of these impacts are addressed in the layout and architectural detailing of the Proposed Development.

- **Photomontage View 8:** All Saint's Road. (Figures 10.8A & 10.8B (Summer) and 10.8C & 10.8D (Winter)).

The residual Construction Phase landscape and visual impact for these areas will be slight negative and short-term.

The residual Operational Phase landscape and visual impact for these areas will be slight neutral and permanent.

10.7.5 *Impact on Landscape Planning Considerations*

Relevant landscape and visual polices from the DCDP have been outlined in Section 10.4.4.1 of this Chapter. The site is zoned Z15 and the Proposed Development is considered to be consistent with the land-use zoning as set out in the Z15 Masterplan for St Paul's and the Planning Report, both of which accompany this planning application. A specific requirement of the Z15 zoning is that 25% of the area be allocated to public open space. In this regard the Proposed Development has been laid out to provide c.1.6ha (25% of the Site) as public open space located along St Anne's Park Avenue. The public open space will be offered to DCC for taking-in-charge.

St Anne's Park is zoned Z9 open space and is also a Conservation Area. The Proposed Development has been sited and laid out to have minimal impact on St Anne's Park. The scheme also provides for pedestrian and cycle access to the Park for enhanced access and connectivity in accordance with the Green Infrastructure (GI04) and Landscape (GI09) objectives of the DCDP, and for evergreen screening along the boundary with the Avenue, to provide for screening of potential views of the Proposed Development from the Avenue and for protection of the Conservation Area and open space (GI7).

The Proposed Development is consistent with the Green Infrastructure, Landscape and Parks objectives of the DCDP, providing for significant areas of open space (65% of overall site is public and semi-private open space) (GIO2, GI13 & GI14) with play facilities (GI33), tree and other planting (GI30 and GIO28), and managed access for pedestrian and cyclist permeability to St Anne's Park (GI5 & GIO9).

The Proposed Development has regard to Sybil Hill House, a protected structure, both in terms of the siting of the entrance and access road, and in terms of the layout of the development. The access road avoids impact on the 'Ha-Ha' style feature, retains mature trees around the property, provides for a new permanent southern boundary and sets Block 1 of the Proposed Development c. 80m east of the property with intervening open space.

In overall terms the residual impact on landscape and visual planning aspects will be significant, with likely positive and permanent effects.

10.8 Monitoring

10.8.1 *Construction Phase*

A Project Arborist and Landscape Architect will be retained for the duration of the Construction Phase.

Monitoring of landscape and tree-related works is an integral aspect of the Proposed Development, and includes monitoring of:

- Tree removal, retention and protection;
- Topsoil stripping and storage;
- Disturbance by site works, services *etc*.;
- Excavation / alteration of ground levels;
- Landscape build-up; profiling and cultivation;
- Landscape finishing and implementation;
- Proposed planting and seeding; and
- 12 months aftercare of landscape measures to ensure establishment.

All works associated with soil stripping and movement; landscape build-up and finishing and landscape implementation shall be reviewed and monitored by the Project Landscape Architect.

All works associated with removal, retention and protection of existing trees and woodlands and with tree surgery works shall be approved and monitored by the Project Arborist.

10.8.2 *Operational Phase*

Planting and seeding will continue to be monitored by the Project Landscape Architect to ensure successful establishment and appropriate management.

Retained trees will be reviewed by the Project Arborist to ensure successful incorporation into the new landscape.

10.9 Reinstatement

10.9.1 *Construction Phase*

Landscape areas disturbed by the construction of the Proposed Development will be reinstated at the end of each phase of construction works. Such reinstatement will see the reuse of stripped soils and topsoil, cultivation, grass seeding and planting works.

The reinstatement works will be monitored by the Project Landscape Architect.

10.9.2 *Operational Phase*

A 12 month aftercare programme will include for the reinstatement of any failed planting or seeding areas. Thereafter the landscape shall be maintained by the Management Company.

The aftercare programme will be monitored by the Project Landscape Architect.

10.10 Interactions

The principal interactions are with Chapter 5 (Biodiversity), Chapter 7 (Hydrology, Water and Hydrogeology – in particular the incorporation of SuDS) and Chapter 11 (Archaeology, Cultural and Architectural Heritage). These aspects have been considered in the assessment in this Chapter and no significant interaction impacts arise.

10.10.1 *Chapter 5 Biodiversity*

The loss of existing trees and shrub planting is limited and mainly involves lower value non-native trees (*e.g.* Japanese Cherry trees in St Paul's College). Some mature trees are to be removed due to poor / dead condition, however, the majority of mature trees are retained and incorporated into the landscape design for the residential open space. The landscape scheme also provides for a wide variety of new tree, hedgerow and other planting and residual effects are not significant. The impact is therefore imperceptible, with neutral effects.

10.10.2 *Chapter 7 Hydrology and Hydrogeology*

The landscape design for the Proposed Development has incorporated surface water management proposals, taking into account the requirements to minimise significant effects on biodiversity, mature trees and St Anne's Park, whilst also providing opportunity for enhanced biodiversity, access to the Park and upgrading of an existing poor quality footbridge in the Park. The residual effects of surface water features on landscape and visual aspects is not significant. The impact is therefore imperceptible, with neutral effects.

10.10.3 *Chapter 11 Archaeology, Cultural and Architectural Heritage*

The landscape and visual assessment has considered potential effects on Sybil Hill House (a protected structure) and on St Anne's Park, a historic landscape and conservation area. The residual landscape and visual effects on these features are not significant. The impact is therefore imperceptible, with neutral effects.

10.11 Difficulties Encountered in Compiling

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

10.12 References

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department of Housing, Planning and Local Government, 2018.

Directive 2014/52/EU (The 2014 EIA (Amending) Directive) of the European Parliament and of the Council of 16 April 2014 amending *Directive 2011/92/EU* on the assessment of the effects of certain public and private projects on the environment.

Dublin City Development Plan 2016-2022. Dublin City Council (DCC), 2016.

Dublin City Parks Strategy 2019-2022. DCC, 2019.

Draft Advice Notes of Current Practice in the Preparation of Environmental Impact Statements. Environmental Protection Agency (EPA, 2015.

Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports. EPA, 2017.

Planning for Watercourses in the Urban Environment. Inland Fisheries Ireland, 2011.

Guidelines for Landscape and Visual Impact Assessment, (3rd Edition) Landscape Institute and Institute of Environmental Management & Assessment, 2013.

BS: 5837:2012 Trees in relation to design, demolition and construction. Recommendations.

11 ARCHAEOLOGY, ARCHITECTURE & CULTURAL HERITAGE

11.1 Introduction

This Chapter assesses the archaeological, architectural and cultural heritage effects of the Proposed Development at St Paul's College, Raheny, Dublin 5. It has been prepared by Rob Goodbody, Historic Building Consultant - Section 11.2 Architectural Heritage - and by Shanarc Archaeology Ltd. - Section 11.3 Archaeology and Cultural Heritage.

This Chapter describes the archaeological, architectural and cultural heritage importance of the land under consideration for the Proposed Development located east of the R808 Sybil Hill Road, immediately east of St Paul's College (Secondary School), in Raheny, Dublin 5. The assessment has been carried out by Rob Goodbody, Historic Building Consultant. Rob has a BA (mod) from Trinity College Dublin (TCD) in Historical Geography; Post-grad Diploma in Environmental Planning; MA in Local History (NUI Maynooth); Master's in Urban and Building Conservation (UCD) and Post-grad Diploma in Applied Building Repair and Conservation (TCD). Rob is a Member of Irish Planning Institute.

The purpose of the impact assessment is to assess the potential significance and sensitivity of the existing archaeological, architectural and cultural heritage environment, and in turn to evaluate the likely and significant impacts of the Proposed Development on this environment. Ameliorative (remedial or reductive) measures are proposed where necessary to safeguard any monuments, features or finds of antiquity or features of local cultural heritage interest that are identified during the present study.

11.2 Architectural Heritage

11.2.1 *Introduction*

The Site consists of a substantial L-shaped area of land, together with a narrower strip that includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road, incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road

The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of the existing pedestrian bridge crossing in St Anne's Park with integral surface water discharge to Naniken River.

The Site is adjacent to the grounds of Sybil Hill House, which is a protected structure. The development site area is bounded on three no. sides by St Anne's Park, which is a conservation area – though not an architectural conservation area.

The upgraded accesses to Sybil Hill House and St Paul's College will run close to these buildings, but will be separated from Sybil Hill House by the grounds to the front of the house.

Sybil Hill House, is located to the west of the Site of the Proposed Development, and is separated from the Site by trees and outbuildings. The nearest building would be circa (**c.**) 80m from the rear of Sybil Hill House.

St Anne's Park lies to the north, east and south of the Site and is physically and visually separated from St Anne's Park by boundary fencing and dense tree planting. The Park extends from its entrance off Sybil Hill Road in the west to the coast at Dollymount in the east.

The c. 1.5km long, straight tree-lined avenue, forms part of the distinctive character and identity of the Park. The western end of the avenue, part of which only dates from the 1950s, adjoins the southern boundary of the Site and of St Paul's College. A c. 1.6ha of public open space is located adjacent to the avenue of St Anne's. On either side of the avenue, the Park is laid out in a series of large 'landscape rooms' enclosed by mature tree belts. Some of these 'rooms' are used as playing pitches (including some with floodlighting), while others include a Millennium Arboretum, the Rose Garden, a pitch and putt course, tennis club, an all-weather floodlit pitch as well as amenity parklands, a playground and a pond.

To the north of the Site, there are more playing pitches as part of the Park, with established residential estates to the north and south of the Park.

11.2.2 *Study Methodology*

The built heritage assessment examines buildings and other structures within, or close to, the Site and assesses the architectural significance of those structures with the anticipated effect of the Proposed Development on their character. The emphasis is on structures still standing. Where a building / other structure has been destroyed it no longer has architectural significance on the landscape, though it may leave traces that fall within the ambit of the archaeological assessment. It may also have had an importance that remains through the historical record, though this is not of concern to the present task. For a structure to have architectural significance, it need not be intact so for that reason ruins, or even fragments of buildings may be of importance.

The identification of buildings and structures to be assessed for the impact was based in the first instance on an analysis of current Ordnance Survey Ireland (**OSi**) maps. The potential for any building or other structure in the vicinity of the Site to have special architectural significance was also gauged through examination of the following sources:

- The Dublin City Development Plan (**DCDP**) 2016-2022.
- Pre-Ordnance Survey maps by John Rocque and John Taylor.
- OSi six-inch maps of 1843, 1871 and 1912.

Any buildings on or close to the Site that were identified on the earlier OSi maps were then checked against the current OSi maps to ascertain which were still extant. The entries in the Records of Protected Structures (**RPS**) for Dublin City was also checked.

Historical sources used in the study are listed in the bibliography.

A Site walkover (including in the vicinity) was undertaken on 11th November 2016, 24th May 2017, 9th May 2018 and 21st August 2019 to identify those structures noted in the desktop survey and to assess them for their architectural quality. The possibility of finding structures

of architectural significance not identified either from the desktop survey was kept in mind during the Site walkover and any potential additional structures were examined.

The structures identified within the Site or in the vicinity were examined to assess the potential effects of the Proposed Development and to consider potential for mitigation where necessary. In each case the structures identified are rated in accordance with the system adopted the National Inventory of Architectural Heritage (**NIAH**) wherein a structure is rated as being of International, National, Regional or Local interest, or, if a structure is of no special interest, the NIAH includes a category of "Record only"[15].

The legislation relating to the protection of architectural heritage is set down in the *Planning and Development Act 2000*, as amended, and this defines architectural heritage as including structures which are of special interest under the headings of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Wherever the phrase "special architectural interest" is used in this Chapter, it should be taken as including special architectural interest in any one or more of these eight categories.

In this assessment each building or structure that is considered is assigned a rating in accordance with the NIAH system or is stated to be not of special architectural interest. Where the rating is deemed to be higher than "Record only" the category of special interest is noted.

It should be noted that the term "special architectural interest" applies only in the context of this assessment of architectural heritage and does not imply that those buildings and other structures that are not considered to be of special architectural interest are in any way inferior or are of lower value.

11.2.3 *Existing Receiving Environment (Baseline Situation)*

11.2.3.1 *The Site*

The Site comprises open relatively flat rough grassland field, which is surrounded by trees, which are outside the site of the Proposed Development. Most of the Site is bounded by a metal railing, though there are masonry walls in some areas. One of these masonry walls is a substantial brick and stone wall just outside the Site boundary to the north, while the western boundary to Sybil Hill House is a high concrete-block wall. The Site is accessed from Sybil Hill Road and passes between Sybil Hill House (a protected structure) in large landscaped grounds and a St Paul's College, (Secondary School) built in the 1950s.

11.2.3.2 *Conservation context*

There are no protected structures within the Site of the Proposed Development and no part of the Site lies within an Architectural Conservation Area (**ACA**). Access to the Site will be from Sybil Hill Road, via the existing vehicular access, between Sybil Hill House and St Paul's College incorporating new accesses to Sybil Hill House and St Paul's College.

[15] National Inventory of Architectural Heritage *NIAH Handbook* edition September 2017 p. 20

Sybil Hill House is a protected structure and is included in the RPS, Reference No. 7910. This building is marked with a red asterisk on the extract from the DCDP Map B, see Figure 11-1 below.

The Site is bounded on its northern, eastern and southern sides by St Anne's Park, which is designated on the DCDP map as a conservation area, but this is not an architectural conservation area. This is depicted by red hatching on Figure 11-1 below.

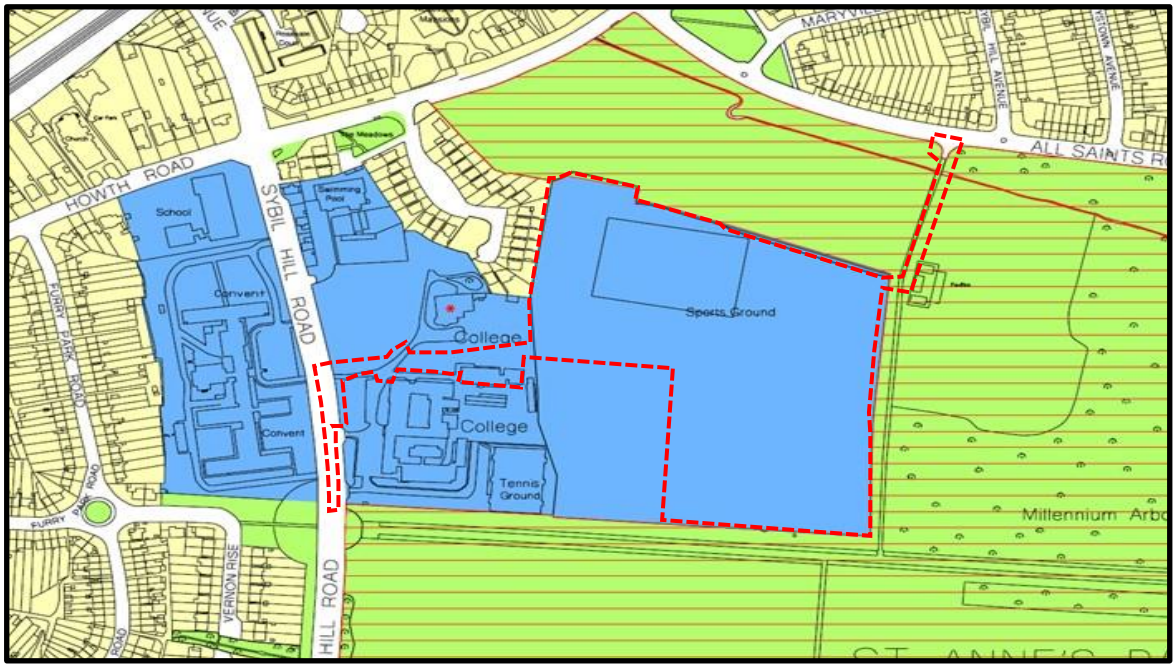

Figure 11-1: Detail of DCDP Map B, with the Site outlined in a broken red line (Source: DCDP 2016-2022 Map B, with the Site boundary overlaid)

11.2.4 *Historical background*

During the 18th century the land around Clontarf and Raheny became popular as the location for villas belonging to the gentry and professional classes. Houses such as Sybil Hill House, Furry Park, Bay View and Verville were built during the 18th century and this trend continued into the opening decades of the 19th century with the construction of Bedford Lodge, Baymount Castle, Sea View and Mount Prospect. Some of these, including Sybil Hill House, were altered and extended in the 19th century, while others, such as St Anne's House, were demolished and new houses built on the site.

The first edition OSi map of this area, published in 1843, shows the villas dotted around the district. In the extract from the map that is reproduced below, which covers a relatively small area, no less than 13 no. villas are included, each with the extent of its grounds shown with a grey stipple, while others are just outside the area shown. The extent of the Site is marked with a broken redline, which shows that in the mid-19th century this land was partly within the grounds of Sybil Hill House, though mostly within the grounds of Maryville. In this map extract (Figure 11-2) St Anne's is towards the right-hand side of the map, a little above centre; the grounds of St Anne's are shown as running westwards to the green line, which depicts the boundary between the civil parishes of Clontarf and Raheny.

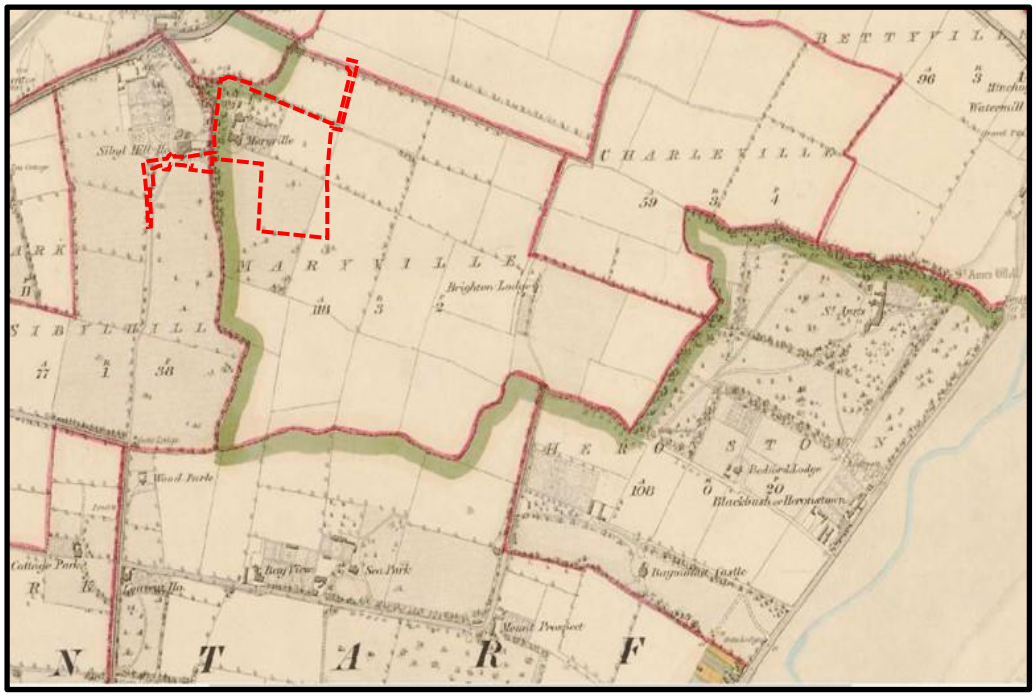

Figure 11-2: Detail of Ordnance Survey Map of 1843 with the Site Boundary overlaid (Source: OSi, 2017)

At the time that the map was published St Anne's House had recently been demolished and rebuilt by the Guinness family. St Anne's was inherited by Arthur Edward Guinness in 1868 and in 1874-76 he enlarged the property significantly, acquiring extensive lands to the north and west in the parish of Raheny. In 1876 he acquired the house at Sybil Hill, with its grounds, and two years later he added Maryville, which stood close to Sybil Hill House, to the east.

Having acquired a substantial area of land to add to his estate at St Anne's, Arthur E Guinness, with his wife, Olivia, laid out an extensive estate, with allées and parkland, and with extensive belts of holm oaks to give shelter from the salt-laden sea breezes. The principal avenue, 1.3km long, ran westwards from the front of the house to the edge of the grounds of Sybil Hill House. However, Arthur Edward Guinness was not able to acquire the lands beyond Sybil Hill House and the entrance to St Anne's turned northwards through the grounds of Sybil Hill House to meet the Howth Road. The Guinnesses did not incorporate either Sybil Hill House or Maryville into the landscaped grounds of St Anne's estate and they continued to be occupied separately.

Arthur Edward Guinness was elevated to the peerage as Lord Ardilaun in 1880. After his death in 1910 Lady Ardilaun continued to live in the house until her death in 1925, though the estate was no longer kept up to its previous high standard. As the Ardilauns were childless, the property was inherited by Lord Ardilaun's nephew, Bishop Benjamin Plunket.

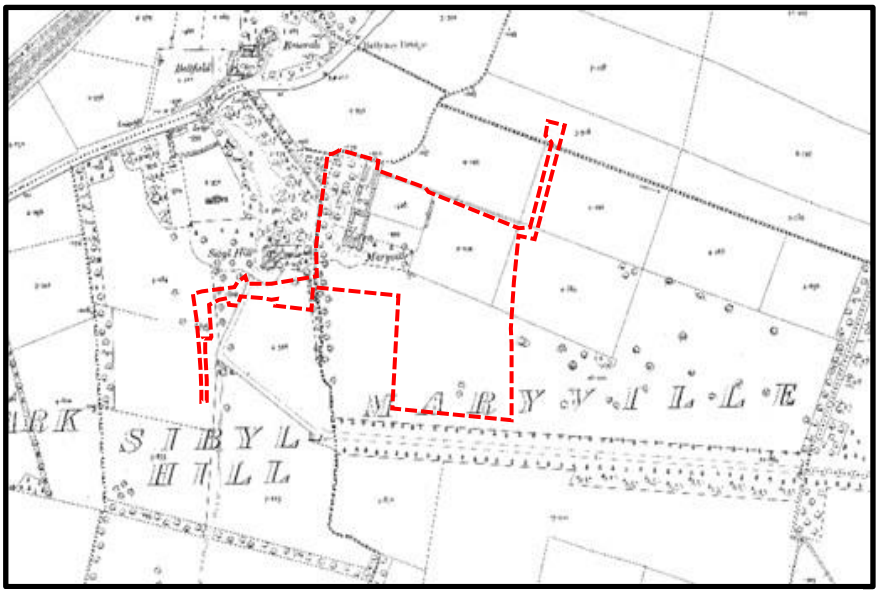

Figure 11-3: Detail of Ordnance Survey Map of 1907 with Site boundary overlaid (Source: OSI Ireland, 2017)

Figure 11-3 above is a map extract showing the approximate outline of the Site superimposed on the OS map of 1907. Maryville may be seen in the north-western corner of the Site.

In 1932, Bishop Plunket put St Anne's estate on the market, though he found it difficult to find a buyer. In 1936 Dublin Corporation (now Dublin City Council (**DCC**)) expressed an interest in acquiring it as housing land and this was pursued through the St Anne's Compulsory Purchase Order (**CPO**), 1938, the public inquiry for which was held in September of that year. The order was initially made for 444.79 acres (180 hectares (**ha**)), the greater part of which was to be used for housing, while 176 acres (71.23ha) was to be used as a public park. The property belonging to Bishop Plunket was included in this total area of land covered by the CPO, though it was acquired by agreement with Dublin Corporation and excluded from the order. Sybil Hill House was not included in the CPO as Bishop Plunket retained it as his residence. Maryville was included in the CPO, but as the Corporation's plans for the estate were put on hold due to the outbreak of the Second World War the property was not acquired at that time. Maryville continued to be occupied by Cecil Milne, under a lease granted in 1932. Cecil Milne had run a dairy farm on the property, though during the war years he cultivated the land as a market garden and this use continued after the end of the War. Maryville was sold to Dublin Corporation in 1956.

In 1948 the Vincentian Fathers acquired 12.5ha of the St Anne's estate from Dublin Corporation for the purpose of building a school. The school was named St Paul's College and opened in 1952. A number of land transactions followed, as Bishop Plunket had died in 1947 and the Vincentian Fathers had been able to purchase Sybil Hill House from his family in 1950. In 1952 Dublin Corporation acquired part of the lands from the Vincentian Fathers along the western side of their property, so that they could lay out a new road to form a northward extension from Vernon Avenue - now Sybil Hill Road. To compensate for the loss of land, the Fathers acquired land to the east of the school from Dublin Corporation and this forms the southern part of the lands now the subject of the Proposed Development. The house

at Maryville, with its grounds, were sold to the Vincentian Fathers in 1959. The Vincentian Fathers demolished Maryville and laid out the site and its grounds as part of the school playing fields.

The land transferred to the Vincentian Fathers in 1952 extended into what is now the Millennium Arboretum area within the Park and did not allow for an efficient layout for playing fields. A further transaction was entered into with Dublin Corporation in 1953 to swap that eastern part of the lands transferred in 1952 with an area to the north. This is clarified in the map below.

The spur of land within the present site that provides the access from Sybil Hill Road was formerly part of the grounds of Sybil Hill House.

St Anne's Park now extends to c. 110ha, as compared with the 71.23ha originally envisaged when the lands were acquired.

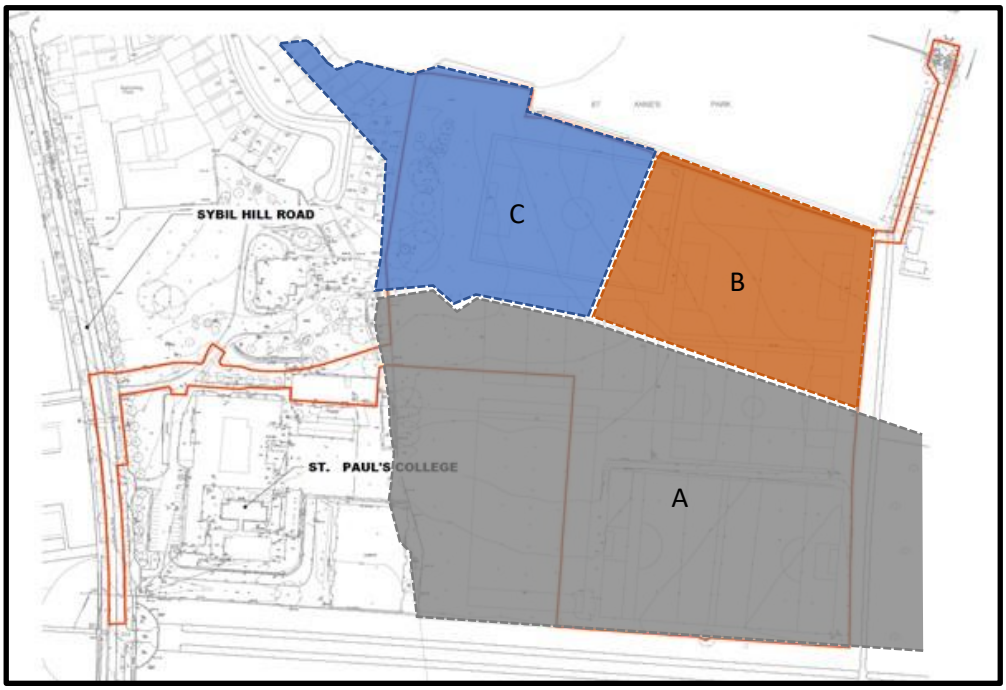

Figure 11-4: Summary of Land Acquisition

Figure 11-4 above shows the various land transactions relating to the site of the Proposed Development.

A. Land acquired from Dublin Corporation in 1952 to compensate for land sold to the Corporation for the laying out of Sybil Hill Road. This acquisition included land now occupied by the Millennium Arboretum.

B. Land acquired from Dublin Corporation in 1953 in a land swap, with the Corporation receiving the land now occupied by the Millennium Arboretum, to the east of the present site, and shown as the green area at bottom right in the map above

C. Lands acquired in 1959 with Maryville.

11.2.5 *Site Survey*

The Site that is the subject of this assessment consists of a sub-rectangular area of ground to the east of St Paul's College and Sybil Hill House, with a narrow strip of ground that joins it westwards to Sybil Hill Road.

The narrow strip at the western end of the Site runs to the north of St Paul's College and to the south of the protected structure at Sybil Hill House. The present driveway leads in from the R808 Sybil Hill Road and turns a little northward to run to Sybil Hill House. The gateway is flanked by brick piers that support steel gates, while the front boundary runs in each direction, marked by a steel fence rising from a concrete plinth wall (see Plate 11-1).

Where the driveway turns northward there is an area of grass directly ahead, to the east, interrupted by a number of trees (see Plate 11-2). To the north of this strip there is a 'Ha-Ha' that separates the grass strip from the parking area to the front of Sybil Hill House (see Plate 11-4).

To the south of this access strip is St Paul's College, which dates from the 1950s (see Plate 11-3). This is a two-storey, red-brick-faced building with a flat roof. It has a long frontage facing west towards Sybil Hill Road and this returns along the northern side, facing the proposed access to the Site.

Sybil Hill House, which lies to the north of the proposed access to the Site, is an 18th century, two-storey villa, which was substantially altered and extended in the 19th century to give it its present appearance. The house is rendered externally and has its main entrance facing southwards, towards the proposed new access and St Paul's College (see Plate 11-5). The western elevation is also significant and looks over a small area of parkland towards a grove of trees. The northern elevation is of somewhat lesser significance but was nonetheless intended to be seen from with the grounds of the house, particularly as the original driveway ran southwards past the front of the house from Howth Road (see Plate 11-6). The eastern side of the house is more utilitarian and there are several outbuildings and additions to the house on this side, beyond which are trees within the grounds (see Plates 11-7 and 11-8). The 'Ha-Ha' is a ditch, c. 1.5m deep and faced on its northern side with reused stone setts from the streets of the city. On the southern side the ditch slopes up to ground level. The 'Ha-Ha' runs in a gentle curve and is aligned c. east-west. This 'Ha-Ha' was constructed at the time that the school was built in the 1950s and serves to demarcate the limit of the area that may be used by children in the school grounds.

There is a block of pre-fab buildings on the site of the proposed new access route and these are depicted in Plate 11-9 below.

The site of the Proposed Development, other than the strip proposed as the new access road, is currently under grass. While the area appears relatively flat, there is a slight fall of around 4m from north-west to south-east. The Site is surrounded on the northern, eastern and southern sides by trees within the grounds of the adjacent St Anne's Park. On the western boundary there are trees along the northern section, which adjoins a housing estate and the central section, which adjoins Sybil Hill House and its outbuildings. The southern part of this boundary runs to the rear of St Paul's College.

Just outside the northern boundary of the Site is a high wall that is faced with brick on the southern side and with brick and stone on the northern side (see Plate 11-10). This is the surviving northern wall of the walled garden associated with Maryville. The mode of construction is typical of garden walls of the period, with the lower part of the wall built in stone, which was relatively cheap, but faced with brick on the side facing the garden, as brick is good for heat retention and its use to face the wall, particularly a south-facing wall, enabled the growth of plants that would not otherwise have survived in our climate. None of the boundaries of the Site are of historical significance. The surviving wall of the walled garden of Maryville is of historical significance but is outside the boundary of the site of the Proposed Development.

St Anne's Park is an extensive high-quality parkland and a major amenity and public open space. Access to the Park from Sybil Hill Road is via a gateway that is of relatively recent date, though constructed to a design that reflects the traditional gates to large estates. Within the gateway there is a substantial avenue that formerly terminated at its eastern end of the Park where the main house once stood. The avenue is straight and tree-lined, and is a striking feature and the mature Holm Oak, Corsican and Monterey Pine trees.

The Site is to the north of the avenue, behind the line of trees. To the east of the Site there is an arboretum and an area of playing fields, while to the north there are more playing fields. There are mature trees within the park along all three no. boundaries.

11.2.6 *Characteristics of the Proposed Development*

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, residential tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas.

Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab classroom to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of the existing pedestrian bridge crossing in St Anne's Park with integral surface water discharge to Naniken River.

A full description of the Proposed Development is set out in Chapter 2 (Project Description & Description of Alternatives).

11.2.7 *Potential impact of the Proposed Development*

From a built heritage perspective there are two issues that need to be examined in assessing the potential impact of the Proposed Development. These are Sybill Hill House (protected structure) and the conservation area within St Anne's Park, adjacent to the Site. In examining

these issues, the principal issue relates to the operational element of the Proposed Development. It is not considered that there would be any specific impact on built heritage during the Construction Phase.

In assessing the predicted impact of the Proposed Development on the built heritage in the it vicinity of the Site, the potential impacts are categorised as either direct or indirect, the latter being taken as being an impact on the setting of the building or another structure that is of built heritage significance. In each case where the assessment below addresses any building, structure or historic landscape feature the text is accompanied by a summary list that states the level of predicted impact in accordance with Table 11-1 below. Where relevant it sets out the nature of the mitigation that would be required to address the predicted impact. The cumulative impact arising from the proposed sports complex development between the St Paul's College buildings and the Site is also addressed and is included in the summary list.

Table 11-1: Definitions of Significance of Effects

Effect	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
Slight	An effect that causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing or emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect that obliterates sensitive characteristics.

11.2.7.1 *Potential Impact of the Access Road on Sybil Hill House (Protected Structure) both during the Construction and Operational Phases and Cumulatively.*

There will be no predicted impact on Sybil Hill House arising from the Construction Phase of the Proposed Development. Sybil Hill House is set in its own grounds, separated from St Paul's College by a driveway, a parking area and an area of lawn, with groves of trees. To the front of the house there is a 'Ha-Ha' that separates the grounds of the house from St Paul's College grounds to the south. While this appears to have been constructed at a later date, probably when the Secondary School was built (1950s), it nonetheless forms a definite demarcation between the grounds of the Sybil Hill House (protected structure) and the 20th century St Paul's College buildings and grounds. It is noted that the 'Ha-Ha' is not shown on the various OS maps published between the first edition in 1843 and the last before the construction of the St Paul's College, which was published in the mid-1930s. The proposed access road would run between the 'Ha-Ha' and the St Paul's College building, at c. 40m from the Sybil Hill House. As such, the widening and realignment of the existing vehicular access will have a slight impact on the character of the Sybil Hill House and its setting at the Operational Phase. The widening and realignment of the existing vehicular access will run

close to the edge of the 'Ha-Ha'. However the side of the 'Ha-Ha' closest to the proposed road widening and realignment consists of a bank that slopes down to the bottom of the ditch; this is inherently stable and is not likely to be endangered by the proximity of the new road acesss, provided it is safeguarded during construction. It is not anticipated that the access road would have any significant impact on the house or its setting.

The proposed sports complex is at a greater distance from Sybil Hill House and would not have a significant impact. It is not considered that there would be any cumulative impact arising from this development or the Proposed Development.

Direct impacts on Built Heritage: None

Effects on Setting: Slight

Cumulative impact: None

Mitigation required: None

The gateway to St Anne's Park is of mid-20th century origin and is not of heritage significance and its removal in order to provide for a wider access would not be a conservation issue.

11.2.7.2 *Potential Impact of the Proposed Development on St Anne's Park (Conservation Area) including Cumulative Impacts*

St Anne's Park is an extensive high-quality parkland and provides amenities for a substantial area in the north-east of Dublin City. The c. 1.6 ha of public open space is located adjacent to the avenue of St Anne's Park.

The Proposed Development is ranging in height from 5 to 9 storeys, and from the northern side of the Site, is not as comprehensively screened at the margin of the Park. The upper part of the proposed apartments will be visible from the playing pitches, but not to the extent that they would have a significant impact on the character of the park. There will be a semi-private area of open space to the east of the Proposed Development. This open space will provide a c. 60m separation between the Proposed Development and the Park to the east of the Site. Block 6 (7 no. storeys) and Block 9 (5-6 no. storeys) are the most easterly blocks of the Proposed Development and closet to St Anne's Park. While all areas of the Park are used for walking, those areas used for pitches are not as sensitive as the parkland or the Rose Garden, and as such it is not considered that the Proposed Development would have a significant impact on the character of the Park (Conservation Area).

The proposed sports complex would be low in height and within an area well screened from the park by evergreen oaks. There would be no cumulative impacts on the conservation area arising from the construction of the sports complex and the residential development.

Direct impacts on the conservation area: None

Effects on setting: Moderate

Cumulative impact: None

Mitigation required: None

11.2.8 *"Do-Nothing" scenario*

In the do-nothing scenario the Site would continue with no impact under existing rough grassland use. There will be no anticipated impact on the architectural heritage that would arise as a result of the Proposed Development not proceeding.

11.2.9 *Difficulties Encountered in Compiling*

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

11.2.10 *Bibliography*

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Sharkey, Joan Ussher, *St Anne's – the story of a Guinness Estate*, Woodfield Press, Dublin, 2002.

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Plates

Plate 11-1: Gateway and railings at access from Sybil Hill Road

Plate 11-2: Site for proposed access, with St Paul's School to right and Sybil Hill House to left

Plate 11-3: St Paul's College

Plate 11-4: Site of the proposed access road, with 'Ha-Ha' at left

Plate 11-5: Sybil Hill House with southern elevation at right and western elevation at left

Plate 11-6: Northern elevation of Sybil Hill House

Plate 11-7: Eastern elevation of Sybil Hill House

Plate 11-8: Eastern side of Sybil Hill House, seen from the site of the Proposed Development

Plate 11-9: Pre-fabricated Buildings

Plate 11-10: Brick-faced wall near the northern boundary

Plate 11-11: Modern gateway to St Anne's Park

Plate 11-12: View eastward along the avenue through St Anne's Park

11.3 Archaeology and Cultural Heritage

11.3.1 *Introduction*

This section assesses the archaeological and cultural heritage effects of the Proposed Development (Figure 11-5 below). The section will provide an archaeological and cultural heritage assessment of the receiving environment (baseline), identify impacts and any corresponding effects on the receiving environment and propose mitigation measures to mitigate those effects.

The assessment has been carried out by Seán Shanahan MSc MIAI MIASP and Marion Sutton MSc, of Shanarc Archaeology Ltd. The section relates directly to a conservation heritage assessment prepared by Rob Goodbody, Historic Building Consultant, and there will be some overlap in the assessment of the receiving environment and architectural heritage effects in this section with Section 11.2 (Architectural Heritage) above.

Figure 11-5: Site Layout

Definition of Archaeology and Architectural, Cultural Heritage

The term 'cultural heritage' is broadly used to describe any combination of archaeological, architectural and cultural heritage features.

- Archaeological heritage comprises objects, monuments, buildings or landscapes that generally pre-date AD1700.
- Architectural heritage, also referred to as built heritage, comprises structures, buildings, their settings and contents that generally post-date AD1700.
- Cultural heritage also comprises less tangible aspects of heritage such as folklore and cultural associations.

11.3.2 *Study Methodology*

The assessment of archaeology, architecture and cultural heritage effects is based on a desktop study of relevant archaeological, architectural and cultural heritage sources, reviewed in August 2019. The desktop study is supported by a Site walkover of the Proposed Development conducted on 15th August 2019. Existing archaeology sources include the results of a 2015 geophysical survey at the site of Maryville previously commissioned by Crekav Trading GP Limited. The geophysical survey was conducted between the 14th and 16th September 2015.

11.3.2.1 *Desktop Study*

The following were the principal desktop sources consulted.

National Monuments

Under the National Monuments Acts 1930-2004, archaeological sites in the ownership or guardianship of the State or a Local Authority and sites under Preservation Orders are designated as National Monuments. Such sites are offered the highest level of protection under Irish legislation.

There are no National Monuments or sites under Preservation Orders located within or near the site of the Proposed Development.

Record of Monuments and Places and Sites and Monuments Record

The Record of Monuments and Places (**RMP**) was established under Section 12 of the 1994 National Monuments (Amendment) Act. The statutory RMP is a list of archaeological monuments known to the National Monuments Service (**NMS**) and is based on the earlier Sites and Monuments Record (**SMR**) files housed at the NMS. The record is updated on a constant basis.

No RMP sites are located within or near the site of the Proposed Development. A total of 26 no. RMP sites are located within a 2km radius of the Proposed Development. The nearest RMP sites, Casino Marino (DU019-037) and Killester Church and graveyard (DU019-010001, -010002), are located at a distance of 0.81 and 0.83km respectively.

Topographical Files of National Museum of Ireland

The topographical files of the National Museum of Ireland (**NMI**) are the national archive of all known antiquities recorded by the NMI. These files relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous excavations. The find-spots of artefacts can be an important indication of the archaeological potential of the related or surrounding area.

The topographical files do not contain any information relevant to the Proposed Development.

Excavations Bulletin and Excavations Database

The Excavations Bulletin is a published annual directory and an online database that provides summary accounts of all the excavations carried out in Ireland (both north and south) from 1969. The online database has been compiled from the published Excavations Bulletins from the years 1970-2010, with additional online-only material from 2011 onwards.

Dublin City Development Plan (DCDP) 2016-2022

Every City and County Development Plan is compiled in accordance with the requirements of the Planning and Development Act 2000 (as amended) and contains a Record of Protected Structures (**RPS**); a list of buildings that cannot be materially altered or demolished without grant of permission under the Act. Sybil Hill House is listed in the DCDP RPS (Reference No. 7910).

National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (**NIAH**) is an ongoing survey within the Department of Culture, Heritage and the Gaeltacht (**DCGG**). The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from AD1700 to the present day and includes country houses, churches, mills, bridges and other structures of note. As well as a survey of buildings and structures the NIAH has also carried out a survey of historic gardens and designed landscapes. The objective of the latter is to better understand the extent of Ireland's historic gardens and designed landscapes. The Garden Survey does not of yet provide an indication of the garden or designed landscapes heritage importance.

The building survey for this part of Dublin City was carried out in 2014 (www.buildingsofireland.ie) and has yet to be published. The gardens of Sybil Hill House (DU-50-O-203374) and St Anne's (DU-50-O-217373) are listed on the NIAH.

Cartographic Sources

Information gathered from cartographic sources is fundamental to the identification of archaeological and architectural heritage sites, including cultural landscapes e.g. demesne landscapes, which, based on the level of landscape change, are now often identified from cartographic records alone. The earliest OS maps date to the late 1830s and early 1840s, but much change has occurred in the use and treatment of the landscape in the intervening years, particularly during the second half of the 20th century, making these a valuable resource in tracing the development of a study area.

Placenames Database of Ireland

The Placename Database of Ireland website (wwww.logainm.ie) hosts online bi-lingual placename research and archival records for townlands. A townland name may preserve valuable information relating to its archaeology, history, folklore, pervious ownership, topography or land use. Many place names were anglicised by the OS which begun in the 1830's. Despite some inaccuracies in translation, the Gaelic, Viking, Anglo-Norman and English origins of place names are generally recognisable.

Documentary Sources

Documentary sources are a valuable means of completing the written archaeological, architectural and cultural heritage record of an area, and of gaining insight into the history of the receiving environment. A list of all consulted documentary sources is provided in bibliographic form.

11.3.2.2 *Site Inspection*

On-site inspection offers the opportunity to examine a study area in light of desktop research and evidence. Inspection is essential in determining the nature and extent of any surviving above-ground evidence, and in predicting the potential effects of a proposal on potential below-ground remains. A Site inspection was conducted by Shanarc Archaeology Ltd. on 15th August 2019.

11.3.2.3 *Legislation, Standards and Guidelines*

The assessment is guided by relevant legislation, standards and guidelines in respect of archaeology, architecture and cultural heritage.

Ireland has ratified several International and European conventions and Directives on the protection of cultural heritage, principally:

- UNESCO World Heritage Convention 1972;
- Charter for the Conservation and Restoration of Monuments and Sites (Venice) 1964;
- European Convention on the Protection of the Archaeological Heritage (Valetta Convention) 1992;
- European Convention on the Protection of the Architectural Heritage (Grenada Convention) 1985; and
- EIA Directive.

National legislation protecting cultural heritage sites comprises:

- National Monuments Act 1930, amended 1954, 1987, 1994 and 2004;
- Heritage Act 1995;

- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999; and

- Planning and Development Act 2000 (as amended).

The following standards and guidelines relating directly to archaeology, architecture and cultural heritage were also consulted as part of the assessment:

- *Frameworks and Principles for the Protection of the Archaeological Heritage* (1999), Department of Arts, Heritage, Gaeltacht & the Islands;

- *Policy and Guidelines on Archaeological Excavation* (1999), Department of Arts, Heritage, Gaeltacht & the Islands;

- The Heritage Council, 2000. *Archaeology & Development: Guidelines for Good Practice for Developers (2000),* The Heritage Council;

- *Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Scheme* (2005), National Roads Authority; and

- *Architectural Heritage Protection Guidelines for Planning Authorities* (2011), Department of Arts, Heritage, Gaeltacht & the Islands.

11.3.2.4 *Impact Assessment Criteria*

The impact assessment undertaken in this Chapter is based on the methodologies presented in the *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017).

A potentially significant effect in terms of archaeology, architecture and cultural heritage is described as an impact to a potential feature / area of archaeological, architectural or cultural heritage that could be significant without mitigation measures being implemented, e.g. potential sub-surface archaeological remains.

11.3.3 *Existing Receiving Environment (Baseline Situation)*

11.3.3.1 *Site Context*

The redline boundary for the Proposed Development is c. 6.7ha, predominantly set out as grassland (formerly utilised as sports fields). The Site is enclosed by the grounds of St Anne's Park to the north, east, and south; by the sportsgrounds of St Paul's College to the south; and to the west by St Paul's College, Sybil Hill House and residential development at 'The Meadows' residential estate. The 4 & 5 storey Convent building / grounds of the Little Sisters of the Poor is located to the immediate west of Sybil Hill Road.

11.3.3.2 *Archaeological Investigations within the Vicinity of the Proposed Development*

A review of the Excavations Bulletin website for previous archaeological investigations within the site of the Proposed Development produced no results. Several investigations have been undertaken within the wider vicinity.

Roadworks in Raheny village in the 1970s uncovered a ditch interpreted by investigating archaeologist Leo Swan as the outer enclosure of the medieval ecclesiastical site of Raheny. Archaeological investigations in 1996 at Cahill Motors, Raheny, revealed a similar feature. The investigating archaeologist concluded that *'the area in which the ditch was found was important historically throughout the medieval period, and there are other boundary and defence features of which such a ditch could form a part'* (Carroll 1996).

Test trenching in advance of a small building extension at 17 Main Street, Raheny, produced no evidence of archaeological remains (Carroll 1994).

Nothing of archaeological significance was found during investigations at the possible site of a windmill at St Francis's Hospice, Raheny (Coughlan 1999).

Investigations at Belmont Park, Raheny, at the possible site of an 18th century windmill produced no evidence of archaeological remains (Bolger 2000).

Investigations at 6 Main Street, Raheny produced five no. sherds of medieval pottery (Dehaene 2004).

Nothing of archaeological significance was found during test trenching at St Assam's Church, Howth Road, Raheny (Ó Maoldúin 2009). Disturbed medieval and post-medieval deposits were identified during archaeological monitoring at Scoil Assaim in the zone of archaeological potential around the ecclesiastical complex at Raheny in 2017 (McLoughlin 2017).

Test trenching at the site of Tonlegee House in July 2006, in the zone of archaeological potential of DU015–078, a dwelling site illustrated on the Down Survey and perceived to be located on the site of Tonlegee House, identified post-medieval structural remains. The remains related to demolished structures, including a well, associated with Tonlegee House dating from 1872–1937 (Dennehy 2006).

Nothing of archaeological significance was found during monitoring in 2008 and 2009 within the grounds of St. Joseph's Hospital, Springdale Road, Raheny (Lynch 2008).

Archaeological monitoring of the Dublin North Fringe Water Supply Scheme, including c. 35km of water pipeline, uncovered tramlines beneath the Howth Road and timbers buried at a depth of 3m in Clontarf (Rogers 2002). A possible medieval closed-arch culvert was uncovered at a depth of 1.2m in Clontarf (Rogers 2003).

Nothing of archaeological significance was found during test trenching at 2 Kincora Road, Clontarf (Myles 2005).

11.3.3.3 *Archaeological and Historical Context*

The extent of prehistoric and historic activity within the wider study area is attested to by the number and range of known archaeological monuments within the surrounding landscape. This part of Dublin was attractive for settlement due to its location near the coast, proximity to rivers and streams (including the Naniken Stream and Santry River) and fertile land.

11.3.3.3.1 *Prehistoric Period*

Mesolithic *c*. 7000-4000BC

Wooden fish traps dating to 6100-5760 cal BC [16]were found on the Mesolithic shoreline at Spencer Dock, Dublin 1 (McQuade 2008, pg. 8–11). A number of shell middens and flint scatters (the most common evidence of Mesolithic activity) are located along the coast from Sutton and Malahide to Balbriggan, most notably on Lambay Island (Baker 2010, pg. 8) and at Howth and Dalkey (Waddell 1998, pg. 19).

Neolithic *c*. 4000-2500BC

A Late Neolithic single cist burial was excavated at Drimnagh (Kilbride-Jones 1939). It was covered with a mound, into which Bronze Age cremation burials were later inserted. Neolithic stone axe production has been recorded at Lambay Island (Cooney 2001).

Bronze Age *c*. 2500-800BC

An Early Bronze Age burnt mound dated to *c*. 1938-1744 cal BC was excavated at a multi-period site (Bronze Age, Viking, medieval and post-medieval) at Hammond Lane, Dublin 7 (Cryerhall 2006).

Iron Age *c*. 800BC-AD500

Evidence of Iron Age settlement in the form of waterfront structures (*c.*160–60BC), including carved wooden vessels, has been excavated at Ormond Quay, Dublin 1 (Bolger 2011).

11.3.3.3.2 *Historic Period*

Early Medieval Period *c*. AD500-1100

Placenames incorporating 'rath' (otherwise known as ringforts, the circular fortified settlements of the period) such as Raheny (from *Ráth Éanna* or *Ráth Eanaigh*) indicate early medieval settlement.

The site of the Proposed Development lies between the early medieval churches of Raheny and Clontarf. Raheny (DU015-082001) was dedicated to St Assam and was also associated with St Nessan's foundation on Ireland's Eye (the name Assam may be a corruption of Nessan). *Circa* AD550 St Comgall of Bangor established a church in Clontarf (DU019-015001).

The Proposed Development is primarily situated in Maryville townland, and partly in adjacent Sybilhill townland. Maryville townland forms the south-west extent of the civil parish of Raheny (**AP1**); Sybilhill townland to the west belongs to the civil parish of Clontarf. Civil parishes were based on the medieval church parish, which could preserve earlier Gaelic *tuath* territorial

[16] ''calibrated years before the present" or "calendar years before the present" and that is a notation which signifies that the raw radiocarbon date cited has been corrected using current methodologies.

boundaries, although no existing land unit corresponds with the early medieval *tuath* (Stout 2017). According to Stout (2017), the closest substitute for the *tuath* is the barony.

Roadworks in Raheny village in 1970 uncovered a ditch interpreted by Leo Swan as the outer enclosure of the medieval ecclesiastical site (DU015-082003) of Raheny. Archaeological investigations in 1996 at Cahill Motors, Raheny revealed a similar feature.

Holy wells in the wider vicinity include one no. at St Anne's Park (DU019-012) and one no. on The Stiles Road, Clontarf (DU019-013) while such wells are frequently associated with early ecclesiastical sites, their ritual use may stem from the prehistoric period.

The Vikings settled at Dublin in AD841. While some debate surrounds the exact location of the Battle of Clontarf (DU019-020) in 1014, it is generally considered to have been fought from Phibsborough to the sea, on both sides of the Tolka River. The Vikings summoned by Sitric Silkbeard, the Hiberno-Norse King of Dublin, beached their boats on the strand at Clontarf and set up camp there. It would appear that many Vikings remained settled in Fingal after 1014 (McIntyre 1987, pg. 83).

In the early 11th century, land in the area was held by Sitric, King of Dublin. *Circa* 1030, Sitric gave Dúnán, first Bishop of Dublin, land to build the Church of the Blessed Trinity (Christchurch Cathedral) in Dublin, along with the lands of 'Beal-dulek [Baldoyle], Rechen [Raheny] and Portrahern [Portrane] with towns, cattle and corn' (Ware 1705, pg. 134).

Medieval Period *c*. AD1100-1600

In 1169, the Cambro-Norman Richard FitzGilbert de Clare (also known as 'Strongbow') seized Dublin. Shortly after, in 1171, Henry II arrived to establish Dublin as the capital of the Norman territory in Ireland.

The Battle of Clontarf 1014

The Battle of Clontarf was considered significant by its contemporaries and was noted in the *Chronicon Scotorum*[17] and the *Annals of Ulster*[18]. It was one of the few Irish battles recorded outside of Ireland, most notably in Wales and France (Enclann *et al*., 2008, pg. 2). However, few, if any, of those recording these events in the 11th century was eye-witnesses (Enclann *et al.*, 2008, pg. 10). The battle was later described in the early 12th century *Cogadh Gaedhel re Gallaibh*[19], incorporated into the late 13th century Icelandic *Brennu-Njáls*[20] saga, and the

[17] A medieval Irish chronicle, covering the period from prehistoric times to AD 1150, with some interludes.

[18] Medieval Irish annals, spanning the years AD 431 to 1540.

[19] The *Cogadh Gaedhel re Gallaibh*, 'The War of the Irish with the Foreigners', is a medieval text that celebrated the victories of the Dál Cais over the Vikings, from the Battle of Sulcoit in AD 967, to Clontarf in 1014. Written *c.*1100, it drew heavily from the earlier Annals of Ulster. The saga was written for Muirchertach Ua Briain, Brian's great-grandson. It fits within the 11th and 12th century genre of propaganda literature that focussed on historic Irish victories over the Vikings; by negatively portraying the Vikings, the sagas argued a justification for Viking ports to be brought under Irish rule.

[20] The *Brennu-Njáls*, 'The Story of Burnt Njáll', deals with blood feuds in the Icelandic Commonwealth. It was written in the early 13th century and describes events between AD 960 and 1020.

Annals of Inisfallen[21], amongst others. Six hundred years had passed between the battle and its description in the early 17th century *Annals of the Four Masters*[22]. It is difficult to differentiate between historical fact and the myths that grew around the battle, even in near-contemporary accounts. The number of combatants that participated grew with successive retellings.

Brian Bóruma was a member of the Dál Cais, a previously obscure family based in Clare who began to emerge in the late 10th century. The battle was a victory for Brian, his son Murchad and Maelsechlainn II (king of Mide), over a Hiberno-Norse alliance of Mael Mórda mac Murchada (king of Leinster), his nephew Sigtrygg Silkbeard (king of Dublin), and their Norse allies under Sigurd (earl of Orkney) and Brodir (of the Isle of Man).

In 1013, war broke out between Brian and his tributaries, and Mael Mórda mac Murchada and Sigtrygg Silkbeard. Brian invaded Leinster, advancing to Dublin, and blockaded the town until Christmas, when a scarcity of provisions forced him to break up camp and return to Kincora in Clare. In early spring 1014, Brian, leading the joint forces of Munster and Connaught, resumed the blockade, demanding submission or battle. They attacked Viking settlements at Fingall and Howth. On Palm Sunday 1014, the overseas reinforcements that the Dublin Vikings and their Irish allies had been waiting for, arrived (O'Gorman 1879-80, pg. 171-73).

According to the *Cogadh Gaedhel re Gallaibh*, Brian's forces were head-quartered at the *faiche Átha Cliath*, the 'green of Átha Cliath'. Various commentators have interpreted this as the plain between Kilmainham and the town, on the south side of the Liffey; others read it as the plain at the extra-mural settlement on the northern side of the Liffey.

The Viking army assembled in Dublin appear to have moved north, in response to the attacks in Howth and Fingall. The Irish forces may have attacked from the west or north, effectively pinning the Viking forces against the sea (Enclann *et al.*, 2008, pg. 8). The battle was reputed to have last 12 hours (from high tide to high tide), with heavy casualties on both sides. Brian's forces were victorious, but he was slain by Brodir.

The location of the battle has been much debated. Many 19th century commentators believed the battle took place close to the city of Dublin, somewhere on the ridge that runs from present day Phoenix Park towards the River Tolka near Clonliffe. In addition, centuries of reclamation and development have radically altered the coastline of Dublin Bay, which adds to the difficulty of locating the battle site.

Based on documentary, literary and archaeological evidence uncovered to date, there is nothing that specifically suggests that the site of the Proposed Development was associated with the events of 1014. Mitigating any potential impact to the general archaeological potential of the Proposed Development is addressed in the recommendations contained in Sections 11.3.6.1 Archaeological Investigations. Therefore, in the (however unlikely) event that any sub-surface archaeological finds or features associated with the events of 1014 were situated within the site of the Proposed Development, these would be identified in advance of construction.

[21] A medieval Irish chronicle, covering the period AD 433 to 1450, believed to have been written between the 12th and 15th centuries.

[22] Medieval Irish chronicles, compiled 1632-36, spanning the period up to AD 1616.

In 1171 Gill Mololmoa, a Dane otherwise known as Gilcolm, held lands in Raheny. Strongbow seized Raheny in 1172 and granted it to Vivien de Cursun (Murphy and Potterton 2010, pg. 91). His son John succeeded as 'Lord of Rathenny and Kilbarrock' but was murdered by the de Lacy's (the lords of Meath) in 1208. Raheny church came under the control of St Mary's Abbey, Dublin, who also acquired grange lands in Raheny in 1172-3 (Murphy and Potterton 2010, pg. 75). Raheny was among the principal medieval manors of the Dublin region (Murphy and Potterton 2010, pg. 170).

In 1172 the lands of Clontarf were granted to Adam de Pheope by Hugh de Lacy, the Norman Lord of Meath. Henry II subsequently granted Clontarf manor to the Knights Templar, as part of his penance for the murder of Thomas a Beckett, confirmed by the monarch in 1226 (McIntyre 1987, pg. 26). Upon the suppression of the Knights Templar in 1307, the property passed to the Knights Hospitallers (also known as the Knights of St John of Jerusalem), who were headquartered at Kilmainham.

In 1317 the invading army of Edward Bruce, brother of Scottish king Robert Bruce, reached the villages on the northern side of Dublin City.

According to Friar John Clyn[23], the Black Death reached Ireland in 1348 through the port of either Howth or Dalkey. It devastated the population of Dublin City, and re-occurred in 1362, late in the 14th century (Foley 2013, pg. 177-8) and again in 1605 (Ball 1917, pg. 92).

Following the dissolution of the monasteries in 1540-41, the St Lawrences of Howth acquired lands in Raheny and Baldoyle (Murphy and Potterton 2010, pg. 109). The Crown took possession of the Clontarf estate in 1541, and the Order of the Knights Hospitallers was disbanded in 1542. Under the 'surrender and regrant policy', the last Prior of the Knights, Sir John Rawson, was granted a peerage, created Viscount Clontarf, granted an annual pension of 500 marks and a seat in Parliament (McIntyre 1987, pg. 27).

Post-Medieval Period *c.* AD1600-1800

By 1600 the St Lawrences of Howth controlled most of the Raheny area. In that same year the 'Manor, territory, tithes, town and lordships' of Clontarf were granted by Elizabeth I to Sir Geoffrey Fenton, principal secretary of state for Ireland. Feton's son, Sir William, inherited the property in 1608. It subsequently passed to the King family through marriage (McIntyre 1987, pg. 86).

In the 1640s, property and parish boundaries on the northern edge of Dublin City, at Raheny, Clontarf, Coolock, Killester and Glasnevin, were in a state of flux (Smyth 1992, pg. 153). The 1641 Rebellion received widespread support in Raheny and Clontarf. To suppress this, Sir Charles Coote led his forces from Dublin City, burning the village of Clontarf and attacking Clontarf Castle. In 1649 Cromwell granted the confiscated Clontarf estate to Captain John Blackwell, who assigned it to John Vernon, quartermaster general of Cromwell's army in Ireland. Vernon relinquished the lands upon the restoration of Charles II to the throne in 1660. However, they were returned to another member of the Vernon family. The castle remained in their possession until Edward Kingston Vernon died in 1967.

[23] A 14th century Franciscan friar and annalist who lived in Kilkenny during the Black Death.

The Down Survey map indicates the extent of the St Lawrence, Lords of Howth, holdings in the area (Figure 11.6).

By the 1660s, Raheny, Clontarf and Drumcondra entered a new phase, becoming centres for gentry settlement outside of the City (Smyth 1992, pg. 174).

In 1732 John Vernon of Clontarf Castle leased Sybil Hill House and 36 acres (14.57ha) of land to James Barlow for a term of 999 years (Gogarty 2013, 27). In the same year, Joseph Fade, a banker from Thomas Street, Dublin, leased Furry Park from Vernon (Gogarty 2013, pg. 23).

11.3.3.3.3 *19th & 20th Centuries*

The population of Dublin City is estimated to have reached 200,000 by 1800 (Casey 2005, pg. 44). It was now one quarter the size of London, and twice the size of any other city in the British Isles. The rapid growth in population brought with it great poverty and disease. With the seat of government moving to Westminster in 1800 under the Act of Union, Dublin City entered a steep political and economic decline.

During this period, Raheny remained a quiet country village with most of the population engaged in agriculture. Lewis (1837) noted, 'The land is in general of good quality, the greater portion is meadow and pasture, and the arable land produces excellent crops of wheat; the system of agriculture is in a very improved state, and there is neither waste land nor bog. Limestone of good quality is abundant and is quarried for building and for agricultural purposes'. Lewis (1837) also listed Sybil Hill among the 'many handsome seats and villas' of Clontarf.

D'Alton (1838, pg. 55) records that the population of the parish and village of 'Ratheny'[24] in 1821 was 505, rising to 608 by 1831. Lord Howth remained the chief proprietor. The opening of the Dublin and Drogheda Railway in 1844 drew an influx of new residents to the area.

In 1835 Benjamin Lee Guinness and Arthur Guinness Jr., sons of Sir Arthur (of brewing fame) of Beaumont, Drumcondra, purchased the Thornhill estate in Raheny. In 1837 Thornhill House was demolished and St Ann's House, named after a holy well (DU019-012) within the estate, was constructed for Benjamin Lee and his new wife, his cousin Elizabeth (Harris 2009, pg. 2). Benjamin, an MP for Dublin in 1865, was an antiquarian with an interest in ancient monuments in Ireland and the Classical world, which strongly influenced the design of the gardens. Benjamin's son Arthur, later Lord Ardilaun, inherited the estate in 1868 and rebuilt the house in 1873-5. Arthur and his wife Olivia Hedges-White, a descendant of the Whites of Bantry House, shared a love of horticulture and further developed the estate and gardens. In the late 1870s a number of neighbouring properties, including Maryville, Sybil Hill House, Bettyville, Charleville and Bedford Lodge, were added to the St Ann's estate. These were kept as homes for their stewards (Gogarty 2013, pg. 16). Upon her death in 1925, Lady Ardilaun left the estate to her husband's nephew, the Right Rev. Benjamin Plunket, Church of Ireland Bishop of Meath (Sharkey 2002, pg. 73). In 1938, Dublin Corporation issued a Compulsory Purchase Order (**CPO**) for the St Ann's area (*ibid*, pg. 80). Bishop Plunket sold St Ann's estate to Dublin Corporation in 1940 for c. £55,000, retaining Sybil Hill House as a private residence and 22 acres (8.9ha) of parkland (present day St Paul's College and the Vincentian Order parochial

[24] Until the mid 20th century, many local residents pronounced the placename as 'Rahenny' or 'Ratheny'.

house). Dublin Corporation used the lands for public housing developments (c. 200 acres), nurseries and recreational parkland and playfields (c. 240 acres). St Ann's House was destroyed by fire in 1943, and the ruins were demolished in 1968.

In 1948 Dublin Corporation sold part of the St Ann's estate to the Vincentian Fathers to build a boy's secondary school. Following Bishop Plunket's death in 1947, his son Benjamin sold Sybil Hill House to the Vincentians in 1950 (McIntyre 1987, pg. 149), who opened a secondary school in the house. Sybil Hill Road[25] was laid out in the 1950s, and the original entrance avenues to Maryville and Sybil Hill on the Howth Road were replaced with a residential development.

In 1952, Dublin Corporation sold part of the St Ann's estate behind Sybil Hill House to the Vincentian fathers for £4,200 (Sharkey 2002, pg. 91). The lease of Maryville House was assigned to Dublin Corporation in 1956.

St Paul's College (Secondary School) was located in the house until the present school building, designed by Downes and Meehan, was completed in 1957 (Gogarty 2013, pg. 28). Sybil Hill House became home to retired Vincentian Fathers and continues to fulfil that function.

In 1959 Dublin Corporation sold Maryville to the Vincentian Fathers for £3,500, who demolished it and used its 4 acres as additional playing fields (Gogarty 2013, pg. 28).

11.3.3.4 *Cartographic Analysis*

Historic Mapping

Relevant extracts are presented from the following consulted historic maps:

- Down Survey map, 1656-58 (Figure 11-6);
- Rocque's 1760 map of County Dublin (Figure 11-7);
- First edition Ordnance Survey 6" map, 1837-43 (Figures 11-8, 11-9);
- 1860 edition Ordnance Survey 6" (Figure 11-10);
- Weller's1885 map (Figure 11-11);
- 1906-09 edition Ordnance Survey 25" map (Figures 11-12, 11-13); and
- 1938 edition Ordnance Survey map (Figure 11-14).

[25] The spelling of 'Sibyl Hill' had changed to 'Sybil Hill' by this time.

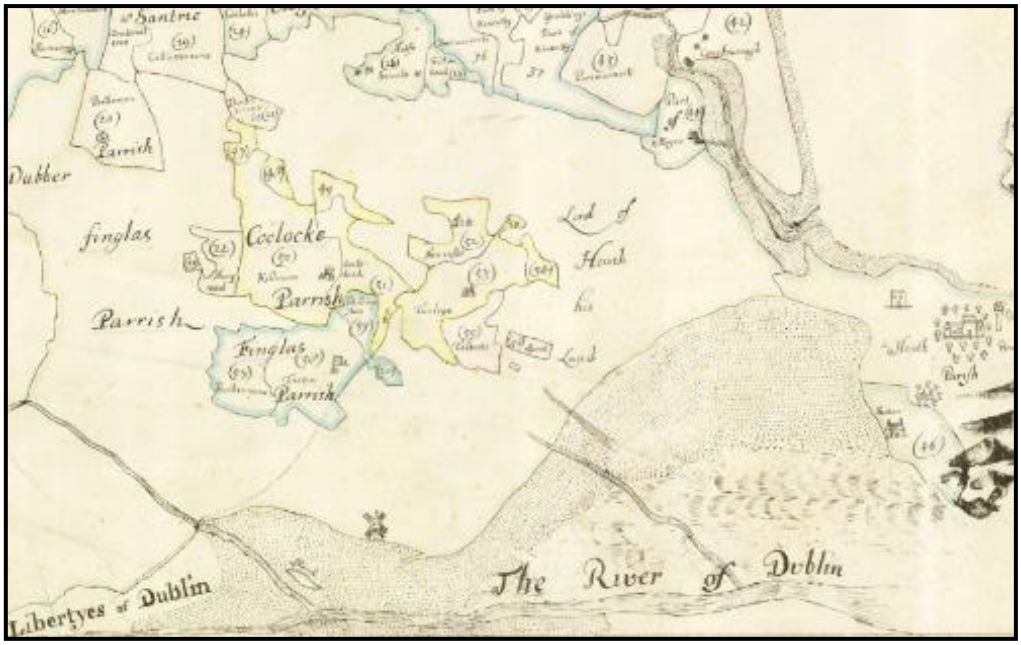

Figure 11-6: Extract from 1656-58 Down Survey Map of Barony of Coolock

By 1600 the St Lawrence family of Howth controlled most of the Raheny area. This is reflected in Petty's 1656-58 Down Survey Map, with extensive land marked as 'Lord of Howth his Land' (downsurvey.tcd.ie), see Figure 11-6. The Naniken River and Santry River appear to be represented; the Naniken Stream being the more southerly of the two. The Santry River was formerly known as 'Skillings Glas', and an area of the same name is marked on the 1656-58 map (south-east of 'Coolock Parish'). The Proposed Development is located on the southern side of the Naniken River, approximately located within the area marked as 'Lord of Howth his Land'.

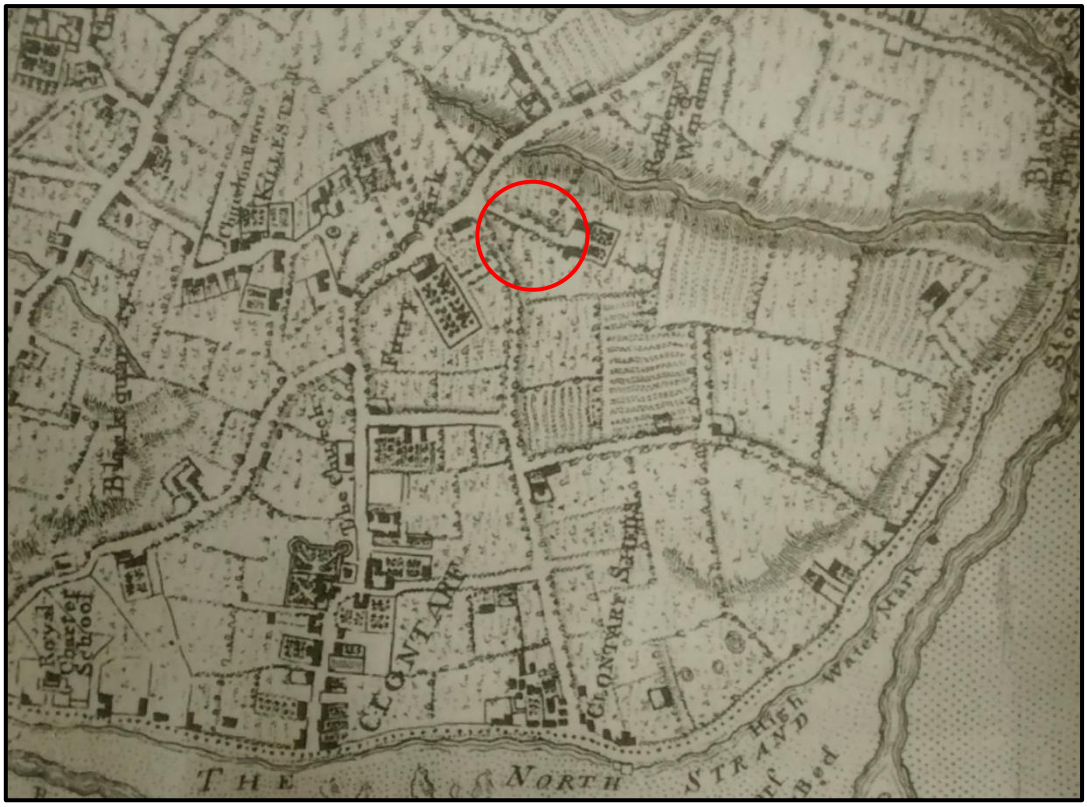

Figure 11-7: Extract from Rocque's 1760 Map of County Dublin, Indicating an un-named Property (circled in red) on the Southern Side of the Naniken River

Rocque's map of 1760 (Gogarty 2013) depicts an un-named property situated on the southern side of the Naniken River, north-east of Furry Park, see Figure 11-7. As illustrated, it comprised two structures with gardens to the east and a linear entrance avenue. While it is not known exactly when Maryville and Sybil Hill houses were constructed, it is established that Sybil Hill had been constructed by this time (1760), as in 1732 John Vernon of Clontarf Castle leased Sybil Hill house and 36 acres (14.57ha) of land to James Barlow for a term of 999 years (Gogarty 2013, pg. 27). In the same year, Joseph Fade, a banker from Thomas Street, Dublin, leased Furry Park from Vernon (Gogarty 2013, pg. 23). While this may suggest that Sybil Hill is the un-named property marked on Rocque's 1760 map, the footprint of this property is aligned on a similar south to south-west / north to north-east orientation to Maryville House and gardens, as depicted in detail on later OS mapping (Figures 11-8 to 11-9, 11-12 and 11-13). Rocque's map also depicts the north-south orientated road that later developed into present day Sybil Hill Road. As depicted in detail on later OS maps, Sybil Hill House was built on the eastern side of this road, which served as an avenue, and its garden on the western side (Figures 11-8, 11-9, 11-12 &11-13). This is not evident on Rocque's 1760 map, but does not preclude the possibility of the gardens being remodelled, or the road being rerouted, in the interim.

Maryville House, associated buildings, garden and demesne lands are depicted in detail on the 1837-43 first edition OS map (Figures 11-8 & 11-9). The entrance avenue extended north-west to a gate house at the Howth Road and the gardens were laid out on the eastern side of the house. The footprint of Maryville House, as depicted on the 1837-43 first edition map, suggests a south-west facing, possibly five-bay house and probably two-storey, with bowed flanking end bays. A second structure (which may connect the property to the aforementioned

Rocque map, Figure 11-7) was located to the rear, within the south to south-west / north to north-east alignment, in addition to two no. other outbuildings. A long narrow south-west facing structure (probably a greenhouse) was depicted within the garden.

The extent of demesne landscapes within the vicinity of the Proposed Development (indicated as shaded portions of land) in the 1830s is evident in Figure 11-8. These include demesne landscapes associated with Sybil Hill, Furry Park, Rosevale and St Ann's. Sybil Hill House faced southwards and an entrance avenue ran north from a gate lodge on Vernon Avenue.

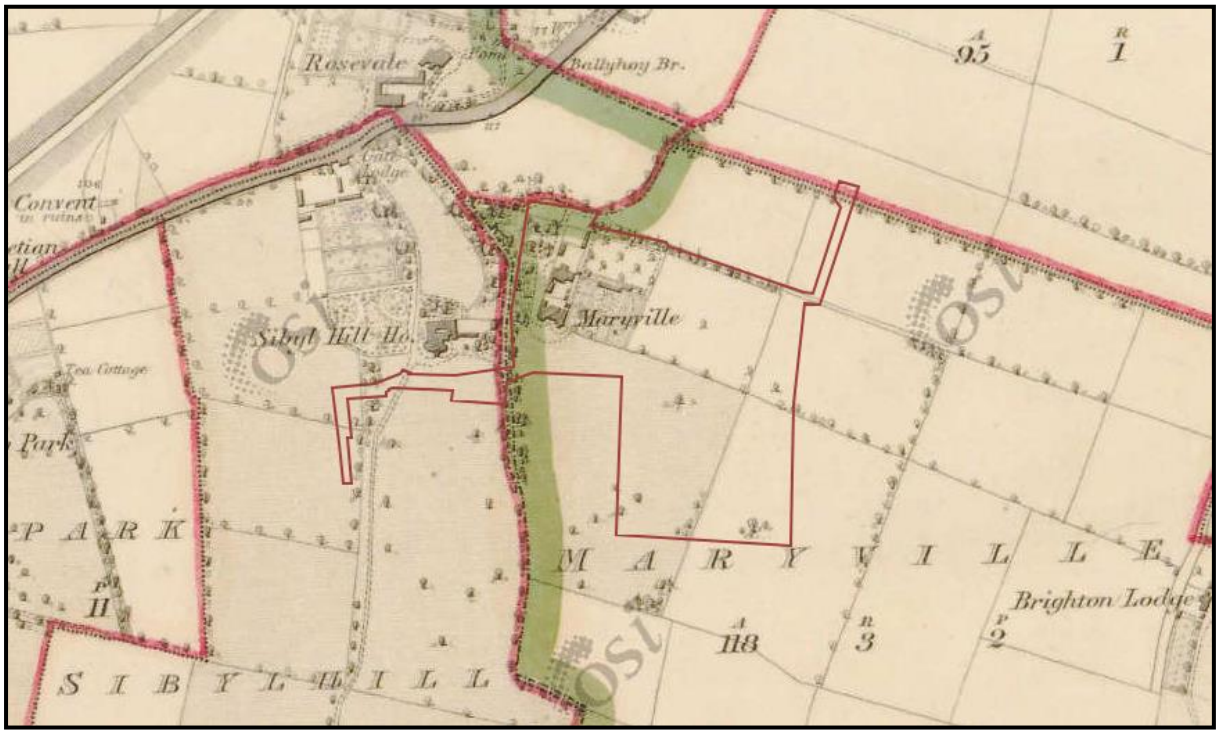

Figure 11-8: Extract from 1837 first edition OS Map, indicating Maryville House, gardens and demesne (fields shaded in grey) and Sybil Hill House, gardens and demesne (fields shaded in grey) (OSI Licence EN 0077919). Approximate development area boundary outlined in red

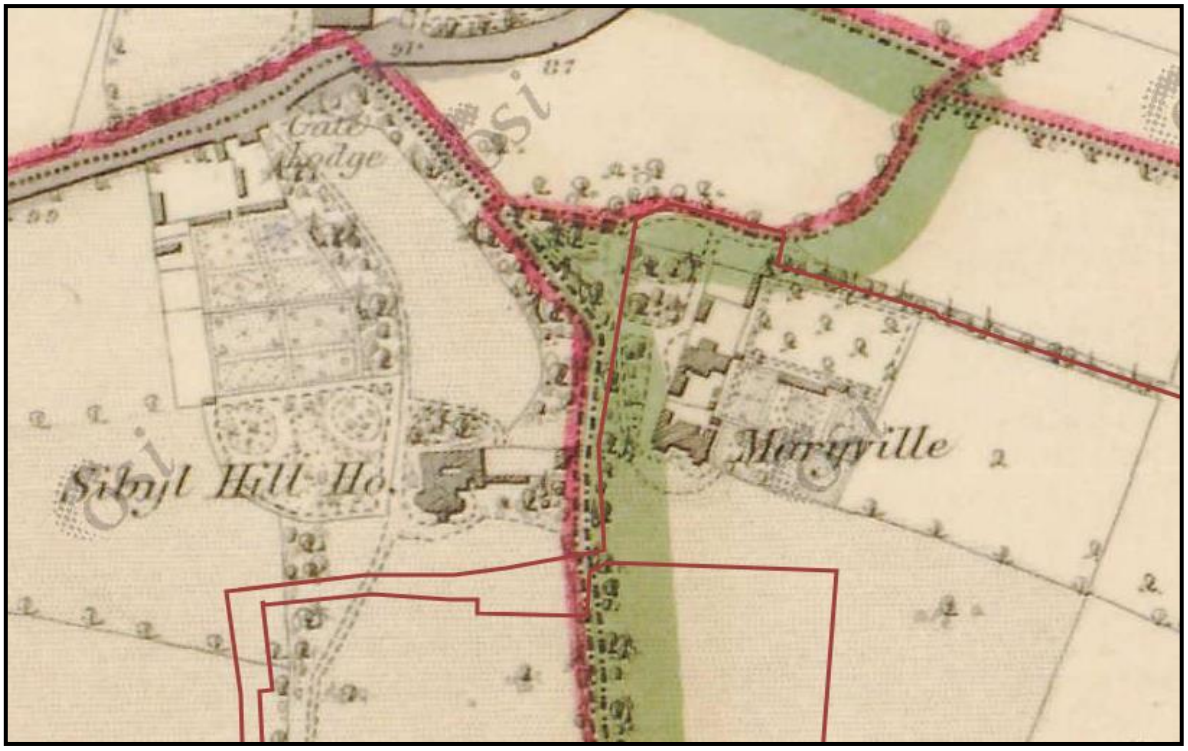

Figure 11-9: Extract from 1837-43 first edition OS Map, showing Maryville House and Gardens and Sybil Hill House and Gardens in Greater Detail (OSI Licence EN 0077919)

Maryville and Sybil Hill House are marked on various 19th century maps, indicating the prominence of the properties during this period, see Figures 11-10 & 11-11.

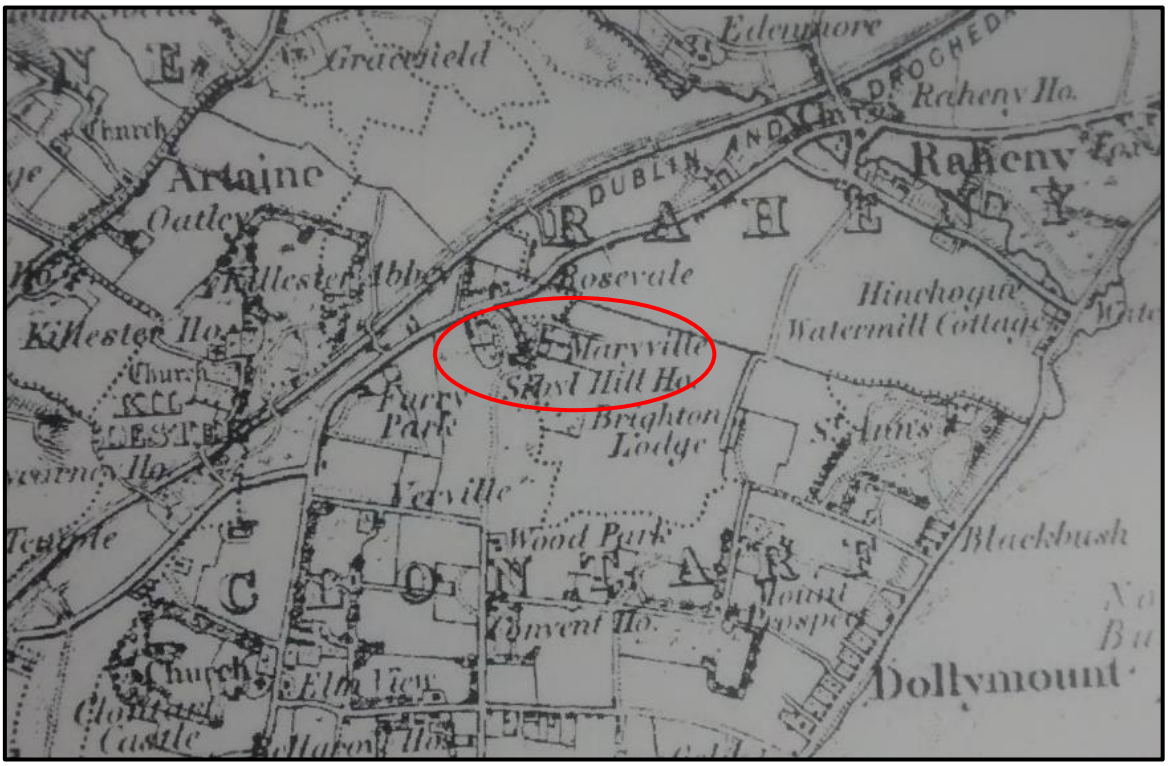

Figure 11-10: Extract from 1860 edition OS Map, showing Maryville House and Sybil Hill House (circled in red) (Lennon 2008) (OSI Licence EN 0077919)

Figure 11-11: Extract from Weller's 1885 Map showing Maryville House and Sybil Hill House (circled in red) (www.swilson.info).

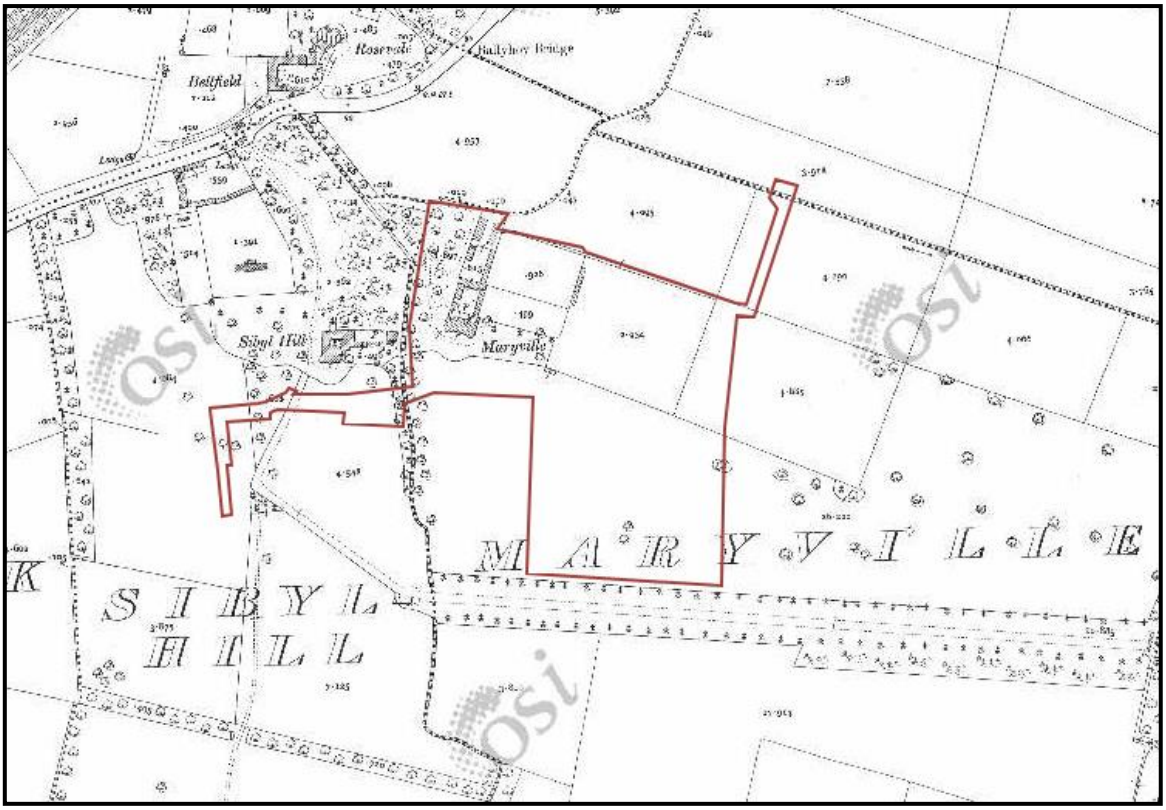

Figure 11-12: Extract from 1906-09 Edition OS Map, indicating Maryville House and garden, Sybil Hill House and garden, and the western extent of the entrance avenue to St. Ann's House (OSI Licence EN 0077919). Approximate site of the Proposed Development outlined in red

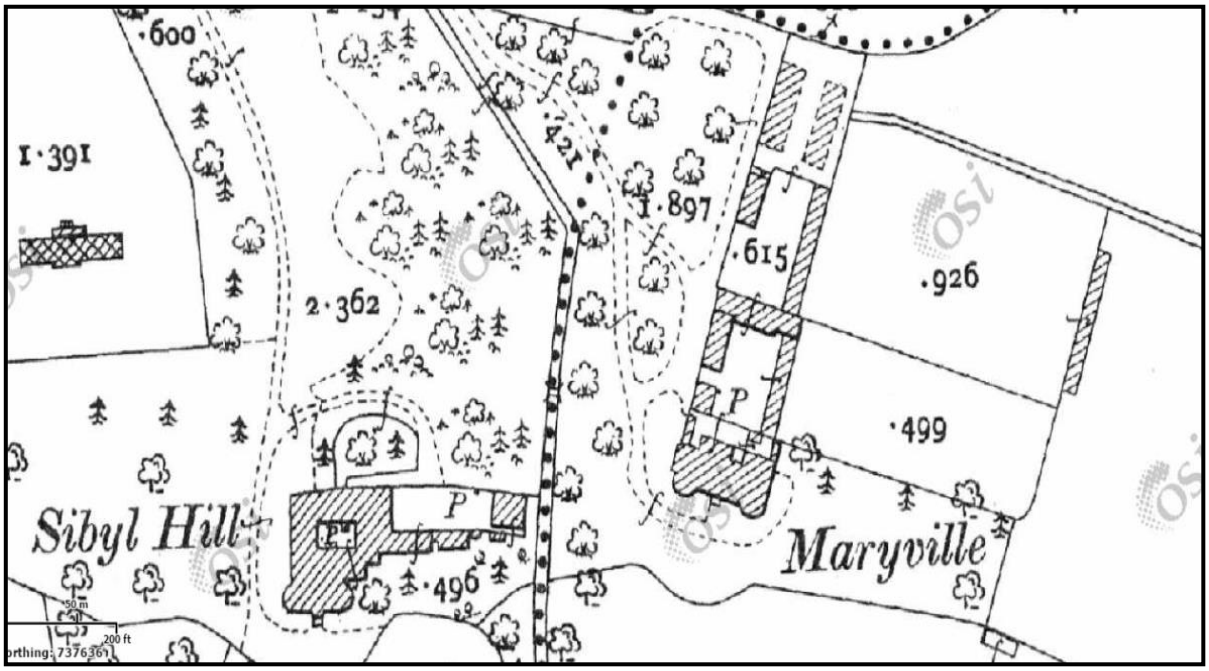

Figure 11-13: Extract from 1906-09 Edition OS Map, showing Maryville House and Garden and Sybil Hill House and Garden in greater detail (OSI Licence EN 0077919)

By the turn of the 20th century, as illustrated on the 1906-09 edition OS map (see Figures 11-12 and 11-13), the footprint of Maryville House had altered little. The structure to the rear had been remodelled and incorporated into additional associated structures that extended in ranges perpendicular to the house, forming enclosed yards. The south-west facing structure in the garden had been removed, and another of similar dimension (probably a greenhouse) built on the eastern side of the garden. While the house was still accessed from the Howth Road, the layout of the approach at the western side of the house had been altered slightly.

In 1880, Sir Arthur Guinness of St. Anne's, Raheny, was raised to the peerage as Lord Ardilaun. To make the occasion, much work was conducted on the estate, including laying out a new 2.4km long entrance avenue (**AH3**) from St Anne's House to the eastern extent of Sybilhill townland (Figures 11-12 & 11-13). The western extent of the new avenue had a direct connection with Sybil Hill House via a modified avenue to the latter from the south. During the first half of the 20th century the avenue by way of the south side of Sybil Hill House was further modified when it was extended to the Howth Road (Figure 11-10). With the main avenue to Sybil Hill House now appearing to be that from the Howth Road, to the north, a new boundary to the south of the house is aligned on a 'Ha-Ha' that currently remains on the Sybil Hill House property (Figure 11-14).

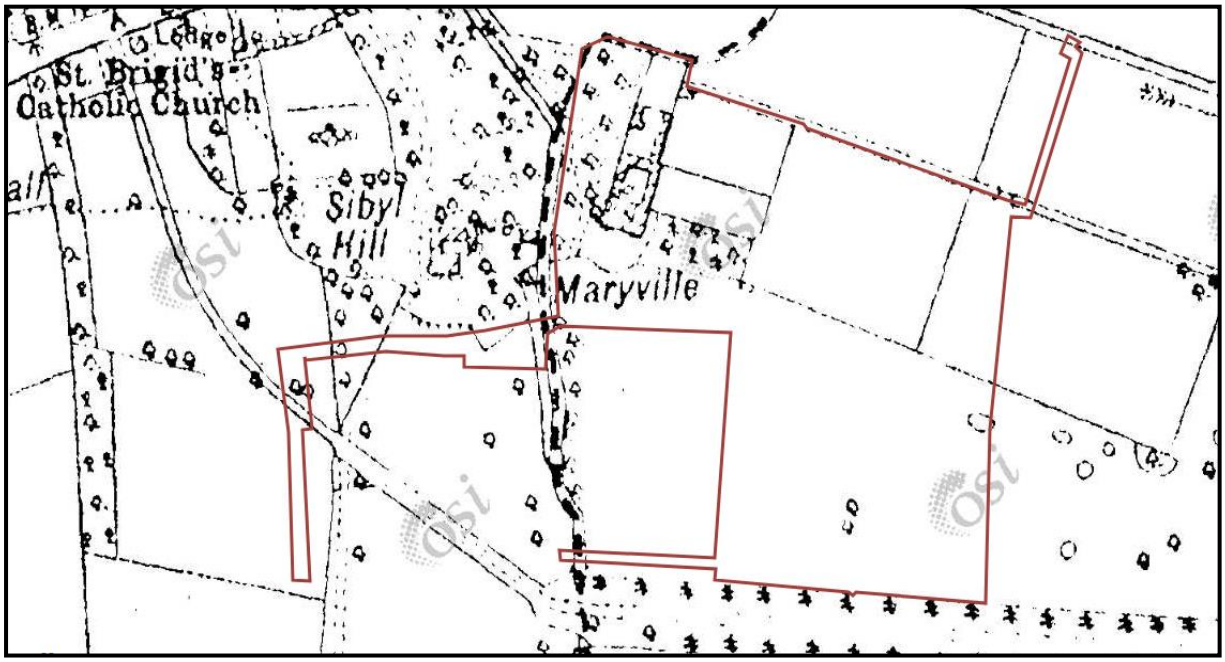

Figure 11-14: Extract from 1938 Edition OS Map indicating Maryville House and Garden, Sybil Hill House Garden, and the western extent of the entrance avenue to St. Anne's House (OSI Licence EN 0077919). Approximate development area boundary outlined in red.

Sybil Hill Road was laid out in the 1950s, on an approximately similar alignment to the entrance avenue to Sybil Hill House from Vernon Avenue (first possibly shown by Rocque, Figure 11-7), and the avenue from St Anne's was subsequently further modified to meet it. The original western extent of the St Anne's avenue forms the southern boundary of the Proposed Development.

Aerial Imagery

Analysis of aerial imagery is valuable in identifying archaeological features by the presence of ‘cropmarks’, ‘shadow-marks’ or ‘soil-marks,’ which may represent the presence of earlier structures. The south to south-west / north to north-east alignment of the site of Maryville House and gardens are roughly visible on aerial imagery, as are former field boundaries (Figures 11-15 and 11-16).

Figure 11-15: Extract from Bing Mapping. The field boundaries marked on the 1837-43 first edition OS map (right) are visible as intersecting cropmarks (marked with red arrows) (OSI Licence EN 0077919)

Figure 11-16: Extract from Google Mapping. The site of Maryville House and associated buildings is roughly visible (marked with red arrows) on this extract. Similarly, associated garden/field boundaries marked on the 1906-09 edition OS map are visible as parallel marks (marked with blue arrows)

Geophysical Survey

A geophysical survey was conducted between the 14th and 16th September 2015, by Shanarc Archaeology Ltd., the results of which are provided in a report by Shanarc Archaeology Ltd. '*Report on the Geophysical Survey, Maryville House, Raheny, Dublin 5'* (2015) (see Appendix 11-2). A series of anomalies were detected, G1-G5. Anomalies G2 and G3 offer the most substantial evidence for remains associated with Maryville House (**AH1**). G1, a distinctive arcing boundary corresponds with that identified on the early OS map editions. Anomalies G4 and G5 suggest possible agricultural or geological features. Recommendations for archaeological monitoring and excavation at the site of Maryville House are provided in the geophysical survey report.

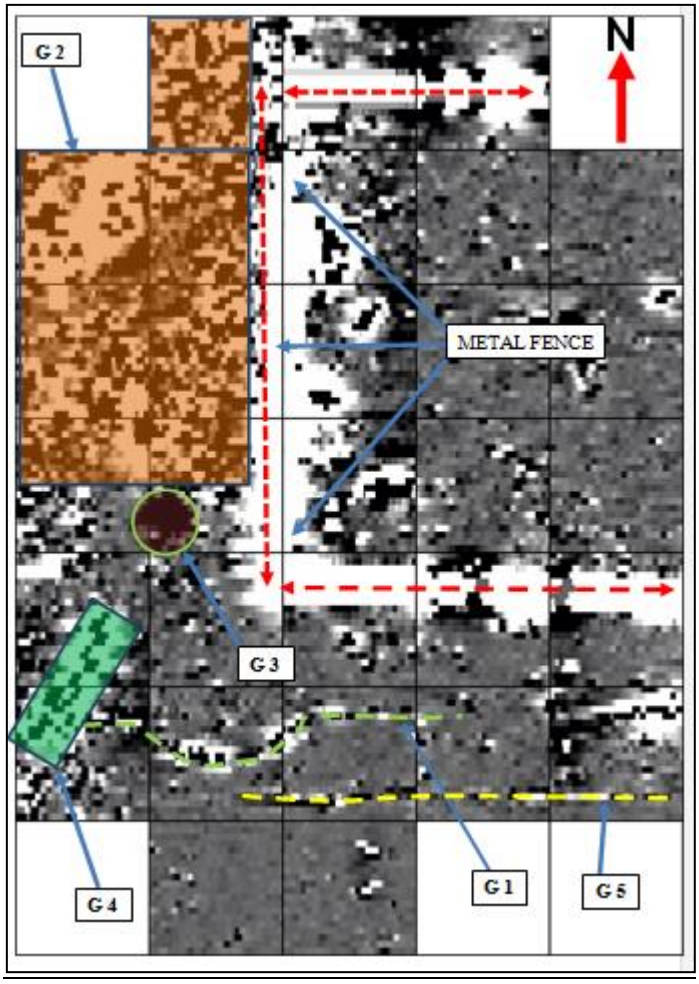

Figure 11-17: Geophysical Survey Interpretation, site of Maryville House (AH1)

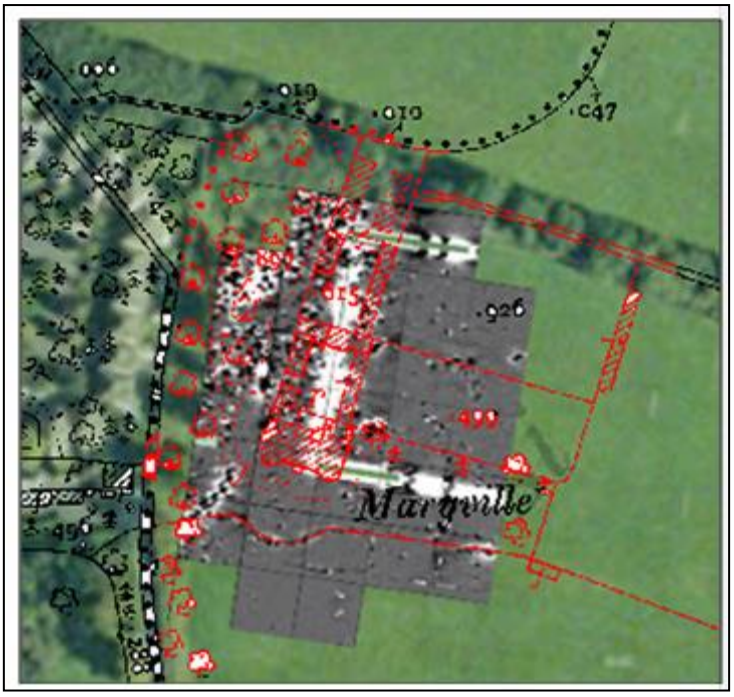

Figure 11-18: Composite Image of an Aerial Photograph with the Geophysics Survey Results Overlaid as an Extract from the 25" Historic Map Indicating the site of Maryville house (AH1)

11.3.3.5 *Site Description and Field Inspection*

The site of Maryville House, an Architectural Heritage site (**AH1**), occupies much of the north-western extent of the site of the Proposed Development. No surface trace of Maryville House and garden was evident during field inspection (Plates 11-13, - 11.4 and 11-15), with the exception of one length of wall (Plates 11.13, 11.16, 11.17, 11.18, 11.19) and some mature trees (Plates 11.13, 11.14); relict parts of the Maryville demesne landscape (**AH1**). A c. 70m length of wall (**AH1**) stands along the northern boundary of the Proposed Development. Built of red brick with a limestone rubble base (evident to the rear), and bonded with lime mortar, the wall stands c. 3.5m high. The brick was predominantly laid in a common bond, with varying courses of headers inserted every five or six courses. The wall is capped with concrete and has been re-pointed in parts with concrete (Plate 11-19). Traces of concrete on the wall suggest the roofline of a lean-to structure, perhaps a greenhouse, once stood within the garden (Plate 11-18).

The site of the Proposed Development is enclosed by modern metal fencing to the north, east and south, and backed by a small drainage stream to the north. There is no surface expression to indicate whether Maryville House was previously enclosed by boundary walls. A modern concrete wall forms the western site boundary; no surface trace of an older boundary wall was observed.

Sybil Hill House, garden and grounds (**AH2**) lie immediately west of the Proposed Development, and immediately north of the existing access road for Sybil Hill House and St Paul's College (Plates 11-21 and 11-22). A 'Ha-Ha', comprising a ditch with dry-stone lying on the north side, is present on the southern vista of the main entry to Sybil Hill House (Plate 11-23). The 'Ha-Ha' appears on the 1938 edition OS map (Figure 11-14).

No surface trace of a physical boundary between the civil parishes of Raheny (Maryville townland) and Clontarf (Sybilhill townland) was noted. This is now delineated by a modern wall topped with railing. The line of the townland boundary is considered to be an Area of Archaeological Potential (**AP1**). The townland boundary with Harmonstown is defined by mature trees and scrub, and forms part of the Area of Archaeological Potential (**AP1**).

The entrance avenue (**AH3**) to St Anne's Park, laid out in 1880 as the grand entrance to the former St Ann's House, forms the southern boundary of the Proposed Development (Plates 11-25 and 11-26). Sybil Hill Road is delineated by a wide grass and tree-lined verge both sides (Plate 11-27) and forms the south-west extent of the Proposed Development.

St Anne's Park also forms the eastern and northern boundary of the Proposed Development. A path exits through the Park, with a stream crossing, defined by a concrete bridge with metal railing, on the alignment of the proposed outfall pipe in the north-east extent of the Proposed Development (Plates 11-28 & 11-29). The concrete base and footings of a former modern structure lies directly to the east of the outfall pipe alignment.

Plate 11-13: View north-east across the site of Maryville House, garden, demesne and extant garden wall (AH1)

Plate 11-14: View west across the site of Maryville House and garden and extant garden wall (AH1)

Plate 11-15: View southwest across the site of Maryville House, garden and demesne (AH1)

Plate 11-16 - View north-east along extant wall of Maryville garden (AH1)

Plate 11.17: View south-west at rear east extent of wall of Maryville garden (AH1)

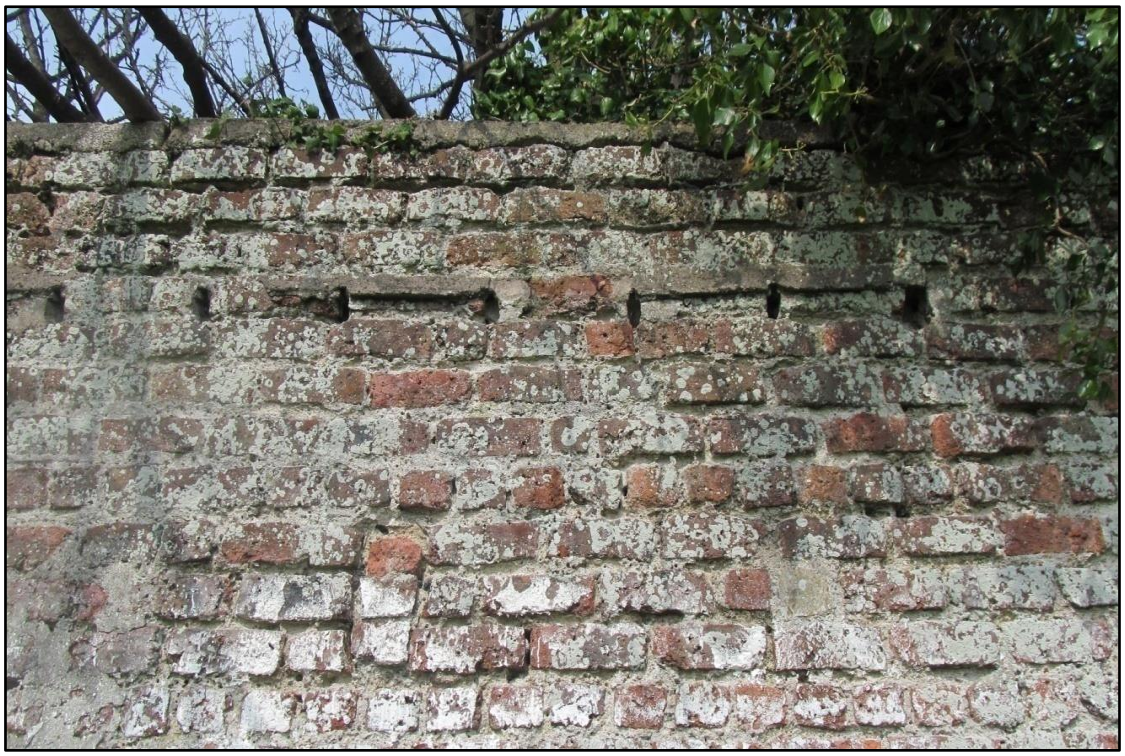

Plate 11.18: Detail of brickwork of extant garden wall (AH1). The remnant ridge of concrete and beam holes suggests a lean-to structure, such as a glasshouse, stood at this location

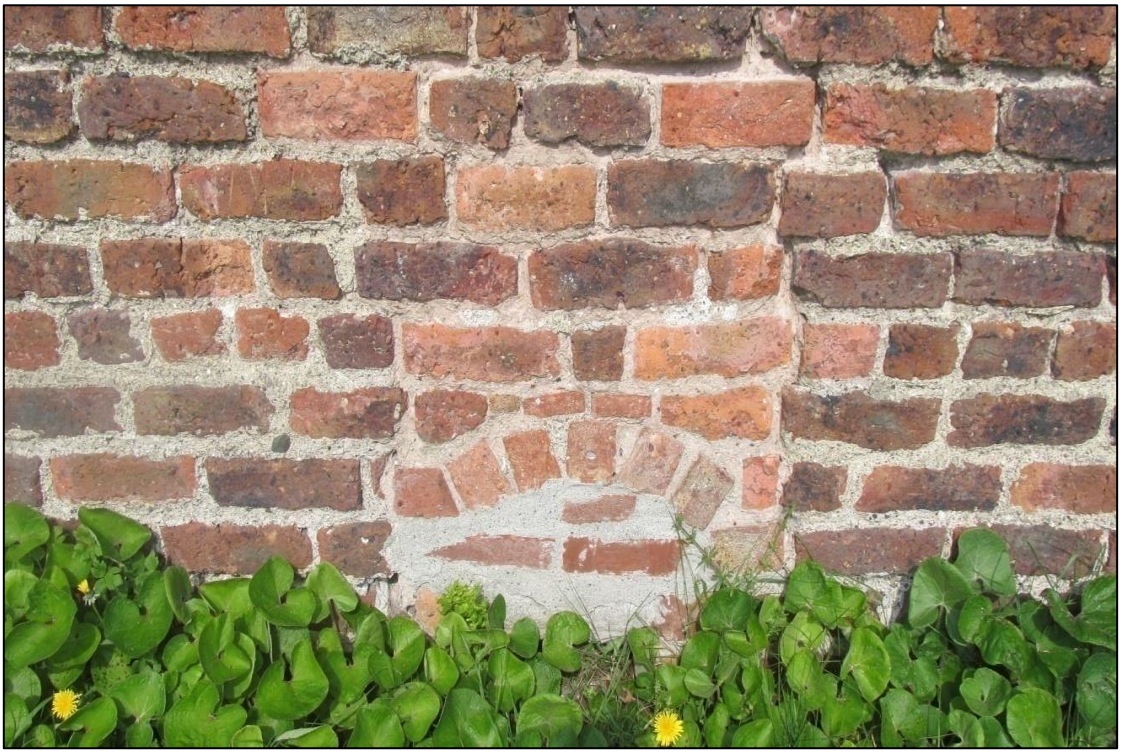

Plate 11.19: One of many later repairs to extant garden wall (AH1)

Plate 11-20: View west across Proposed Development site to Sybil Hill House (AH2) (at centre, beyond trees)

Plate 11-21: West and south elevations of Sybil Hill House (AH2)

Plate 11-14*: Existing access road between Vincentian Residence and St Paul's College at Sybil Hill House (AH2)*

Plate 11-153: View west-northwest along 'ha-ha' associated with Sybil Hill House (AH2)

Plate 11-164*: View north-west across Proposed Development site towards AH1*

Plate 11-25: View east along entrance avenue (AH3) in St Anne's Park

Plate 11-*26: View west across along southern boundary of Proposed Development area, through to entrance avenue (AH3) of St Anne's Park*

Plate 11-27: View north along Sybil Hill Road

Plate 11-28: Concrete bridge with railing over Naniken River at entrance to St Anne's Park on All Saint's Road

Plate 11-29: Footpath and modern building footings in St Anne's Park on out-fall pipe alignment

Plate 11-30: Photograph (undated) of the front elevation of Maryville House (AH1) (Ussher Sharkey 2002, 44)

11.3.4 *Characteristics of the Proposed Development*

The following inventory (Table 11-2) details identified archaeology, architecture and cultural heritage characteristics within and in direct proximity to the Proposed Development. The inventory consists of three no. architectural heritage sites (**AH1**, **AH2** and **AH3**) and one area of archaeological potential (**AP1**).

Table 11-2: Characteristics of the Proposed Development

SITE AH1	**Figures 11-8 – 11-14** **Plates 11-13 to 11-19**
TOWNLAND	Maryville
COUNTY	Dublin
GRID REFERENCE	E720380 N737553
IDENTIFICATION	Cartographic, Field inspection
SITE TYPE	House, associated buildings, garden (site of), extant garden wall and relict demesne landscape
SITE NAME	'Maryville'
NATIONAL INVENTORY OF ARCHITECTURAL HERITAGE REF. NO.	-
RECORD OF PROTECTED STRUCTURES REF. NO.	-
REFERENCES	McIntyre 1987; Grogan 2013
PROXIMITY	Within the Proposed Development
DESCRIPTION 'Maryville' is depicted in detail on the 1837-43 first edition 6" OS map (Figures 11-8, 11-9) and the 1906-09 25" edition OS map (Figure 11-15, 11-23). The year of its construction is unknown. It may	

be represented on the much earlier Rocque map of 1760 (Figure 11-7), which depicts an un-named property comprising two structures with gardens to the east in this general vicinity. The footprint of the property illustrated on Rocque's map is aligned on a similar south-southwest/north-northeast orientation to Maryville as depicted on later OS mapping.

The footprint of Maryville House, as depicted on the 1837-43 first edition map, suggests a southwest-facing, possibly five-bay house and probably two storey, with bowed flanking end bays. A second structure (which may connect the property to the aforementioned Rocque map) was located to the rear, within the south-southwest/north-northeast alignment, in addition to two other outbuildings. A long narrow southwest-facing structure (probably a greenhouse) was depicted within the garden. An undated photograph (Plate 11.28) captures the south façade of Maryville House (Ussher Sharkey 2002, 44).

By the turn of the 20th century, as evidenced on the 1906-09 edition OS map, the footprint of the house itself had altered little. The structure to the rear had been remodelled and incorporated into addition associated structures which extended in ranges perpendicular to the house, forming enclosed yards. The southwest-facing structure in the garden had been removed, and another of similar dimension built on the eastern side of the garden.

Griffith's Valuation of 1850 lists John Barlow Esq. (of Sybil Hill) as the occupier of Maryville, and the Earl of Howth as the lessor. The Barlow family of Sybil Hill had leased Maryville to increase their landholding (Gogarty 2013, 28). In 1876, John Barlow, now a Justice of the Peace, and his son, John Herbert Barlow, sold the lease to Sir Arthur Edward Guinness of St. Ann's, Raheny for $5,000 (Gogarty 2013, 28; Ussher Sharkey 2002, 43). The Guinness family continued to enlarge their estate, purchasing other neighbouring properties. Such homes were retained as accommodation for their stewards (Gogarty 2013, 16). In 1912 Maryville was occupied by Henry Kearney (Porter's Guide and Directory for North County Dublin 1912).

Upon her death in 1925 Lady Ardilaun left the St. Ann's estate – including Maryville - to her husband's nephew, the Right Rev. Benjamin Plunket, Church of Ireland Bishop of Meath. In 1938, Dublin Corporation issued a Compulsory Purchase Order for the St Anne's area. Bishop Plunket sold the estate to Dublin Corporation in 1940 but retained Sybil Hill House as a private residence and 22 acres of parkland (present day St. Paul's College and the Vincentian Order parochial house) (Sharkey 2002, 83).

The lease of Maryville House was assigned to Dublin Corporation in 1956. For several years previous, it was occupied by Cecil Milne, who kept a market garden within its four acres (Ussher Sharkey 2002, 91). In 1959 it was sold to the Vincentian Fathers for £3,500. They later demolished the house and used its four acres as additional playing fields (Gogarty 2013, 28).

Sybil Hill Road was laid out in the 1950s, and the original entrance avenues to Maryville and Sybil Hill on the Howth Road were replaced with a residential development.

Garden wall

A wall on the northern boundary of the development constitutes the only extant above-ground structural remains of Maryville post-demolition. Approximately 70m in length, it was built of red brick with a limestone rubble core and bonded with lime mortar. It stands approximately 3.5m high. The brick was predominantly laid in a common bond, with varying courses of headers inserted every five or six courses. The wall is capped with concrete and has been re-pointed in parts with concrete. It supports strong ivy and lichen growth.

The wall formed the northern boundary of the gardens at Maryville and most likely corresponds with the boundary marked on the 1837-43 first edition OS map (Figure 11.9). Red brick was commonly utilised for garden walls for its heat retaining properties and for fruit training. Traces of concrete on the wall suggest the roofline of a lean-to structure, perhaps a greenhouse, once stood within the garden (Plate 11.16).

SITE AH2	**Figures 11-8 – 11-14** **Plates 11.20 - 11.23**
TOWNLAND	Sybilhill
COUNTY	Dublin
IDENTIFICATION	Extant, Cartographic, NIAH
GRID REFERENCE	E720266 N757504
SITE TYPE	House, garden and grounds
SITE NAME	'Sybil Hill'
NATIONAL INVENTORY OF ARCHITECTURAL HERITAGE REF. NO.	DU-50-0-203374 (Garden)
RECORD OF PROTECTED STRUCTURES REF. NO.	No. 7910
REFERENCES	Bence-Jones 1988; Dictionary of Irish Architects 1720-1940; Gogarty 2013; McIntyre 1987
PROXIMITY	Proposed access road from Sybil Hill Road encroaches on grounds.

DESCRIPTION

'Sybil Hill' is depicted in detail on the 1837-43 first edition 6" OS map (Figures 11-8, 1195) and the 1906-09 25" edition OS map (Figure 11-12, 11-13). The year of its construction is unknown. However, in 1732 John Vernon of Clontarf Castle leased Sybil Hill House and 36 acres of land to James Barlow for 999 years at £40 per annum. Barlow was an attorney in law with an office on Great George's Street, Rutland Square [now Parnell Square] (Gogarty 2013, 27).

Sybil Hill may be represented on Rocque's map of 1760 (Figure 11-7), which depicts an un-named property comprising two structures with gardens to the east in this general vicinity. However, the footprint of the property illustrated on Rocque's map is aligned on a similar orientation to neighbouring Maryville, as depicted on later OS mapping. Nonetheless, it was certainly in existence when Rocque's survey was planned.

In 1758 John Barlow was resident at Sybil Hill in 1758 (Gogarty 2013, 24). In 1802, James Barlow, a barrister (Shaw's Dublin City Directory 1850), commissioned Frederick Darley26 to make alterations to Sybil Hill House (Dictionary of Irish Architects 1740-1940), adding a bowed front elevation. Bence-Jones (1988, 269) describes the house as a 'plain late-Georgian house... Of 2 storeys, entrance front with 1 bay on either side of a central bow; adjoining front with curved bow and 5 bays.'

Griffith's Valuation of 1850 lists John Barlow as holding more than 59 acres at Sybilhill townland, valued at £230, and the house is valued at £90. He is named as the owner of Sybil Hill in census returns of 1873–5 (Ireland Genealogy Projects Archives).

In 1878 Arthur Guinness, later Lord Ardilaun, of St. Ann's, Raheny, purchased the leases of a number of existing homes from the Vernon family of Clontarf Castle, including Sybil Hill, which they kept as homes for their stewards (Gogarty 2013, 16). In 1900 the Land Improvement Society valued Sybil Hill House and 77 acres at a rental of £295 (Gogarty 2013, 28). In 1912, Sybil Hill was occupied by Walter Keating (Porter's Guide and Directory for North County Dublin 1912). Katherine Everett, Lady Ardilaun's cousin and godchild, lived at Sybil Hill from 1916–1924 (McIntyre 1987, 147).

Upon her death in 1925 Lady Ardilaun left the St Anne's estate—including Sybil Hill—to her husband's nephew, the Right Rev. Benjamin Plunket, Church of Ireland Bishop of Meath. In 1928 Bishop Plunkett rented the estate to Colonel Charles Newbold, Assistant MD of Guinness brewery for a short time, after which Bishop Plunkett moved in (Gogarty 2013, 28). In 1938, Dublin Corporation issued a Compulsory Purchase Order for the St Anne's area. Bishop Plunket sold the St. Ann's estate to Dublin Corporation in 1940 for

[26] Darley (1764-1841), was referred to in 1802 as being 'among the most eminent architects of the kingdom' but 'would probably be more properly described as a builder and developer' (Dictionary of Irish Architects 1740-1940). Married to Elizabeth Guinness, daughter of Arthur Guinness of Beaumont, Drumcondra, in 1785, he was active in Dublin Corporation, as a sheriff in 1798, master of the city works and alderman in 1800 and Lord Mayor in 1808-09 (*ibid*.)

approximately £55,000, retaining Sybil Hill House as a private residence and 22 acres of parkland (present day St. Paul's College and the Vincentian Order parochial house). In 1948 Dublin Corporation sold 31 acres of the St Anne's estate to the Vincentian Fathers to build a boys secondary school. Following Bishop Plunket's death in 1947, his son Benjamin sold Sybil Hill House to the Vincentians in 1950 (McIntyre 1987, 149), who opened a secondary school in the house. St. Paul's College secondary school was located in the house until the present school building, designed by Downes and Meehan, was completed in 1957 (Gogarty 2013, 28). Sybil Hill House became home to retired Vincentians, and continues t8o fulfil that function.
Sybil Hill Road was laid out in the 1950s on an approximately similar alignment to the entrance avenue to Sybil Hill House from Vernon Avenue (first possibly shown by Rocque Figure 11-3)

SITE AH3	**Figures 11-12, 11-14** **Plates 11.25,11.26**
TOWNLAND	Sybil Hill and Maryville
COUNTY	Dublin
GRID REFERENCE	E720411 N737286
IDENTIFICATION	Extant, Cartographic, NIAH
SITE TYPE	Entrance avenue to St. Ann's (house, site of). Currently entrance to St Anne's Park.
SITE NAME	-
NATIONAL INVENTORY OF ARCHITECTIRAL HERITAGE REF. NO.	DU-50-O-217373 (Garden)
RECORD OF PROTECTED STRUCTURES REF. NO.	Entrance avenue is not listed in RPS
REFERENCES	Bence-Jones 1988; Devitt 2010; Harris 2009
PROXIMITY	On southern boundary of Proposed Development.

DESCRIPTION

In 1880, Sir Arthur Guinness of St. Ann's, Raheny, was raised to the peerage as Lord Ardilaun. To make the occasion, much work was conducted on the estate, including laying out a new 1.5 mile long entrance avenue from St Anne's House to the eastern extent of Sybilhill townland (Figure 11-12). Guinness had hoped to connect the main avenue to the Howth Road, but the occupier of Furry Park could not be persuaded to allow the avenue through the property (Devitt 2010). Sybil Hill Road was laid out in the 1950s and the avenue was subsequently extended westwards to meet it.
At the time of its construction, the entrance avenue was planted with holm oaks and pines, providing an evergreen approach to St. Ann's House. It continues to serve as the entrance to St Anne's Park.

SITE AP1	**Figures 11-8, 11-9**
TOWNLAND	Maryville/Sybilhill/Harmonstown
CIVIL PARISH	Raheny/Clontarf
BARONY	Coolock
COUNTY	Dublin
GRID REFERENCE	E720325 N737506
IDENTIFICATION	Cartographic
SITE TYPE	Townland and civil parish boundary
RECORD OF MONUMENTS & PLACES NO.	-
RECORD OF PROTECTED STRUCTURES REF. NO.	-

PROXIMITY	The townland and civil parish boundary forms the western and northwestern boundary of the Proposed Development.
DESCRIPTION The boundary between the townlands of Maryville, Sybil Hill and Harmonstown is depicted on the 1837-43 first edition 6" OS map (Figures 11-8, 11-13). Maryville is situated within the civil parish of Raheny. Sybil Hill and Harmonstown lie within the civil parish of Clontarf; both belong to Coolock barony. Sub-surface traces of an earth-cut ditch, or a similar earthwork that marked these boundaries, may survive. For this reason, the townland boundaries are considered an Area of Archaeological Potential. The civil parish was created by Elizabeth I. It was based on the medieval church parish, which could preserve part of an earlier Gaelic tuath territorial boundary. The term tuath anciently signified a clan or tribal family, later evolving to mean the unit of land that a local taoiseach (chieftain) controlled. Civil parish boundaries no longer correspond to the modern day boundaries of Roman Catholic (which changed post-Reformation) or Church of Ireland parishes, which are generally larger.	

11.3.5 *Potential Impact of the Proposed Development*

A total of four no. heritage sites, three no. of Architectural Heritage (**AH**) and one no. area of Archaeological Potential, were identified within and in close proximity to the site of the Proposed Development. These heritage sites are illustrated on Figure 11-19.

11.3.5.1 *Construction Phase*

The Construction Phase will impact two no. AH sites;

1. Maryville (site of), extant garden wall and relict demesne landscape **(AH1)**, which lie within or abutting the Proposed Development; and

2. Sybil Hill House (Vincentian's residence), garden and grounds (**AH2**) situated immediately west of the Proposed Development area, and encroached by the proposed access road;

The Construction Phase will impact one Area of Archaeological Potential (**AP**):

3. The townland and civil parish boundary between Maryville townland (Raheny civil parish) and Sybilhill and Harmonstown townlands (Clontarf civil parish) (**AP1**), which forms the western and north-western boundary of the Proposed Development.

The Construction Phase impacts on the extant garden wall and relict demesne landscape at the site of Maryville House (**AH1**) and on Sybil Hill House and its extant garden and grounds (**AH1**), including a ha-ha, are addressed separately above by Rob Goodbody, Historic Building Consultant.

From an archaeological perspective the Proposed Development may have a significant direct impact on the site of Maryville House, and have a potentially significant direct impact on unrecorded, sub-surface architectural or archaeological features or material elsewhere at the Site, associated with the site of Maryville House, the former curtilage layout at Sybil Hill House or the townland and parish civil boundary. Required mitigation measures are discussed below.

11.3.5.1.1 *Discussion of Impacts*

AH1: Maryville House and garden (site of), extant garden wall and relict demesne landscape

The Proposed Development will have a significant direct impact on the site of Maryville House and gardens and relict demesne landscape. In the absence of mitigation measures, the effect of the impact would be negative and permanent in duration. While the red brick wall on the northern boundary of the Proposed Development constitutes the only extant above-ground remains of Maryville post-demolition, sub-surface remains do exist, as indicated on satellite imagery (Figures 11-15 and 11-16) and as demonstrated by geophysical survey (Figures 11-17 and 11-18).

Most of the site of the Proposed Development is notable as a relict demesne landscape. Maryville House probably dated to the 18th century, and, as illustrated on the 1837–43 first edition OS map, was set within its own demesne lands (shaded in grey on Figure 11-8). The first edition OS map illustrates several similar properties in the vicinity, many of which have since been lost; the houses demolished (excluding Sybil Hill House) and demesne lands broken up for redevelopment.

Maryville was added to St Anne's estate in 1876. The lease was assigned to Dublin Corporation in 1956, and subsequent to its sale to the Vincentian Fathers in 1959, the house and associated buildings were demolished (Gogarty 2013, 28). Further degradation of its setting occurred with the loss of the Avenue and gatehouse on the Howth Road, which became a residential development. The northern boundary wall of the garden is extant, and along with some mature trees on the western side of the property, constitute the only above ground elements of the demesne landscape.

The Proposed Development offers an opportunity to retrieve knowledge about Maryville and to preserve the relict elements of its demesne landscape in situ, which is considered a positive effect.

AH2: Sybil Hill House (Vincentians' Residence), garden and grounds

Sybil Hill House and demesne were greatly impacted in the early-mid 20th century, with the construction of present-day Sybil Hill Road, St Paul's College, a convent and nursing home (on the west side of Sybil Hill Road) and residential development. The house itself is sensitively maintained by the Vincentians.

In the absence of mitigation measures discussed below, the Proposed Development could have a potentially significant direct impact on unrecorded, sub-surface architectural or archaeological features within the wayleave of the proposed access road to the south of Sybil Hill House. The effect of this impact would be negative and permanent in duration. The proposed access road is aligned in very close proximity of a 'Ha-Ha' and traverses the line of a possible 18th century avenue that serviced Sybil Hill House from Vernon Avenue. Remains of an early metalled surface may exist below the modern road surface.

AP1: Townland (Maryville/Sybilhill/Harmonstown) and civil parish (Raheny/Clontarf) boundary

The Proposed Development will have a potentially direct impact on the townland and civil parish boundary between Maryville townland (Raheny civil parish) and Sybilhill and Harmonstown townlands (Clontarf civil parish) (**AP1**). The effect of this impact will be negative and permanent in duration. Extant and sub-surface information on the nature or form of the townland and civil parish boundary may be present on the western and north western boundary of the Proposed Development.

11.3.5.1.2 *Impact Categorisation*

The likely impacts on archaeology, architecture and cultural heritage sites are detailed in Table 11-3.

Table 11-3: Likely Impacts on Archaeology, Architecture, and Cultural Heritage Sites

Site No.	Nature of Impact	Type and Quality of Effect	Impact Significance and Probability	Duration
AH1	Maryville House and garden (site of), extant garden wall and relict demesne landscape	Direct, negative However, the opportunity to retrieve information on the demolished Maryville House and to preserve the relict elements of its demesne landscape in situ is also considered an impact with a positive effect.	Significant, likely	Permanent
AH2	Sybil Hill House, extant garden and grounds, including ha-ha	Addressed by Rob Goodbody, Historic Buildings Consultant	Addressed by Rob Goodbody, Historic Buildings Consultant	Addressed by Rob Goodbody, Historic Buildings Consultant
	Sybil Hill House, garden and grounds, sub-surface remains	Direct, negative on access road alignment	Potentially significant, likely	Permanent
AH3	Entrance avenue to St Anne's Park	Addressed by Rob Goodbody, Historic Buildings Consultant	Addressed by Rob Goodbody, Historic Buildings Consultant	Addressed by Rob Goodbody, Historic Buildings Consultant
AP1	Townland (Maryville/Sybilhill) and civil parish (Raheny/Clontarf) boundary	Direct, negative.	Potentially significant, likely	Permanent

11.3.5.2 *Operational Phase*

The Operational Phase will potentially impact three no. AH sites:

1. The extant garden wall of Maryville garden and relict demesne landscape (**AH1**);

2. Sybil Hill House, garden and grounds (**AH2**) situated immediately west of the Proposed Development, and encroached by the proposed access road; and

3. The entrance avenue to St Anne's Park (**AH3**), which forms the southern boundary of the Proposed Development.

The Operational Phase impacts on the extant garden wall and relict demesne landscape at the site of Maryville House (**AH1**), on Sybil Hill House and its extant garden and grounds (**AH1**), including a ha-ha, and on the entrance avenue to St Anne's Park (**AH3**) are addressed in Section 11.2 by Rob Goodbody, Historic Building Consultant.

11.3.5.3 *Potential Cumulative Impacts*

It will be possible to mitigate the archaeological and cultural heritage impacts of the Proposed Development whether it proceeds in its entirety or in a phased manner over a number of years. In the event the Proposed Development proceeds in a phased manner there will be no potential cumulative archaeological and cultural heritage impacts. The site of Maryville House is fully within the Proposed Development area and will be resolved in its entirety in the event the Proposed Development proceeds.

11.3.5.4 *''Do Nothing'' Impact*

There will be no impacts on identified heritage characteristics if the Proposed Development did not proceed.

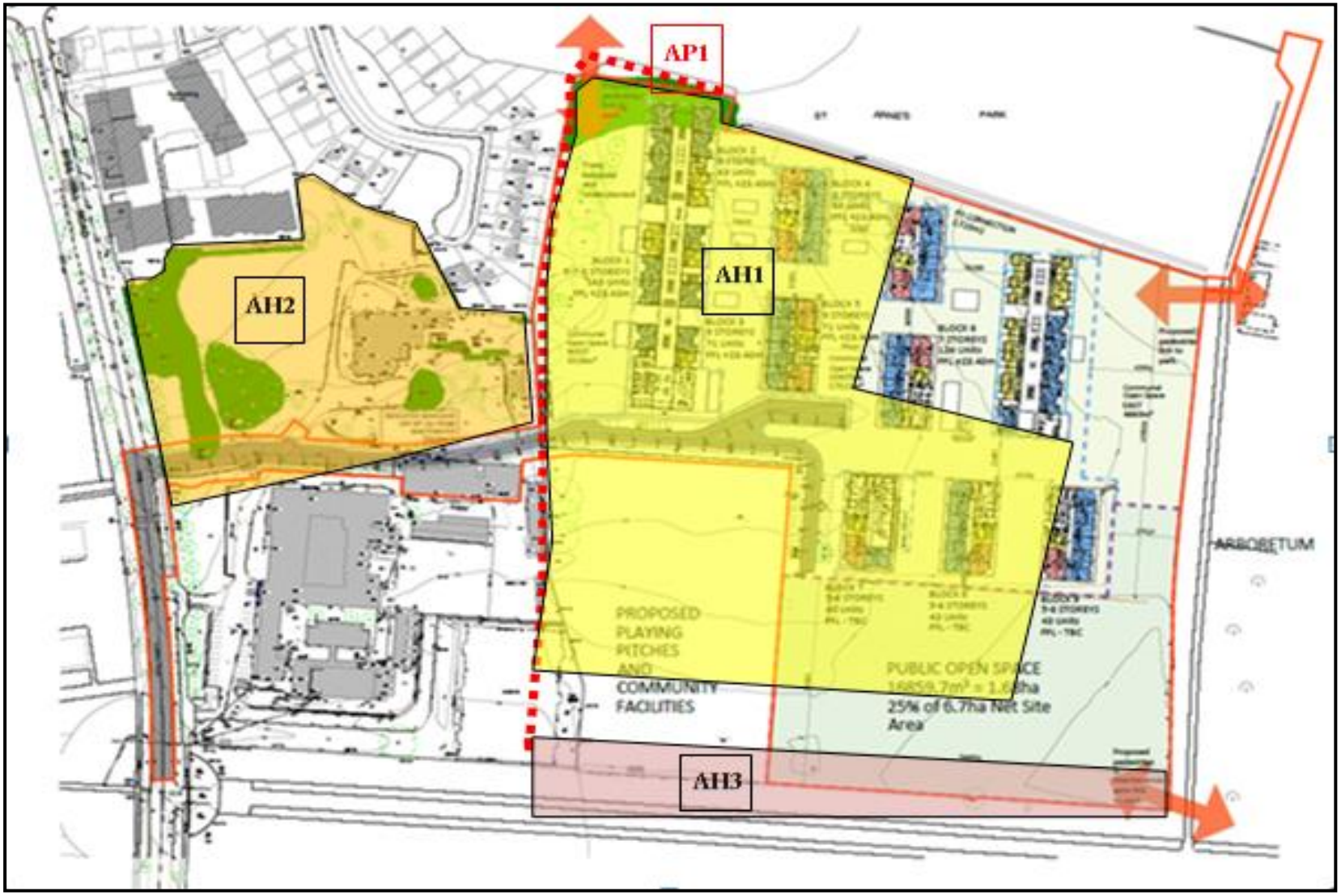

Figure 11-19: Location of Architectural Heritage Sites AH1, AH2, AH3, and Area of Archaeological AP1 in relation to the Proposed Development

11.3.6 *Avoidance, Remedial & Mitigation Measures*

Avoidance of direct and indirect impacts and their effect on archaeology, architecture and cultural heritage sites is preferable with regards to the Proposed Development. As this is not always feasible due to the nature and constraints of the Proposed Development, pre-construction, during and post-construction recommendations are offered to provide mitigation measures when avoidance and preservation in situ are not possible. No mitigation measures are recommended for any of the 26 no. RMP sites.

11.3.6.1 *Pre-Construction Phase*

The measures set out below will be undertaken in advance of the Construction Phase. This will allow a satisfactory timeframe in which the mitigation measures can be implemented, and the results assessed without causing delays to construction.

Archaeological Test Trenching

Based on the results of a geophysical survey at the site of Maryville House**,** archaeologically directed and targeted test trenching is recommended to further refine the nature, date, extent and significance of the remains present.

Archaeologically directed test-trenching is also recommended along the proposed access road between Sybil Hill House (Vincentian Residence) (**AH2**) and St Paul's College and on the townland and civil parish boundary (**AP1**).

To address the archaeological potential elsewhere across the Proposed Development, and any potential association of the Site with the Battle of Clontarf, it is recommended that archaeologically directed test trenching be undertaken across the footprint of the Proposed Development. Insertion of machine-excavated test trenches at intervals is an effective method for locating archaeological sites in advance of construction. This allows for resolution in advance of construction works, thus minimising potential delays during the Construction Phase.

This work must be carried out under licence in accordance with Section 26 of the National Monuments Acts 1930–2014, and in accordance with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland.

The results of this investigation will determine whether redesign to allow for preservation *in situ*, full archaeological excavation and / or monitoring are required. The investigation report will include mitigation proposals for dealing with the discovery of archaeological deposits and material during the construction of the Proposed Development. This work will be conducted by a suitably qualified archaeologist.

It is envisaged that the following will apply:

i. Should investigation yield evidence of archaeologically significant material or structures, preservation *in-situ* may be recommended. Strategies for the *in-situ*

preservation of archaeological remains are conducted in consultation with the statutory authorities, and may include avoidance, if possible, of the remains during construction, or preservation through redesign.

ii. Should investigation yield evidence of archaeologically significant material or structures that cannot be preserved *in-situ*, archaeological excavation and recording, to full resolution, is recommended.

iii. Where less substantial archaeology is anticipated, it is proposed that groundworks are monitored by a suitably qualified archaeologist, with the provision for full excavation of any archaeologically significant material uncovered at this time (if an impact cannot be avoided) (see Section 11.6.3.1 Archaeological Monitoring below).

iv. Should archaeological features or material be uncovered, adequate funds to cover excavation, fencing (if required), post-excavation analysis and reporting, and conservation work should be made available.

Removal of vegetative root systems

Should the removal of vegetative root systems be required, this work will be supervised by a suitably qualified archaeologist.

11.3.6.2 *Construction Phase*

Archaeological Monitoring

Based on the results of archaeologically directed test trenching, archaeological monitoring of all groundworks associated with the Proposed Development may be recommended, with the provision for full excavation of any archaeologically significant material uncovered at this time.

It is envisaged that the following will apply:

i. In the event of archaeological features or material being uncovered during Construction Phase monitoring, it is crucial that machine work cease in the immediate area to allow the archaeologist to assess, excavate and record any such material.

ii. Should archaeological features or material be uncovered, adequate funds to cover excavation, fencing (if required), post-excavation analysis and reporting, and conservation work should be made available.

iii. This work will be done under licence in accordance with Section 26 of the National Monuments Acts 1930–2014, and in accordance with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland.

Removal of vegetative root systems

Should the removal of vegetative root systems be required, this work will be supervised by a suitably qualified archaeologist.

11.3.6.3 *Operational Phase*

It is suggested to retain ‘Maryville’, or a component thereof, in naming the Proposed Development.

11.3.6.4 *‘Worst-Case’ Scenario*

In the event that extensive remains of Maryville House or other sub-surface archaeological or architectural remains are identified and cannot be retained in-situ through re-design, the worst-case scenario will be the full excavation and resolution of all sub-surface remains across the Proposed Development.

All recommendations are subject to approval by the Department of the Culture, Heritage and Gaeltacht**.**

11.3.7 *Residual Impacts*

The final or intended impact is that which occurs after the proposed mitigation measures have taken effect. When the recommended mitigation measures are taken into consideration, the level of impact and the effects are considerably reduced. The residual impacts on archaeology, architecture and cultural heritage sites are detailed in Table 11-4.

Table 11-4: Residual Impacts

Impact Phase	Archaeological, Architectural and Cultural Heritage Feature/Site/Structure	Impact Type	Significance of Impact	Mitigation Measure	Residual Impact
Construction	**AH1** Maryville (site of), extant garden wall and relict demesne landscape	Direct	Significant	Archaeologically directed targeted test trenching and excavation of all sub-surface remains to full resolution. Archaeological monitoring of vegetative root system removal. *In-situ* retention of extant garden wall and relict demesne trees	Archaeological information retrieved
	AH2 Sybil Hill House, extant garden and grounds, including 'Ha-Ha'	-	-	Addressed by Rob Goodbody, Historic Buildings Consultant in Section 1	-
	AH2 Sybil Hill House, garden and grounds, sub-surface remains	Direct	Potentially Significant	Archaeologically directed targeted test trenching within wayleave of the proposed access road and excavation of all sub-surface remains to full resolution. Archaeological monitoring of vegetative root system removal.	Archaeological information retrieved
	AH3 Entrance avenue to St Anne's Park	-	-	Addressed by Rob Goodbody, Historic Buildings Consultant	-
	AP1 Townland (Maryville/Sybilhill) and civil parish (Raheny/Clontarf) boundary	Direct	Potentially significant	Archaeologically-directed targeted test trenching and excavation of all sub-surface remains to full resolution. Archaeological monitoring of vegetative root system removal.	Archaeological information retrieved
Operational	**AH1** Maryville House extant garden wall and relict demesne landscape	-	-	Addressed by Rob Goodbody, Historic Buildings Consultant	-
	AH2 Sybil Hill House, extant garden and grounds, including 'Ha-Ha'	-	-	Addressed by Rob Goodbody, Historic Buildings Consultant	-
	AH3 Entrance avenue to St Anne's Park	-	-	Addressed by Rob Goodbody, Historic Buildings Consultant	-

11.3.8 *Monitoring*

No Operational Phase monitoring is anticipated in respect to the archaeology and cultural heritage, as all identified impacts will be mitigated at the pre- and Construction Phases of the Proposed Development.

11.3.9 *Reinstatement*

No reinstatement measures are required in respect of archaeology and cultural heritage as no further phase of archaeological mitigation will be implemented prior to the Proposed Development receiving full permission to proceed.

11.3.10 *Interactions*

No impact interactions have been identified in respect of archaeology and cultural heritage.

11.3.11 *Difficulties Encountered in Compiling*

No difficulties were encountered in compiling the archaeology and cultural heritage section of this Chapter.

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12 MATERIAL ASSETS (TRAFFIC, WASTE & UTILITIES)

12.1 Traffic

12.1.1 *Introduction*

This section of the Material Assets Chapter has been prepared by ILTP Consulting (ILTP) and assesses any likely and significant impacts associated with traffic due to the Proposed Development. Mitigation measures are proposed where negative impacts are identified.

The Traffic section of the EIAR has been prepared by Christy O'Sullivan, Ken Swaby and Ben Waite of ILTP. Christy O'Sullivan is the Managing Director of ILTP and has 30+ years of experience in traffic and transport engineering and planning. Ken Swaby is a Senior Transport Engineer with 15 years' experience in roads, civil and transportation engineering, and Ben Waite is a Senior Transport Analyst with 12 years' experience in traffic and transport design, analysis and planning.

Full details of the Traffic Impact Assessment undertaken by ILTP are included in the *Traffic & Transport Assessment and Mobility Management Plan* report included under separate cover as part of the planning application for the Proposed Development.

12.1.2 *Study Methodology*

In order to assess the traffic impact of the Proposed Development it was first necessary to assess the current traffic situation in the area. Fully classified traffic counts in the environs of the Proposed Development were previously undertaken by ILTP in 2015 and 2017, with new site surveys conducted in February 2019.

The purpose of the surveys was to measure current traffic flows at the Site and neighbouring junctions during the peak periods. This was of critical interest in gauging the effect the Proposed Development would have on existing traffic patterns and volumes in the area during peak flow periods.

The site survey also allowed sight lines and traffic conditions to be observed, in addition to signal phasing at nearby junctions.

ILTP also observed pedestrian and cyclist patterns and behaviours in the vicinity of St Paul's College and the Proposed Development.

A desktop study relating to the Proposed Development was undertaken by ILTP in 2019, concluding in September 2019.

ILTP conducted an assessment of available information on projected traffic trends, including the National Transport Authority (**NTA**) / Dublin City Council (**DCC**) annual Cordon Count (*Canal Cordon Report 2018 - Report on Trends in Mode Share of Vehicles and People Crossing the Canal Cordon 2006 to 2018*, April 2019), Smarter Travel a Sustainable Transport Future and the current Dublin City Development Plan (**DCDP**) 2016-2022.

ILTP calculated the estimated trip rates from the Proposed Development using comparable developments and the TRICS database and added these figures to the base flows. A Picady traffic modelling analysis was also undertaken to assess the capacity of the proposed access onto Sybil Hill Road. LinSig Traffic Signal Junction modelling software was also utilised to assess the capacity of the adjacent Howth Road junction with the Proposed Development in place.

From these results a conclusion could be drawn as to the impact that the Proposed Development will have on the overall traffic flows. Once details were available ILTP then assessed what impact the Proposed Development had on the road network.

Full details of traffic modelling assumptions and results are included in the *Traffic & Transport Assessment and Mobility Management Plan* report completed by ILTP for the Proposed Development, included separately with the planning application.

To assess the projected traffic impacts / effects of the Proposed Development on the receiving environment in EIAR terms, the Environmental Protection Agency (**EPA**) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft)*, August 2017, was followed.

Table 3.3 of these Guidelines, as shown below as Table 12-1, was followed in order to quantify the projected effects of the Proposed Development in terms of quality, significance, extent / context, probability and duration / frequency, and to incorporate appropriate mitigation measures for the identified effects / impacts, particularly where effects are projected to be significant.

Table 12-1: Description of Effects (Source: Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft), EPA, August 2017)

Table 3.3 Descriptions of Effects

Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral 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 nuisance).
Describing the Significance of Effects ''Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see *Determining Significance* below.).	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable[2] changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**Extent** Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the balance of risk over advantage when making a decision.	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects 'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**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
	Reversible Effects Effects that can be undone, for example through remediation or restoration
	Frequency of Effects Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

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

12.1.3 *Characteristics of the Proposed Development*

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, residential tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include extensive communal amenity areas, and a proposed significant area of public open space.

The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a Protected Structure) and St Paul's College incorporating upgraded accesses to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of existing pedestrian stream crossing in St Anne's Park with integral surface water discharge to Naniken River.

The site of the Proposed Development is located off Sybil Hill Road, Raheny on lands to the east of St Paul's College as illustrated in Figure 12-1 below.

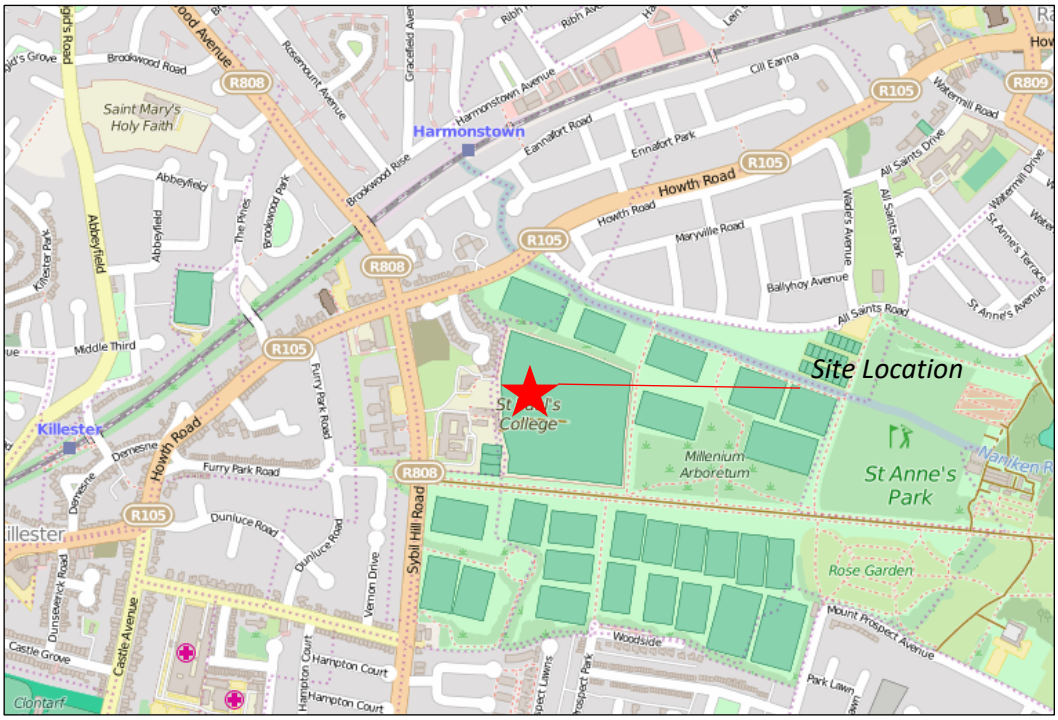

Figure 12-1: Site Location

The Proposed Development is located circa (**c.**) 200m from Sybil Hill Road. This is beneficial in ensuring that there can be no overspill of car parking on to Sybil Hill Road during the Operational Phase and that the residential area will also remain free from external car parking.

At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas.

The proposed access road includes for on-road cycle lanes from the junction with Sybil Hill Road to beyond the access to the Sybil Hill House, to give a safe cycle route from Sybil Hill Road to beyond the school and Sybil Hill House access points. This cycle route will link with the DCC Cycle Network planned for the area.

The northern gate of St Paul's College, to the main access road will be gated. Pedestrians and cyclists will normally use this entrance during school hours, which is in keeping with the existing arrangements. The vehicular entrance will normally be closed and will be only used occasionally.

Beyond Sybil Hill House and St Paul's College the access gate the nature of the new access road will become solely residential in nature, with landscaping and traffic management measures to ensure that cyclists and cars can share the carriageway.

It is proposed that a 30kph speed limit will apply to all internal streets of the Proposed Development. The access of Sybil Hill Road is proposed to be a single lane entrance and exit, which keeps the access road to an appropriate scale. The gated entrance to St Paul's College, off the main access road to the Proposed Development, will ensure that pupils going to and from St Paul's College on foot or cycle can gain access to the school at this location. However vehicular traffic to and from St Paul's College will continue to use the existing entrances off

Sybil Hill Road.

The proposed residential development adjoins St. Anne's Park along three sides. Three pedestrian links are proposed between the Proposed Development and St. Anne's Park. These pedestrian links could also allow direct access to the Park for residents, which would further increase the use of the Park and would also reduce walk and cycle distance to Bus and Dart services. The Roads Planning section of DCC previously advised that a link to the Park would probably need to be gated, with opening times consistent with the park opening times. Public access would be permitted through the Proposed Development, also during park opening hours.

The layout of the internal roads, pedestrian and cycle linkages to the adjacent St Paul's College, Park and public transport links ensure that the overall design seeks to promote greater use of sustainable travel modes and to provide good permeability for walking and cycle modes consistent with NTA guidance. The locations of the pedestrian and cycle links ensure good connectivity to the adjacent St Anne's Park and public transport links. This should help foster greater use of public transport and help promote healthy living for the new community.

12.1.4 *The Existing Receiving Environment (Baseline Situation)*

The Proposed Development is located off the R808 Sybil Hill Road. This regional roadway runs north-south connecting the R807 Clontarf Road with the R105 Howth Road. The R808 Sybil Hill Road is a two-way road with pedestrian footpaths on either side and a grass verge with trees on either side of the road.

The R105 Howth Road is located 200m to the north of the proposed vehicular access to the Proposed Development. This junction has cycle lanes and pedestrian crossing facilities, including a traffic signal pedestrian phase.

Pedestrian facilities including footpaths are provided on the R808 Sybil Hill Road adjacent to the Proposed Development. There is an existing pedestrian crossing on the R808 Sybil Hill Road adjacent to the Proposed Development.

In addition to the pedestrian network adjacent to the road network there are pedestrian routes in the adjacent St Anne's Park which will facilitate pedestrian access to the Proposed Development from the east.

The Site is to the south-east of the DART line running from Greystones to Howth / Malahide via the City centre, with Killester and Harmonstown rail stations in closest proximity. The Harmonstown rail station is c. 10 minutes' walk from the proposed access to the site of the Proposed Development (see Figure 12-2).

The DART Services serving the Killester and Harmonstown stations are high capacity high frequency services connecting the Site with the City centre and the wider Commuter and Intercity rail services. There are c. 95 services per day in each direction and up to 6 services per direction per hour at peak times.

The R105 Howth Road to the north of the Site is also one of sixteen no. Quality Bus Corridors (**QBCs**) in Dublin.

There are regular bus services on the R105 Howth Road to the north of the Site, and also on Vernon Avenue to the southwest. Howth Road is a primary arterial route connecting the suburbs of north Dublin with the City centre.

The closest bus stop to the Site is located on Howth Road c. 360m walking distance. This stop is served by a number of bus services, including 29A, 31, 31A, 31B and 32. The bus stops to the south of the Site on Sybil Hill Road and Vernon Avenue are served by the 130 bus route (see Figure 12-2).

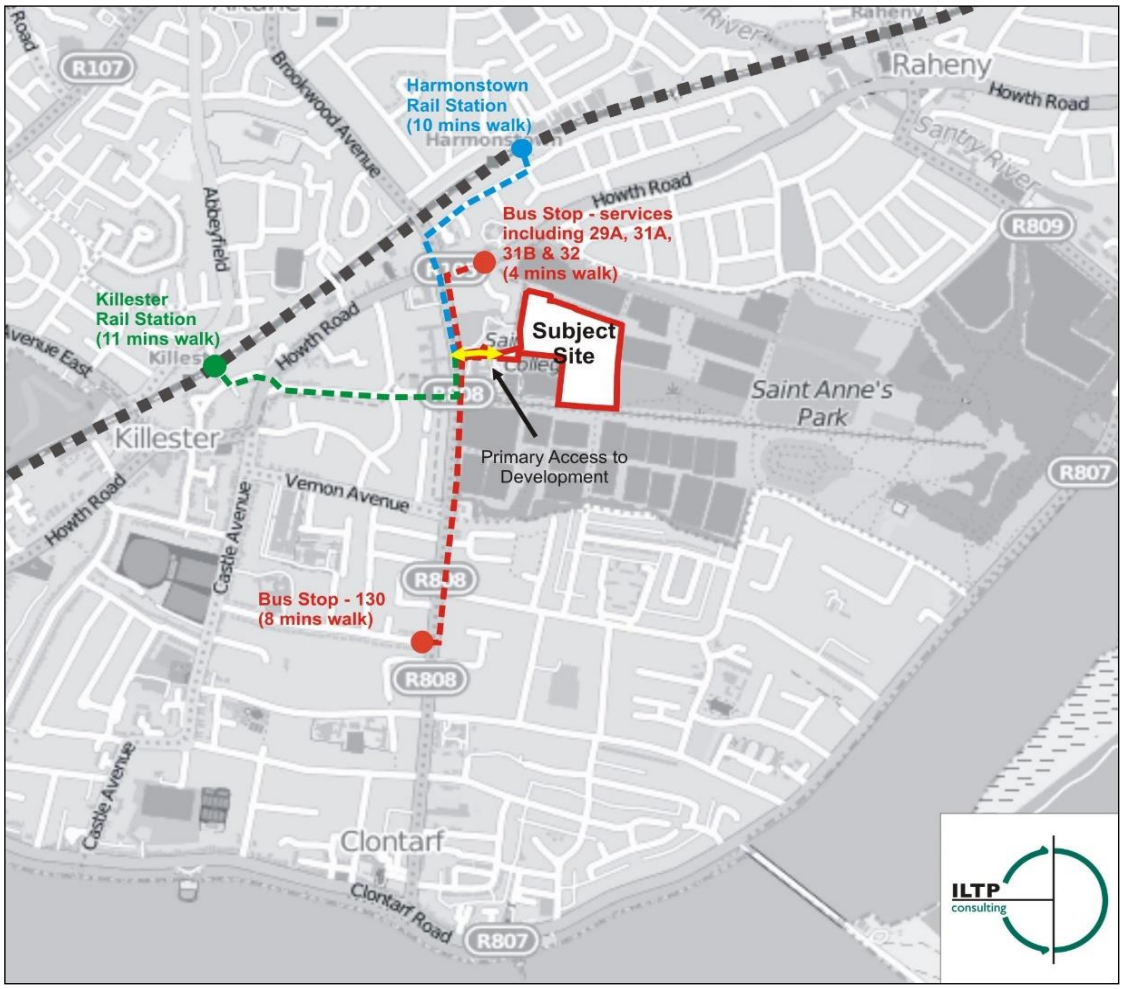

Figure 12-2: Walking Distance from the Proposed Development to the Nearest Rail and Bus Stops

Bus routes in the vicinity of the Site are mapped in Figure 12-3 below. Further details of the bus routes serving the Site are included in the *Traffic & Transport Assessment and Mobility Management Plan* report included separately with the planning application for the Proposed Development.

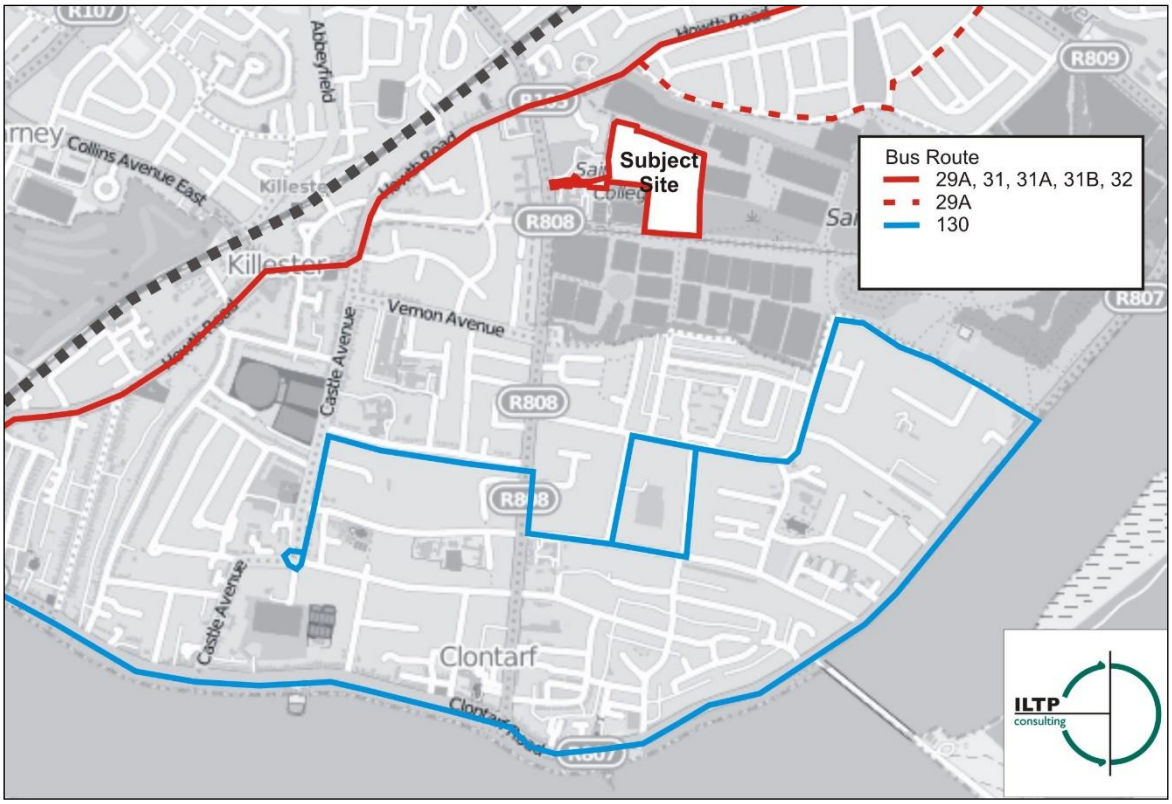

Figure 12-3: Bus Routes in the Vicinity of the Proposed Development

In order to assess the worse-case scenario impact of the Proposed Development on the wider traffic network, ILTP have taken account of the recent permitted planning application for Ardilaun Court, residential development, to the immediate north of the Site (Dublin City Council planning ref. 4242/15, and amended by ref. 2977/17), which is currently partially occupied by residents and under completion. In order to ensure a robust and worse-case scenario Traffic Impact Assessment is carried out, ILTP have applied the full projected trip generation figures from the permitted Ardilaun Court residential development, to the base flows for the Proposed Development.

From the 2019 traffic count surveys, traffic on all arms of the junction of Howth Road / Sybil Hill Road was observed to move relatively freely, however queueing was observed to develop on Brookwood Avenue and Sybil Hill Road during peak hours. The majority of queues were observed to clear in a single cycle once the signals changed at the junction.

Details of the existing traffic count surveys are included in the *Traffic & Transport Assessment and Mobility Management Plan* report included separately with the planning application for the Proposed Development.

The LinSig Signalised Junction Traffic Model shows that the existing Howth Road approaches are operating within capacity with the Brookwood Avenue and Sybil Hill Road approaches already near or at capacity. It is noted however that the current signal setting gives priority to Howth Road, which has frequent bus services, with minimum green time allocated to Sybil Hill Road and Brookwood Avenue.

It is also noted that the junction has been recently upgraded to provide dedicated two-lane

approaches on Sybil Hill Road and Brookwood Avenue.

From the completed 2019 traffic count surveys the estimated Annual Average Daily Traffic (**AADT**) volumes on the road network adjoining the Proposed Development for the 2019 Base Year are shown below in Figure 12-4 and Table 12-2.

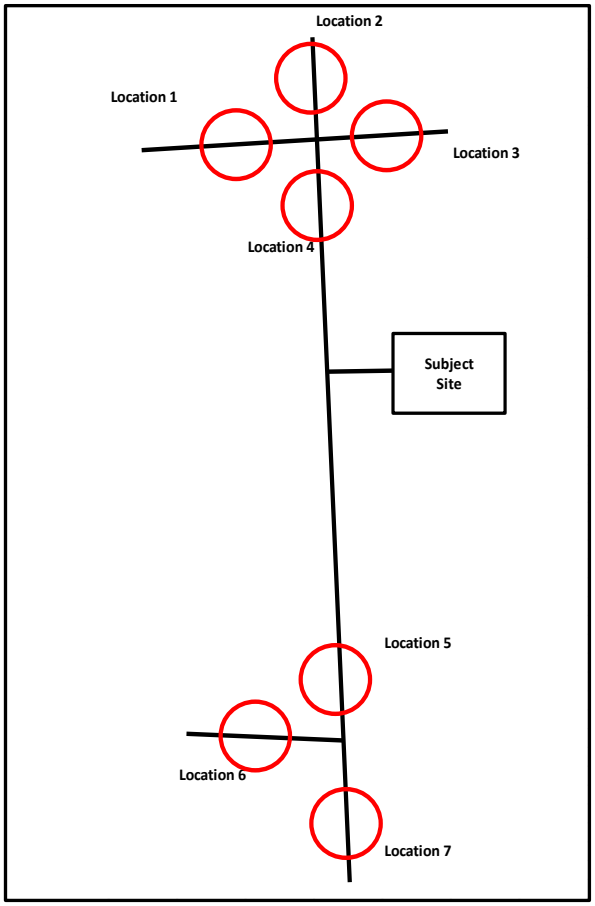

Figure 12-4: Location of Estimated 2018 Base Year AADTs

Table 12-2: Estimated 2019 Base Year AADTs

Location	**2019 Base Year AADT**
Location 1 - Howth Road West	12,030
Location 2 - Brookwood Avenue	10,078
Location 3 - Howth Road East	13,369
Location 4 - Sybil Hill Road North	6,690
Location 5 - Sybil Hill Road	6,317
Location 6 - Vernon Avenue	4,321
Location 7 - Sybil Hill Road South	8,312

In terms of projecting future year traffic scenarios, the assumed Opening Year of the Proposed Development was taken to be 2021, with the Design Year taken as 2036.

To project likely future traffic growth patterns ILTP conducted an assessment of the available traffic data sources, including the National Transport Authority / Dublin City Council annual Cordon Count (*Canal Cordon Report 2018 - Report on Trends in Mode Share of Vehicles and People Crossing the Canal Cordon 2006 to 2018*, April 2019).

The Cordon Count Report shows that in overall terms there has been a significant decline since 2006 in the number of vehicles coming into Dublin during the Cordon Count period. Car numbers crossing the canal cordon have continued to decline in recent years, with a total reduction of 16.8% between 2006 and 2018.

This decline in private car usage is promoted and supported by policy objectives at National and Local level, such as *Smarter Travel a Sustainable Transport Future*. It is further noted that the current DCDP targets an ongoing reduction in private car trips crossing the Canal Cordon.

It was also confirmed from traffic count surveys conducted between 2015 and 2019 that traffic in the vicinity of the Site, on average, did not grow but marginally declined in this four-year period.

As a worse-case scenario however, ILTP have assumed that background traffic up to the 2021 Opening Year and 2036 Design Year of the Proposed Development will not decline further but remain constant at the recorded 2019 levels.

12.1.5 *Potential Impact of the Proposed Development*

12.1.5.1 *Construction Phase*

Typical construction working hours on site are expected to be as follows:

- Mondays to Fridays – 07:00 to 18:00
- Saturday – 08:00 to 14:00
- Sundays and Public Holidays – No activity on site

The proposed routes for HGV movements during the Construction Phase are shown in Figure 12-5. It is proposed that Construction Phase traffic will access the Site from the north along the R808 Brookwood Avenue, and egress the Site in the same direction. This provides a route to the M50 (Junction 2) using the R104 and R107 (Malahide Road) regional roads, and to the City centre using the R107 Malahide Road.

It is projected that the majority of HGV movements during the Construction Phase will be to and from the M50. The HGV route to the M50 is proposed as it is the most direct and shortest route, solely uses regional roads and avoids lower capacity local roads.

The proposed route minimises impact on the nearby Howth Road / Sybil Hill Road junction, as all construction traffic can pass through the junction via ‘Straight-Ahead’ movements. This negates the need to turn left and right, which can contribute to delays by swinging into adjacent traffic lanes.

The R105 Howth Road was also considered as an alternative route to and from the city centre,

however there is no right-turn permitted from Howth Road onto Sybil Hill Road.

The proposed haul route will be agreed with the Local Authority prior to any works commencing on site.

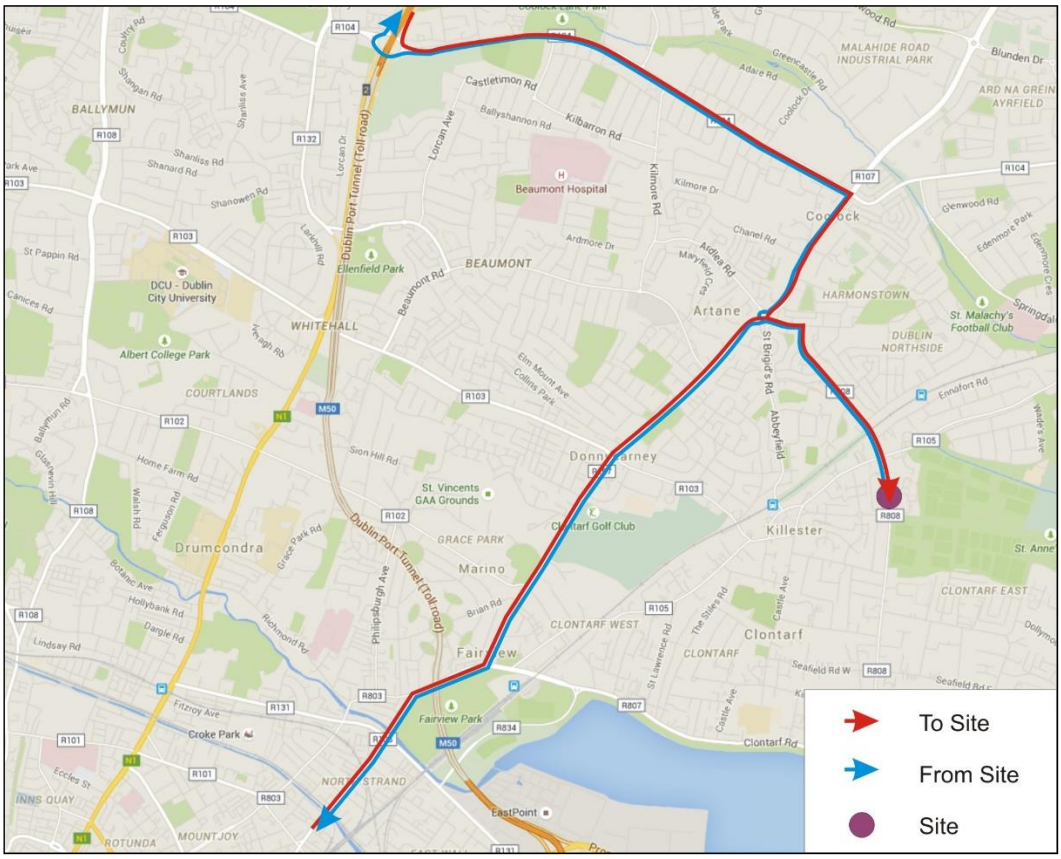

Figure 12-5: Proposed Haul Route for HGV Movements during Construction

ILTP have undertaken an assessment of the projected peak Construction Phase traffic movements associated with the Proposed Development, which include:

- Demolition waste removal;
- Bulk earthworks excavation; and
- Deliveries.

As set out in the *Traffic & Transport Assessment and Mobility Management Plan* report included separately with the planning application for the Proposed Development, the highest projected concentration of HGV movements arriving and departing the Site are associated with the bulk earthworks excavation phase. The bulk earthworks phase is projected to take place over a maximum period of 6 months, and require an average of 100 no. one-way HGV movements per day.

Allowing for a possible intensification of excavation activities over the duration of the bulk earthworks excavation period, it is further projected that there may likely be up to 150 no. one-way HGV loads of excavated material departing the Site per day. This equates to a projected peak of 300 no. one-way HGV movements per day.

It is proposed that all HGVs arriving to and departing from the Site would travel via the

designated construction haul route shown in Figure 12-5 above. Therefore, all HGVs during the Construction Phase are expected to travel via the R808 Brockwood Avenue and the Howth Road / Sybil Hill junction to the north of the Proposed Development entrance.

Excluding HGV drivers, it is estimated that the bulk earthworks phase would require a maximum of 15-20 no. personnel on site. It is further estimated that there will be a maximum of 50 no. car / light vehicle traffic movements per day associated with these Site personnel during the Earthworks Phase. Given typical Construction Phase working hours the majority of these personnel are expected to arrive to the Site in advance of the 08:00-09:00 morning peak hour and depart after the 17:00-18:00 evening peak hour.

The projected peak Construction Phase traffic movements associated with the bulk earthworks excavation phase are shown in terms of traffic flows in Table 12-3 below and Annual Average Daily Traffic (AADT) volumes in Table 12-4 below.

Table 12-3: Projected Peak One-Way Construction Phase Traffic Movements during Bulk Earthworks Excavation Phase

Construction Activity / Phase	Estimated Period	Projected HGV Movements per Day	Projected Car / Light Vehicle Movements per Day	Projected Total Movements per Day	Projected Total Vehicle Movements for AM Peak Hour	Projected Total Vehicle Movements for PM Peak Hour
Exporting Excavated Material (Bulk Earthworks Phase)	6 months	300 (150 Loads)	50	350	32	32

Table 12-4: Estimated Peak Construction Phase Movements – AADTs (see Figure 12-2 for referenced locations)

	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
2019 Base Year AADT	12,030	10,078	13,369	6,690	6,317	4,321	8,312
% HGV	0.5%	0.9%	0.5%	1.0%	1.2%	0.7%	1.1%
2020 Do Minimum AADT - without Construction Traffic	12,052	10,152	13,401	6,818	6,482	4,343	8,456
% HGV	0.5%	0.9%	0.5%	1.0%	1.2%	0.7%	1.1%
Projected AADT - Peak Construction Traffic Stage	3	247	7	257	23	3	20
2020 Do Something AADT - with Projected Peak Construction Traffic	12,055	10,399	13,408	7,075	6,505	4,346	8,476
% HGV	0.5%	3.2%	0.5%	4.3%	1.2%	0.7%	1.1%

Note 1: '2020 Do Minimum' scenario includes permitted MKN development projected Trip Generation figures.

Note 2: Projected commencement of construction in 2020, and projected peak construction traffic volumes during bulk earthworks excavation phase.

As shown in Table 12-3, the projected peak one-way Construction Phase traffic movements during the bulk earthworks excavation phase are 350 no. total vehicular movements per day.

This is averaged over an 11 hour working day as 32 no. vehicular movements per hour, including the peak traffic hour periods.

Beyond the bulk Earthworks Phase, other phases during the Construction Phase are estimated to have lower HGV volumes and lower traffic volumes overall. Further details are included in the *Traffic & Transport Assessment and Mobility Management Plan* included separately with the planning application for the Proposed Development.

The projected peak volume of Construction Phase traffic, including both truck and staff movements, is lower than the peak traffic volumes projected for the fully occupied Proposed Development during the Operational Phase, as set out below.

Therefore, in Traffic Impact Assessment terms, the most onerous scenario to assess in terms of capacity and traffic impact is the Operational Phase of the Proposed Development.

Systematic Definition of Impacts

The likely effect of the Proposed Development during the Construction Phase will be:

- Additional HGV traffic along the proposed designated haul route which will have a slight short-term negative effect on the local road network during the Construction Phase.
- Additional construction personnel car / light vehicle movements which will have an insignificant short-term negative effect on the local road network during the Construction Phase.
- Construction vehicle movements and works on Sybil Hill Road, such as when forming the new junction with the Proposed Development or when undergoing service connections on the public road, which will have a slight short-term negative effect on traffic movements on Sybil Hill Road in the vicinity of the Proposed Development.
- Construction vehicle movements and works on Sybil Hill Road, which will have a slight short-term negative effect on pedestrian and cycle movements on Sybil Hill Road in the vicinity of the Proposed Development, for example due to pedestrians and cyclists having to give way at the construction access to the Site and / or divert around construction works on Sybil Hill Road.

For further details relating to the Construction Phase of the Proposed Development refer to the 'Construction Traffic Impact Assessment' section of the *Traffic & Transport Assessment and Mobility Management Plan* report, the *Construction & Demolition Waste Management Plan (CDWMP)*, and *Construction Environmental Management Plan (CEMP)*, which are included separately with the planning application for the Proposed Development.

12.1.5.2 *Operational Phase*

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal. As a sensitivity analysis the proposed sports hall and playing pitches development has been included for in the traffic impact assessment of the Proposed Development during the Operational Phase, as included in the *Traffic & Transport Assessment and Mobility Management Plan* report included with the planning application for the Proposed Development.

The projected peak traffic hour trip generation associated with Proposed Development and adjoining St Paul's College Sports Hall and Playing Pitches development is shown in Table 12-5 below.

Table 12-5: Projected Trip Generation for the Proposed Development & Adjoining St Paul's College Sports Hall/Playing Pitches Development

Land Use	Number of Units / Area	AM Peak Trips		PM Peak Trips	
		Arrival	Departure	Arrival	Departure
Proposed Development (Apartment)	657	32.9	92.0	65.7	39.4
Crèche (Projected External Trips)	612m^2	5.6	4.8	6.7	7.1
St Paul's College Sports Hall & Playing Pitches (DCC planning application ref. 3777/17 under appeal ABP ref. 301482-18)	NA	0	0	20	20
Total		**39**	**97**	**93**	**67**

Overall for the combined Proposed Development and adjoining St Paul's College Sports Hall and Playing Pitches development, the Trip Generation assessment yielded an estimate of an additional 39 no. inward and 97 no. outward trips for the AM peak hour (08:00 – 09:00). An additional 93 no. inward trips and 67 no. outward trips were estimated for the PM peak hour (17:00 – 18:00).

As the AM and PM peaks are the times of the day with the highest level of traffic volumes it can be assumed that if the road network can perform effectively at these times it will meet all demands placed upon it.

In assessing the traffic impact of the Proposed Development, the assumed Opening Year of the development was taken to be 2021, with the Design Year taken as 2036. As set out above, ILTP have assumed that background traffic up to the 2021 Opening Year and 2036 Design Year will not decline further in line with recorded trends such as the recorded site surveys and the National Transport Authority / Dublin City Council annual Cordon Count (*Canal Cordon Report 2018 - Report on Trends in Mode Share of Vehicles and People Crossing the Canal Cordon 2006 to 2018*, April 2019), but remain constant at the recorded 2019 levels.

The estimated AADT volumes on the road network adjoining the Proposed Development for

the 2021 Opening Year and 2036 Design Year scenarios are shown in Table 12-6 below.

Table 12-6: Estimated 2021 Opening Year and 2036 Design Year AADTs

Location	2019 Base Year AADT	2021 Opening Year without St. Paul's Development	2021 Opening Year with St. Paul's Development	2036 Design Year without St. Paul's Development	2036 Design Year with St. Paul's Development	% HGV
Location 1 - Howth Road West	12,030	12,052	12,185	12,052	12,185	0.5%
Location 2 - Brookwood Avenue	10,078	10,152	10,499	10,152	10,499	0.9%
Location 3 - Howth Road East	13,369	13,401	13,636	13,401	13,636	0.5%
Location 4 - Sybil Hill Road North	6,690	6,818	7,533	6,818	7,533	1.0%
Location 5 - Sybil Hill Road	6,317	6,482	7,346	6,482	7,346	1.2%
Location 6 - Vernon Avenue	4,321	4,343	4,460	4,343	4,460	0.7%
Location 7 - Sybil Hill Road South	8,312	8,456	9,203	8,456	9,203	1.1%

Note 1: '2021 Opening Year without St. Paul's Development' and '2036 Design Year without St. Paul's Development' scenarios include permitted adjacent MKN development projected Trip Generation figures.

Note 2: '2021 Opening Year with St. Paul's Development' and '2036 Design Year with St. Paul's Development' scenarios include proposed St. Paul's SHD & proposed adjacent St. Paul's School Sports Hall & Pitches development.

A Picady traffic modelling analysis was undertaken to assess the capacity of the proposed access junction onto Sybil Hill Road with the Proposed Development traffic in place. The Picady analysis found that the proposed access junction will operate at or below 22% capacity with the peak hour Proposed Development t traffic in place. This confirms the proposed access has more than adequate capacity for the Proposed Development. Further details of the Picady traffic modelling analysis are included in the *Traffic and Transport Assessment & Mobility Management Plan* report, included separately with the planning application for the Proposed Development.

The Sybil Hill Road / Vernon Avenue junction is signal controlled and was observed to have significant spare capacity to accommodate the projected additional flows from the Proposed Development.

With regard to the Howth Road / Sybil Hill Road junction, the overall change in traffic flow through this junction from the Proposed Development and adjoining St Paul's College Sports Hall and Playing Pitches development is projected to increase by approximately 3.1% during the morning peak hour and 3.8% during the evening peak hour. These increases are below the 5% Traffic Impact Assessment threshold which would normally be regarded as having a material impact on the junction (TII / NRA document *Traffic and Transport Assessment Guidelines*, May 2014).

The capacity of this junction was assessed by using LinSig Signalised Junction Modelling software. The analysis has shown that the junction can satisfactorily accommodate the projected traffic from the Proposed Development.

For further details of the traffic analysis and wider traffic impact assessment refer to the *Traffic and Transport Assessment & Mobility Management Plan* report, included separately with the planning application for the Proposed Development.

The Proposed Development adjoins St. Anne's Park along three sides. Three pedestrian links

are proposed between the Proposed Development and St Anne's Park. These pedestrian links could also allow direct access to the Park for residents, which would further increase the use of the park and would also reduce walk and cycle distance to Bus and Dart services.

Systematic Definition of Impacts

The likely effect of the Proposed Development during the Operational Phase will be additional traffic which will have a slight, long-term negative effect on the adjoining road network.

The Proposed Development will not give rise to any likely significant long-term negative traffic impacts.

The proposed pedestrian links between the Proposed Development and St Anne's Park would have significant long-term positive impacts with regard to reduced walking and cycling travel times to public transport services and improved permeability and connectivity to amenities in St Anne's Park.

12.1.6 *Potential Cumulative Impacts*

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal. As a sensitivity analysis the proposed sports hall and playing pitches development has been included for in the traffic impact assessment of the Proposed Development during the Operational Phase, as included in the *Traffic & Transport Assessment and Mobility Management Plan* report, included separately with the planning application for the Proposed Development.

The 'Ardilaun Court' development (Reg. Ref. 3383/14) on the former St Paul's swimming pool site to the north-west of the Site at 1 Sybil Hill Road is also in the process of being built-out and has also been considered as part of the traffic impact assessment of the Proposed Development during the Operational Phase, as included in the *Traffic & Transport Assessment and Mobility Management Plan* report included separately with the planning application for the Proposed Development. This scheme consists of 75 no. residential units comprising 7 no. houses and 68 no. apartments.

The Ardilaun Court construction works are almost complete and are projected to be fully complete well in advance of commencement of construction of the Proposed Development, subject to planning.

12.1.7 *''Do Nothing'' Impact*

In the 'Do Nothing' scenario the Site would not be developed and there would be no resulting additional traffic on the adjoining road network from the Proposed Development.

The Proposed Development is located on an in-fill site in a strong urban area proximate to the City centre and with good public transport connectivity. In the 'Do Nothing' scenario the housing supply equivalent to the Proposed Development may have to be satisfied by an alternative new residential development at a different location. This may result in more car dependant residential developments coming forward for development in areas more remote

from public transport and sustainable transport options.

12.1.8 *Avoidance, Remedial and Mitigation Measures*

12.1.8.1 *Construction Phase*

Identified impact: Additional HGV traffic along proposed designated haul route which will have a slight short-term negative effect on the local road network during the Construction Phase.

Mitigation Measures:

- Tracked excavators will be moved to and from the Site on low-loaders and will not be permitted to drive onto the adjacent roadway.
- The appointed Contractor shall at all times keep all public and private roads and footpaths entirely free of excavated materials, debris and rubbish.
- Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of dust and litter.
- The appointed Contractor shall be responsible for and make good any damages to existing roads or footpaths caused by his own contractors or suppliers transporting to and from the Site.
- The appointed Contractor shall confine his activities to the area of the Site occupied by the works and the construciton compound, as far as practicably possible, during any particular phase of the works.

Identified impact: Additional construction personnel car / light vehicle movements which will have an insignificant short-term negative effect on the local road network during the Construction Phase.

Mitigation Measures:

- All construction workers will be encouraged to use public transport, and to car share.
- No daytime or night time parking of site vehicles or construction staff vehicles will be permitted outside agreed areas.

Identified impact: Construction vehicle movements and works on Sybil Hill Road, such as the development of the new junction with the Proposed Development or when undergoing service connections on the public road, which will have a slight short-term negative effect on traffic movements on Sybil Hill Road in the vicinity of the Proposed Development.

Mitigation Measures:

- Construction work will be limited to normal working hours; that are 07.00 – 18.00 on weekdays and 08.00 – 14.00 on Saturdays. All deliveries of materials, plant and machinery to the Site and removal of waste or other material will take place within the permitted hours of work. Vehicle movements will be planned to ensure arrival and departure times are maintained inside the agreed working hours.

- Deliveries will be co-ordinated to prevent queuing of vehicles adversely affecting traffic flow and to minimise disruption to local traffic. They will be timed and coordinated to avoid conflict with collection of waste, other deliveries (particularly to adjoining owners), and rush hour traffic. Large deliveries will be scheduled outside peak traffic hours to minimise disruption.

- Properly designed and designated access and egress points to the Site will be used to minimise impact on external traffic.

Identified impact: Construction works and construction vehicle movements on Sybil Hill Road, which will have a slight short-term negative effect on pedestrian and cycle movements on Sybil Hill Road in the vicinity of the Proposed Development, for example due to pedestrians and cyclists having to give way at the construction access to the Site and / or divert around construction works on Sybil Hill Road.

Mitigation Measures:

- Priority to keep construction vehicles and pedestrians apart.

- Separate entry and exit gateways will be provided for pedestrians and vehicles with a gate man in attendance to interface with the traffic and public to facilitate safe access and egress of vehicles.

- Firm, level, and well-drained pedestrian walkways will be provided.

- Measures will be implemented to ensure drivers driving out onto public roads can see both ways along the footway before they move on to it.

- Footpaths will not be blocked resulting in pedestrians having to step onto the road.

12.1.8.2 *Operational Phase*

Identified impact: The likely effect of the Proposed Development will be additional traffic which may have a slight long-term adverse negative on the adjoining road network.

Mitigation Measures:

The following traffic mitigation measures shall be implemented for the Operational Phase of the Proposed Development:

- A Mobility Management Plan has been prepared for the Proposed Development which includes recommended mitigation measures to reduce usage of private cars and increase the use by residents within the Proposed Development of more sustainable modes of travel, such as including good cycle parking provision, use of a car club, and car sharing, will further promote the greater use of sustainable travel modes. It is projected that successful implementation of the Mobility Management Plan mitigation measures included, will reduce the vehicular trip generation from the Proposed Development below that included for in the Traffic Impact Assessment for the Proposed Development. For further details refer to the *Traffic & Transport Assessment and Mobility Management Plan* included separately with the planning application for the Proposed Development.

- The proposed residential development adjoins St. Anne's Park along three sides. Three pedestrian links are proposed between the Proposed Development and St. Anne's Park. These pedestrian links would further increase the use of the Park and would also reduce walk and cycle distances to bus and DART services. This would make public transport an even more attractive alternative to the private car and further reduce the traffic impact of the Proposed Development.

- A Phase 3 Road Safety Audit will be undertaken post construction and pre-opening of the Proposed Development in accordance with RSA Guidelines to address any potential road safety issues related to the completed scheme – see Appendix 12-1.

During the Operational Phase of the Proposed Development it is projected that the adjoining road network can readily accommodate the additional traffic from the Proposed Development. Full details of traffic modelling assumptions and results are included in the *Traffic & Transport Assessment and Mobility Management Plan* report completed by ILTP for the Proposed Development, included separately with the planning application for the Proposed Development.

12.1.9 *Residual Impacts*

Construction of the Proposed Development will have slight short-term negative impacts on the adjoining road network with construction traffic on Sybil Hill Road in the vicinity of the proposed access and on the assigned dedicated haul route.

The likely effect of the Proposed Development at Operational Phase will be additional traffic which may have a slight long-term negative effect on the adjoining road network.

The Proposed Development will not give rise to any likely significant long-term traffic impacts.

12.1.10 *Monitoring*

12.1.10.1 *Construction Phase*

In advance of work starting on site the appointed Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. The appointed Contractor will also prepare a CEMP. The CEMP sets out the overarching vision of how the Construction Phase of the Proposed Development will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project. The CEMP incorporating the Construction and Demolition Waste Management Plan (**CDWMP**) are included in the main submission.

Further specific monitoring measures are set out below:

- A site liaison officer will be identified as a single contact point for the planning authority and local community to deal in a prompt and efficient manner with any issues that may arise in relation to construction traffic and activity on the public road.

- Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.

- Site personnel will be present on the public road at the Site access junction at all times during Site operational hours to facilitate the safe movement of:

    - Construction vehicles to and from the Site.

    - Road users along Sybil Hill Road in the vicinity of the Site access or any construction works on Sybil Hill Road.

12.1.10.2 *Operational Phase*

As part of the Mobility Management Plan for the Proposed Development it is recommended that a Mobility Manager be appointed by the Management Company for the residential units. The Mobility Manager will also be involved in monitoring of the mode of travel from the residential development. This ideally will be done on an annual basis. Monitoring of travel patterns will facilitate the provision of sustainable transport modes and ensure that modal targets are met.

12.1.11 *Reinstatement*

In the event of the proposal being discontinued, decommissioning of the Proposed Development and reinstatement of the lands will have slight short-term negative impacts on the adjoining road network with construction traffic on Sybil Hill Road in the vicinity of the

proposed access and on the assigned dedicated haul route.

12.1.12 *Interactions*

12.1.12.1 *Construction Phase*

The Proposed Development is not projected to give rise to any likely significant impacts during the Construction Phase. Slight short-term negative impacts will be experienced during the Construction Phase with construction traffic on the local road network. These in turn have the potential to interact with noise, air quality, human health and dust. These interactions are addressed in the individual Chapters of this EIAR and in Chapter 14.

12.1.12.2 *Operational Phase*

The Proposed Development when assessed cumulatively with the proposed St Paul's Sports Hall and Playing Pitches development, (Dublin City Council ref. 3777/17, An Bord Pleanála ref. 301482-18) and permitted Ardilaun Court residential development (Reg. Ref. 3383/14), is not projected to give rise to any likely significant long-term traffic impacts.

The likely effect of the Proposed Development during the Operational Phase will be additional traffic which may have a slight long-term adverse effect on the adjoining road network.

12.1.13 *Difficulties Encountered in Compiling*

No difficulties were encountered with regard to assessing the potential traffic impact of the Proposed Development.

12.1.14 *References*

Canal Cordon Report 2018 - Report on Trends in Mode Share of Vehicles and People Crossing the Canal Cordon 2006 to 2018, National Transport Authority / Dublin City Council, April 2019

Dublin City Development Plan 2016 – 2022, Dublin City Council

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft), Environmental Protection Agency, August 2017

National Development Plan 2018 – 2027, Department of Finance and Public Expenditure and Reform

Project Ireland 2040 - National Planning Framework, Department of Housing, Planning

and Local Government

Regional Spatial & Economic Strategy 2019 – 2031, Eastern and Midland Regional Assembly

Route to Sustainable Commuting: an Employer's guide to travel plans, UK DTO guideline document

Smarter Travel a Sustainable Transport Future – A New Transport Policy Document for Ireland

2009 –2020, Department of Transport, 2009

Sustainable Urban Housing: Design Standards for New Apartments - Guidelines for Planning Authorities, Department of Housing, Planning and Local Government, 2018

Traffic & Transport Assessment and Mobility Management Plan (for Proposed Development), ILTP Consulting, September 2019

Traffic and Transport Assessment Guidelines, National Roads Authority / Transport Infrastructure Ireland, May 2014

Transport in the Urban Environment, The Institution of Highways & Transportation

www.dublinbus.ie

www.irishrail.ie

12.2 Waste

This section of Chapter 12 (Material Assets) provides a description of the Proposed Development in connection with waste; the baseline for waste for the Proposed Development and a statement of the likely significant impacts associated with both the Construction and Operational Phases of the Proposed Development. A 'do-nothing' scenario has also been considered. Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, and reinstatement or remedial measures and recommendations for monitoring are included where appropriate. Predicted residual effects are also described. This section on Waste has been prepared by O'Connor Sutton Cronin (OCSC) with supporting information provided by AWN Consulting Limited. The authors of the Chapters are set out in Table 12-7 below:

Table 12-7: Qualifications

Jonathan Burke	Material Assets	O'Connor Sutton Cronin Consulting Engineers	BEng Tech Civil Eng. DIT; Member of Engineers Ireland; Over 8 years' experience in Civil Engineering Design Consultancy
Anthony Horan	Material Assets	O'Connor Sutton Cronin Consulting Engineers	B. Eng (UCD), P. Dip. Project Management. (TCD), P. Cert Road Safety Engineering, Chartered Engineer (MIEI), RCONSEI Over 16 years' experience of Civil Engineering Consultancy.

12.2.1 *Study Methodology*

12.2.1.1 *Approach*

The assessment of waste is a desktop study, to identify properties, and the generation of waste materials that may arise from the Proposed Development and consultation with Local Authorities and the relevant utility providers. The assessment followed a phased approach as outlined in Chapter 4.4 of the Environmental Protection Authority's (**EPA**) *Draft Advice Note for Preparing Environmental Impact Statements* (EPA, 2015).

An initial assessment was carried out which defined the Proposed Development in terms of location, type and scale; established the baseline conditions; established the type of wastes on-site and generated during the Operational Phase; established the activities associated with the Proposed Development and; initial assessment and impact determination. This assessment identified any likely Source-Pathway-Receptor (**SPR**) linkages relating to the site of the Proposed Development.

The information sources that were utilised to establish the baseline conditions for the Site and all available information was compiled in accordance with:

- *Guidelines on the Information to be Contained in Environmental Impact Statements* (Environmental Protection Agency (**EPA**) 2002) (and revised guidelines 2015 (EPA 2015b;));
- Advice *Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA 2003) (and revised advice notes (EPA, 2015a);
- The classification of impacts / effects in this Chapter follows the definitions provided in the Draft Guidelines (EPA, 2017);
- Guidelines *for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of the Environment, Community and Local Government, 2013);
- *Additional* guidance and EIA definitions are contained in NRA Guidelines (NRA, 2009).
- The *Construction* and Demolition Waste Management Plan for the Proposed Development (OCSC);
- Protection *of* the Environment Act 2003 as amended;
- The Construction Environmental Management Plan (**CEMP**) for the Proposed *Development* incorporating the Operational Phase Waste Management Plan (**WMP**) for the Proposed Development ;
- *The Eastern Midlands (**EMR**) Waste Management Plan (WMP) 2015-2021*; (EMRWMP 2015-2021)
- *Dublin* City Council (**DCC**) (Storage and Segregation of Household and Commercial Waste) Bye-Laws (2018).
- *DCC* (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018);
- EPA *National* Waste (Database) Reports;
- *The Dublin* City *Development Plan* (**DCDP**) 2016-2022;
- Waste *Management* Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No. 20 of 2011) Sub-ordinate and associated legislation;
- *Environmental* Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Litter Pollution Act 1997 (Act No. 12 of 1997) as amended and Planning and *Development* Act 2000 (S.I. No. 30 of 2000) as amended;
- *EPA* 'Waste Classification – *List of Waste & Determining if Waste is Hazardous or Non-Hazardous';*
- *BS5906*:2005 Waste Management in Buildings – Code of Practice; and
- *DEHLG*, *Sustainable* Urban Housing: *Design Standards for New Apartments, Guidelines for Planning Authorities (2018)*.

Additional information was obtained from the following sources;

- *Department* of the Environment, Community & Local Government, (**DECLG**);
- *EPA*; and
- *Irish Waste* Management Association (**IWMA**).

Table 12-8: Definition of Quality of Effects

Quality	Definition
Positive Effects	A change which improves the quality of the environment
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

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts, see Table 12-9 below.

Table 12-9: Definition of Significance of Effects

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

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects, see Table 12-10 below.

Table 12-10: Definition of Duration of Effects

Quality	Definition
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
Reversible Effects	Effects that can be undone, for example through remediation or restoration

12.2.1.2 *Assumptions and Limitations*

The description of existing conditions is based on the available desktop study (August 2019) and on current available public service records information. Given the site history and site activities it is not envisaged that any significant contaminated ground (including contaminated waste) exists within the site of the Proposed Development.

12.2.2 *Characteristics of the Proposed Development*

The development is described in detail in Section 12.1.3.

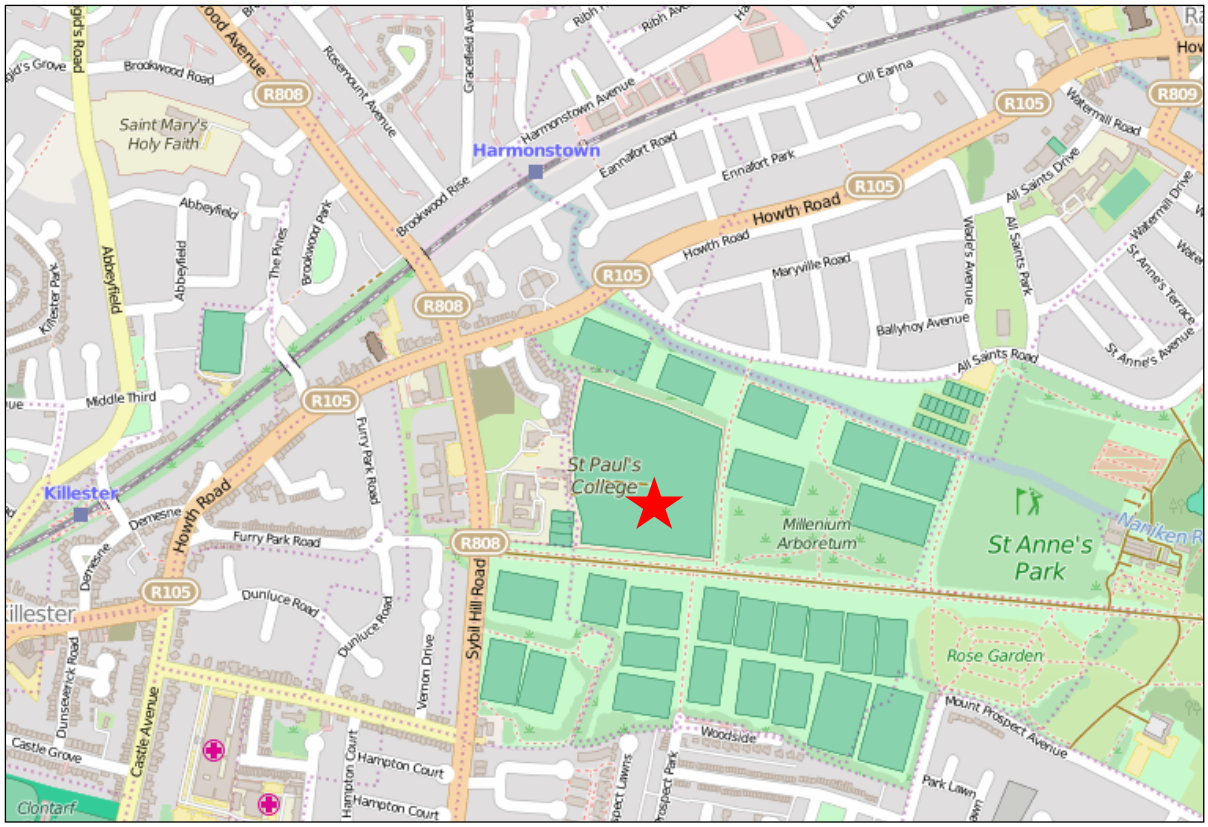

Figure 12-6: Site Location (Source: Open Street Maps)

The St Paul's College (Secondary School) will remain *in-situ* at its current capacity and the Department of Education (**DOE**) is satisfied that the Proposed Development will not adversely affect future operations.

Two no. dedicated communal Waste Storage Area (**WSA**) will be allocated within the basement of the Proposed Development, in Blocks 1-6 and a third no. residential WSA will be allocated for storage of full waste receptacles and additional empty receptacles if required. The room will not be accessible to residents, only facilities management. These shared WSAs are located on basement level of the Proposed Development.

Blocks 7-9 will have shared WSAs allocated on the ground floor level of their respective buildings, while one no. WSA has been allocated for the crèche unit on ground level adjacent to the external play area level. All WSAs can be viewed on the drawings submitted with the planning application.

Dedicated WSAs have been allocated at basement level (-1) for use by the residents of Blocks 1-6. It is proposed to install compaction equipment for the residents, for mixed non-recyclable (**MNR**) and dry mixed recyclable (**DMR**) waste types. Other main waste types will be stored in traditional wheelie bins.

The total area of the WSA for the Proposed Development will be 270.4m^2.

It is proposed that building management will avail of 1-2 no. commercially available mini compactors for the DMR and MNR waste streams in the residential WSAs (one no. referred to as an Epac Lodestone compactor and the other an LSM WR350H Mini compactor).

The WSAs should be designed and fitted-out to meet the requirements of relevant design standards, including:

- Provide ventilation to reduce the potential for generation of odours with a recommended 6-10 air changes per hour for a mechanical system for internal WSAs;
- Each WSA will be fitted with a non-slip floor surface;
- Provide suitable lighting – a minimum Lux rating of 220 is recommended;
- Be easily accessible for people with limited mobility;
- Be restricted to access by nominated personnel only;
- Be supplied with hot or cold water for disinfection and washing of bins;
- Be fitted with suitable power supply for power washers;
- Have a sloped floor to a central foul drain for bins washing run-off;
- Have appropriate signage placed above and on bins indicating correct use;
- Have access for potential control of vermin, if required; and
- Be fitted with CCTV for monitoring.

The facilities company(s) will be required to maintain the WSA in 'good condition' as directed by DCC

12.2.3 *The Existing Receiving Environment (Baseline Situation)*

12.2.3.1 *Sourcing Baseline Information*

The site of the Proposed Development is located in the Local Authority area of DCC. The receiving environment in the DCC area is governed by the requirements set out in the Eastern-Midlands Region Waste Management Plan 2015-2021 (EMRWMP 2015-2021) (EMWRO 2015). The EMRWMP 2015-2021 provides a framework for the prevention and management of waste in a sustainable manner in 12 local authority areas.

Details of waste collection permits (granted, pending and withdrawn) for the region are available from the National Waste Collection Permit Office (**NWCPO**).

12.2.3.2 *Topography & Setting*

A topographical survey was carried out and issued on the 01/01/2014 by Precision Surveys Limited. The existing access to the Site is off the R808 Sybil Hill Road to the north of St Paul's College.

The Proposed Development also includes for the widening and realignment of the existing vehicular access onto Sybil Hill Road, to facilitate the construction of an access road with footpaths, on-road cycle tracks and new boundary wall and railings. The new access will also serve Sybil Hill House to the north and St Paul's College to the south. To facilitate this new access road it is proposed to demolish an existing pre-fab building. The Proposed Development also includes for a proposed pedestrian crossing on Sybil Hill Road.

The Site comprises open relatively flat rough grassland field located to the north and east of St Paul's College.

The redline boundary for the Proposed Development is c. 6.7ha and the Site (development site) is c. 6.4ha. The Site is located east of the Sybil Hill Road, immediately east of St Paul's College and Sybil Hill House, in Raheny, Dublin 5, see Figure 12-2.

The site topography is generally level at c. 24.9mOD in the north-west to 21.28mOD in the south-east corner. The ground level falls gradually away to the east through St Anne's Park (c. 13mOD) and then to the sea at Dollymount (c.1mOD). Beyond Dollymount is North Bull Island and then Dublin Bay which is c. 2.5km to the south-east of the Site. A detailed topographical survey has been carried out for the Site and has informed the EIAR and design. This was carried out by Precision Surveys and was completed on 01/01/2014.

Figure 12-7: Site Context (Source: Bing Maps)

The Site, as shown on Figure 12-7 above, bound by St Anne's Park to the north, east and south. St Anne's Park is an extensive high-quality parkland and a major amenity and public open space. St Anne's Park sits on an earlier designed parkland landscape and its central tree-lined avenue is a striking feature of the Park. The Naniken River lies to the north of the Proposed Development and flows eastwards, before discharging to Dublin Bay at Dollymount. 'The Meadows' residential estate is to the west of the Site (from the north-west corner). St Paul's College lies to the west of the Proposed Development.

12.2.3.3 *Receiving Environment*

There are three no. municipal solid waste landfills in currently in operation in Leinster and all are operated by the private sector. There are two no. existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

There is a number of other licensed and permitted facilities in operation in the Region including waste transfer stations, hazardous waste facilities, soil waste and integrated waste management facilities.

The closest Bring Centre to the Proposed Development is located c. 2.8km to the north-west on Oscar Traynor Road and there are bottle banks located a short distance away at Raheny Public Library (1.3km) and Raheny Village (1.4km).

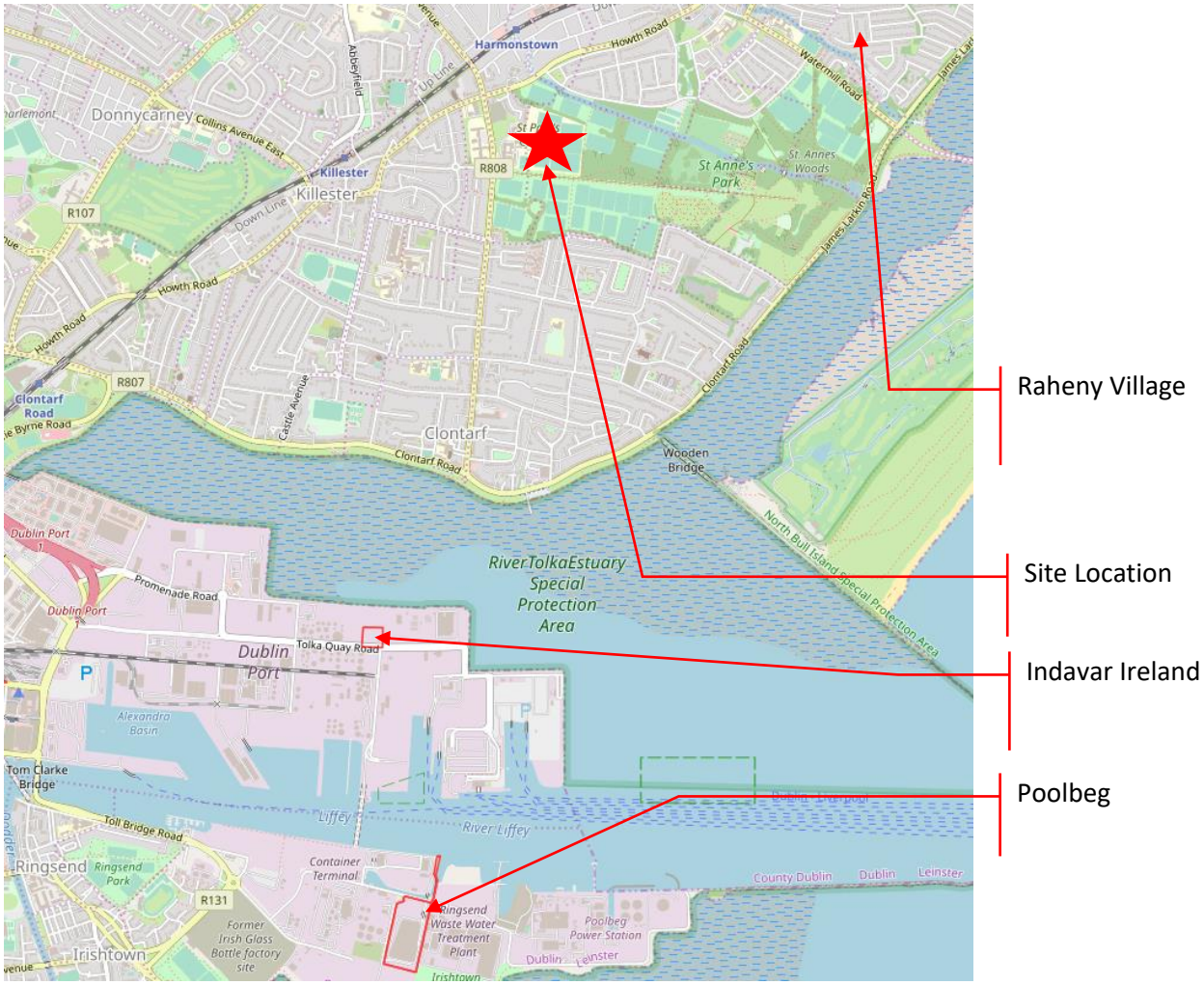

Figure 12-8: Location of Waste Facilities within Proximity of the Site (Source: EPA)

12.2.3.4 *Description of Other Related Projects*

A separate planning application (Ref: 3777/17) has been submitted by the Vincentian Fathers (trustees to St Paul's College) for a proposed sports complex on the south-west of the lands and granted. The sports complex application consists of a 2-storey 1,584sqm sports hall, one large all-weather pitch, one small all-weather pitch and all supporting infrastructure including additional car parking and floodlighting. This application is currently under consideration by An Bord Pleanala and a decision is pending at the time of writing this report.

The Ardilaun Court development (Reg. Ref. 3383/14) on the former St. Paul's swimming pool site to the north-west of the subject site at 1 Sybil Hill Road is also in the process of being built-out and will need to be considered as part of the EIA process. This scheme has been named 'Ardilaun Court' and consists of 75 no. residential units comprising 7 no. houses and 68 no. apartments.

12.2.4 *Potential Impact of the Proposed Development*

12.2.4.1 *Construction Phase*

The majority of waste arising during the Construction Phase will comprise soil and stone material associated with basement, foundations and the surface water outfall route. There will be some construction waste associated with the demolition of an existing pre-fab building and the laying of the proposed foul water outfall pipe along Sybil Hill Road.

Preliminary site investigations indicate that the material to be excavated is clean inert material (waste that does not undergo any significant physical, chemical or biological transformations) which may be suitable for off-site reuse.

The waste streams that will be generated by Construction and Demolition (**C&D**) activities are as follows. It is noted that all materials will be segregated in line with the below classifications:

- Soil, stones (75,542m^3)
- Concrete; bricks; tiles and ceramics (183t)
- Wood, glass and plastics (10t)
- Bituminous mixtures, coal tar and tarred products (40m^3)
- Metals (including their alloys) (10t)
- Insulation materials and asbestos-containing materials[27] (1t)
- Gypsum-based construction material. (1t)

These wastes are as defined in the Construction and Demolition Waste Management Plan **(CDWMP**). As set out inter alia in the CEMP incorporating the CDWMP which is submitted as a separate document with this planning application, all waste generated during the Construction Phase process will be segregated and removed off site. As there is limited space available on the Site there will not be any accumulations of waste. Wastes will be removed from the Site on a regular basis as managed by the appointed Contractor. A waste storage and collection area will be segregated on site in line with the specimen example in the overleaf schematic Fig 12-9. Where appropriate waste will be taken off site in a mixed format and be segregated in a waste segregation yard. There will be a slight, negative and short-term impact. Note the impact of transportation during the Construction Phase has been considered and is dealt with in Section 12.1 (Traffic) of this EIAR.

It is noted that there will be small amounts of domestic waste generated by workers present on the site during the Construction Phase. This will be managed in accordance with the DCC byelaws on waste and in accordance with the principles set out in the CEMP and OWMP. All wastes generated from the work force on site will be managed and disposed of in accordance with the principles of segregation and will be removed from site by a provider with appropriate licencing.

[27] Abestos Survey Report included in Appendix 13-1

Figure 12-9: Location of Waste Facilities within Proximity of the Site (Source: EPA)

12.2.4.2 *Operational Phase*

There are a number of elements associated with the Operational Phase of the Proposed Development which have the potential to impact on the environment with respect to waste.

The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following:

- Dry Mixed Recyclables (**DMR**) - includes wastepaper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons. These materials could potentially catch fire, and this would be a significant local effect with a short-term impact. Mitigation noted in Mitigation Section.

- Organic waste – food waste and green waste generated from internal plants / flowers. These materials could attract vermin if it is not appropriately stored and the stores maintained. Mitigation noted in Mitigation Section.

- Glass; No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development.

- Mixed Non-Recyclable (**MNR**) / General Waste. These materials could attract vermin if it is not appropriately stored and the stores maintained. Mitigation noted in Mitigation Section.

The estimated waste generation in cubic metres per week is contained in the Table 12-11 below.

Table 12-11: Estimated Waste Generation in Cubic Metres per Week

	Block Number										
Waste Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Creche**	**Totals**
Organic	1.69	0.79	0.49	0.79	0.49	0.81	0.5	0.54	0.54	0.02	**6.66**
Dry Mixed Recyclable	12.35	5.78	3.6	5.78	3.6	5.97	3.41	3.69	3.69	0.24	**48.11**
Glass	0.33	0.15	0.1	0.15	0.1	0.16	0.1	0.1	0.1	0.01	**1.3**
Mixed Non Recyclable	6.84	3.2	1.99	3.2	1.99	3.31	1.98	2.14	2.14	0.04	**26.83**
Totals	21.21	9.92	6.18	9.92	6.18	10.25	5.99	6.47	6.47	0.31	**82.9**

In addition to the typical waste materials that will be generated at the Proposed Development on a daily basis, there will be some additional waste types generated in small quantities which will need to be managed separately including:

- Green / garden waste may be generated from internal plants or external landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (**WEEE**) (both hazardous and non-hazardous);
- Printer cartridges / toners;
- Chemicals (paints, adhesives, resins, detergents, etc.); and
- Light bulbs (Fluorescent Tubes, Long Life, LED and Filament bulbs).

Further details in relation to the waste management can be found in the Operational Waste Management Plan (**OWMP**). This has been prepared by AWN Consulting Ltd. specifically for the Proposed Development.

12.2.4.3 *Potential Cumulative Impacts*

The cumulative impacts take into account the combined effects of the Proposed Development and other proposed projects in the surrounding area. Cumulative impacts occur as a result of actions taking place in the same area and within the same timeframe as the Proposed Development.

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal.

The Ardilaun Court residential development (Reg. Ref. 3383/14) on the former St. Paul's swimming pool site to the north-west of the subject site at 1 Sybil Hill Road is also in the process of being built and has also been considered and there is no impacts on review of the developments waste and infrastructure in the area. This is in relation to the construction of the project, as given the progress to date with the MKN development their construction process is substantially complete.

According to the Construction & Demolition Waste: Soil and Stone Recovery / Disposal Capacity report (the Report) (EMWRO 2016) there is a lack of licensed capacity for soil and stone wastes Nationally and in the Region due to the growth in construction activities. However, as the material that has been sampled is inert there are many close by facilities such as the Integrated Materials Solutions (**IMS**) and Walshestown facilities which are capable of taking the material.

12.2.4.4 *"Do Nothing" Impact*

In the 'Do Nothing' scenario the Site would not be developed there will be no impact on any of the waste services and facilities nearby.

12.2.4.5 *Worst-Case Scenario*

The worst-case scenario assessed is that there would be a delay due to sub-contractor difficulties (such as a workers strike in a waste transporter or a waste acceptance facility. It is unlikely that such a difficulty would last longer than one week and it is noted that as both waste collectors and waste facilities are paid on a per unit basis it would be reasonable to assume that within one week an alternative contractor would be engaged for the Proposed Development. On the basis of the above there would be a temporary, slight negative impact.

12.2.5 *Avoidance, Remedial & Mitigation Measures*

12.2.5.1 *Construction Phase*

As outlined in the CEMP for the Site, it is proposed to ensure the highest possible levels of waste reduction, waste reuse and waste recycling are achieved for the Proposed Development. Specifically, the CEMP aims to achieve waste prevention, maximum recycling and recovery of waste. The plan has as a central tenet, the diversion of waste from landfill wherever possible.

The CEMP describes the applicable legal and policy framework for C&D waste management in Ireland (both nationally and regionally), it also estimates the category and quantity of waste generated by the Proposed Development and makes recommendations for the bespoke management of the various waste streams. The CEMP also provides guidance on collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources).

Any soil removed off-site will be carried out by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007 and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments.

It will be the role of an appointed Waste Manager to try to find alternative options for demolition waste before sending it to landfill. It is preferable, where possible, to retain the soil on site for reuse rate than soil leaving the Site. Some wastes may be transported to another site for reuse on that site. All waste will be documented prior to leaving the Site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility.

The Waste Manager will be in contact with other sites to ensure that as much waste is reused as possible, such as concrete for fill purposes etc. All wastes leaving the Site will be placed in appropriate containers. Any concrete, soil, gravel, or broken stone transported off site will be covered to prevent dust or particle emissions from the load.

12.2.5.2 *Operational Phase*

The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following:

- Dry Mixed Recyclables (**DMR**) - These materials could potentially catch fire, and this would be a significant local effect with a short-term impact. This is mitigated by the risk being taken into account by the Fire consultant in the production of their strategy for the scheme.

- Organic waste – These materials could attract vermin if it is not appropriately stored and the stores maintained. As mitigation there will be a fulltime caretaker / concierge presence within this development.

- Glass; No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development.

- Mixed Non-Recyclable (**MNR**) / General Waste. These materials could attract vermin if it is not appropriately stored and the stores maintained. As mitigation there will be a fulltime caretaker/concierge presence within this development.

A waste management plan has been developed for the development this form the basis of the above in Section 12.2.3. More detail is provided in the Waste & Storage Management Plan prepared by AWN Consulting Limited and included with the submission.

Alternative Designs Considered

There have been no other alternative designs considered for waste as all proposed designs are constrained by existing infrastructure and to be implemented as directed by local service providers and the local authority in accordance with best practice.

12.2.6 *Residual Impacts*

It is considered that once the mitigation measures discussed above are employed, there will not be residual impacts on the environment in relation to waste as a result of the Proposed Development.

12.2.7 *Monitoring*

A CEMP has been prepared in advance of any works starting on site. The appointed Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator and the measures set out in the CEMP. The Contractor will also update the CEMP prior to that start and throughout the construction process.

The CEMP sets out the overarching strategy for ensuring that construction of the Proposed Development will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in this EIAR and any subsequent conditions relevant to the Proposed Development. The CEMP incorporating the CDWMP are included in the planning application submission. Monitoring shall be carried out for compliance with these plans.

12.2.8 *Reinstatement*

12.2.8.1 *Construction Phase*

It is not perceived that there will be any significant negative impacts in the event of the Proposed Development being discontinued.

12.2.8.2 *Operational Phase*

It is not perceived that there will be any significant negative impacts in the event of the Proposed Development being discontinued.

12.2.9 *Interactions*

These impacts also relate to and interact with other Chapters within the EIAR such as:

- Chapter 4, Population & Human Health
    - The proper management of wastes during construction stage and operation phase is required to ensure that waste does not pose a hazard to human health. This has been considered in the mitigation measures outlined above.
- Chapter 5, Biodiversity: Flora and Fauna
    - The proper management of wastes during construction stage and operation phase is required to ensure that waste does not pose a hazard to flora and fauna. This has been considered in the mitigation measures outlined above.

- Chapter 6, Lands, Soils & Geology
    - The excavation and removal of soil is also discussed in the Land, Soils and Geology chapter.
- Chapter 7, Hydrology, Water and Hydrogeology
    - The management of runoff during the Construction Phase is also discussed in this chapter.
- Chapter 8, Air Quality & Climate
    - The management of dust during the Construction Phase in accordance with the CEMP will be an interaction with this chapter.
- Chapter 9, Noise and Vibration
    - The Management of construction stage noise is dealt with in the CEMP.
- Chapter 11, Cultural, Archaeological and Architectural Heritage
    - The discovery of archaeological finds can take place during earthworks.
- Chapter 12, Materials Assets (Transportation)
    - The management of the removal of waste from the site has been considered in the Materials Assets Transportation chapter

12.2.9.1 *Further detail on these interactions is provided in the relevant Chapters and in Chapter 14 Interactions Construction Phase*

The likely effect of the Proposed Development during the Construction Phase will be additional connections and infrastructure to existing utilities which will not have any long-term adverse is not projected to give rise to any likely significant long-term impacts to the level of service of existing waste public infrastructure.

12.2.9.2 *Operational Phase*

The completion of the proposed residential development will result in an increased waste and demand on public infrastructure.

However, the proposed St. Paul's residential development, when assessed cumulatively with the proposed St. Paul's Sports Hall and Playing Pitches development, currently under appeal to An Bord Pleanála (DCC ref. 3777/17, ABP ref. 301482-18) and permitted Ardilaun Court residential development (Reg. Ref. 3383/14), is not projected to give rise to any likely significant long-term impacts to the level of service of existing waste public infrastructure.

12.2.10 *Difficulties Encountered In Compiling*

No notable difficulties will be encountered with regard to the potential waste impacts of the Proposed Development as the site is a generally a greenfield in a well serviced urbanised area.

12.2.11 *References*

Waste Management Act 1996 (S.I. No. 10 of 1996) as amended 2001 (S.I. No. 36 of

2001), 2003 (S.I. No. 27 of 2003) and 2011 (S.I. No. 20 of 2011). Sub-ordinate and associated legislation;

Environmental Protection Act 1992 (Act No. 7 of 1992) as amended;

Litter Pollution Act 1997 (Act No. 12 of 1997) as amended;

Eastern-Midlands Waste Region, Eastern-Midlands Region (EMR) *Waste Management Plan 2015 – 2021* (2015);

Dublin City Council (DCC) Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018);

Department of Environment and Local Government (DoELG) Waste Management – *Changing Our Ways, A Policy Statement* (1998);

Department of Environment, Heritage and Local Government (DoEHLG) *Preventing and Recycling Waste - Delivering Change* (2002);

DoELG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action* (World Summit on Sustainable Development) (2002);

DoEHLG, *Taking Stock and Moving Forward* (2004);

DoECLG, *A Resource Opportunity - Waste Management Policy in Ireland* (2012);

Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2012;

DCC, *Dublin City Development Plan 2016 – 2022* (2016) Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended 2010 (S.I. No. 30 of 2010) and 2015 (S.I. No. 310 of 2015);

European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC);

Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC);

EPA, European Waste Catalogue and Hazardous Waste List (2002);

EPA, Waste Classification – List of Waste & Determining if Waste is Hazardous or

Non-Hazardous (2015);

BS 5906:2005 Waste Management in Buildings – Code of Practice;

DoEHLG, *Sustainable Urban Housing: Design Standards for New Apartments; Guidelines for Planning Authorities* (2018).

12.3 Utilities

This section of Chapter 12 (Material Assets) provides; a description of the Proposed Development (in connection with foul, potable water, gas, electricity and telecommunications); the baseline for utilities for the Proposed Development; and a statement of the likely significant impacts associated with both the Construction and Operational Phases of the Proposed Development. A 'do nothing' scenario has also been considered. Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, and reinstatement or remedial measures and recommendations for monitoring are included where appropriate. Predicted residual effects are described. The utilities section of this Chapter has been prepared by O'Connor Sutton Cronin (**OCSC**), by Anthony Horan and Jonathan Burke of OCSC, their experience and qualifications are detailed below in Table 12-12.

Table 12-12: Qualifications

Jonathan Burke	Material Assets	O'Connor Sutton Cronin Consulting Engineers	BEng Tech Civil Eng. DIT; Member of Engineers Ireland; Over 8 years' experience in Civil Engineering Design Consultancy
Anthony Horan	Material Assets	O'Connor Sutton Cronin Consulting Engineers	B. Eng (UCD), P. Dip. Project Management. (TCD), P. Cert Road Safety Engineering, Chartered Engineer (MIEI), RCONSEI Over 16 years' experience of Civil Engineering Consultancy.

12.3.1 *Study Methodology*

12.3.1.1 *Approach*

The assessment of material assets (utilities) is a desk-based exercise, to identify properties, utilities and resources that may be affected by the Proposed Development and consultation with Local Authorities and the relevant utility providers. The assessment followed a phased approach as outlined in Chapter 4.4 of the Environmental Protection Authority's (**EPA**) *Draft Advice Note for Preparing Environmental Impact Statements* (EPA, 2015).

An initial assessment was carried out in August 2019 which; defined the project in terms of location, type and scale; established the baseline conditions; established the type of utilities available; established the activities associated with the Proposed Development and; initial assessment and impact determination. This assessment identified any likely Source-Pathway-Receptor (**SPR**) linkages relating to the site of the Proposed Development.

The information sources were utilised to establish the baseline conditions for the Site and all available information was compiled in accordance with:

- *Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency* (EPA) 2002) (and revised and draft guidelines 2015 (EPA 2015b));

- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* (EPA 2003) (and revised advice notes (EPA 2015a); and

- The classification of impacts / effects in this Chapter follows the definitions provided in the Draft Guidelines (EPA, 2017).

- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of the Environment, Community and Local Government 2013).

- Additional guidance and EIA definitions are contained in NRA Guidelines (NRA, 2009).

12.3.1.2 *Assumptions and Limitations*

The description of existing conditions is based on the available desktop study and on current available public service records information. Given the site history and site activities it is not envisaged that any significant existing services exist within the site of the Proposed Development.

12.3.1.3 *Data and Survey*

The gathering of data has been taking place with the relevant utilities provider to determine exact location, depth and specifics of underground cables and pipelines. The data necessary to carry out the assessment comprises of;

- Existing services information was obtained from:
    - Irish Water records (foul and potable water services);
    - DCC Drainage Records (local drainage networks);
    - Gas Network Ireland (**GNI**) (gas networks);
    - Electricity Supply Board (**ESB**) (electricity); and
    - Eir, BT, Vodafone, Aurora and Virgin (telecommunications).

Consultation will take place prior to any excavation works with the relevant utilities to determine exact location, depth and specifics of underground cables and pipelines.

The source of knowledge will be based on the following guidelines:

- DCC Local Authority Requirements (with liaison with technical departments);
- BS EN 752 – Drainage Outside Buildings;
- The Building Regulations – Technical Guidance Document Part 'H';
- Recommendations for Site Development works for housing Areas, Dept. of Environment, 1998;

- Greater Dublin *Strategic* Drainage Study (GDSDS);
- BS EN 12056-2:2000 Gravity drainage systems inside buildings;
- EPA Wastewater Treatment Manual, For Small Communities;
- Irish Water Code of Practice for Water Infrastructure; and
- Irish Water Code of Practice for Wastewater Infrastructure.

Additional information has been compiled through consultation and feedback from stakeholders and the project / EIAR Team and from the following sources:

- Geological Survey of Ireland (GSI);
- Environmental Protection Agency (EPA);
- Site Investigation Report completed by GII Ltd.;
- Site Visit completed by OCSC;
- GSI online maps and databases;
- Ordnance Survey of Ireland (OSI) and National Parks and Wildlife Services (**NPWS**);
- Dublin City Development Plan (DCDP) 2016 -2022; and
- Correspondence and meetings with DCC.

12.3.2 *Characteristics of the Proposed Development*

The development is described in detail in Section 12.1.3.

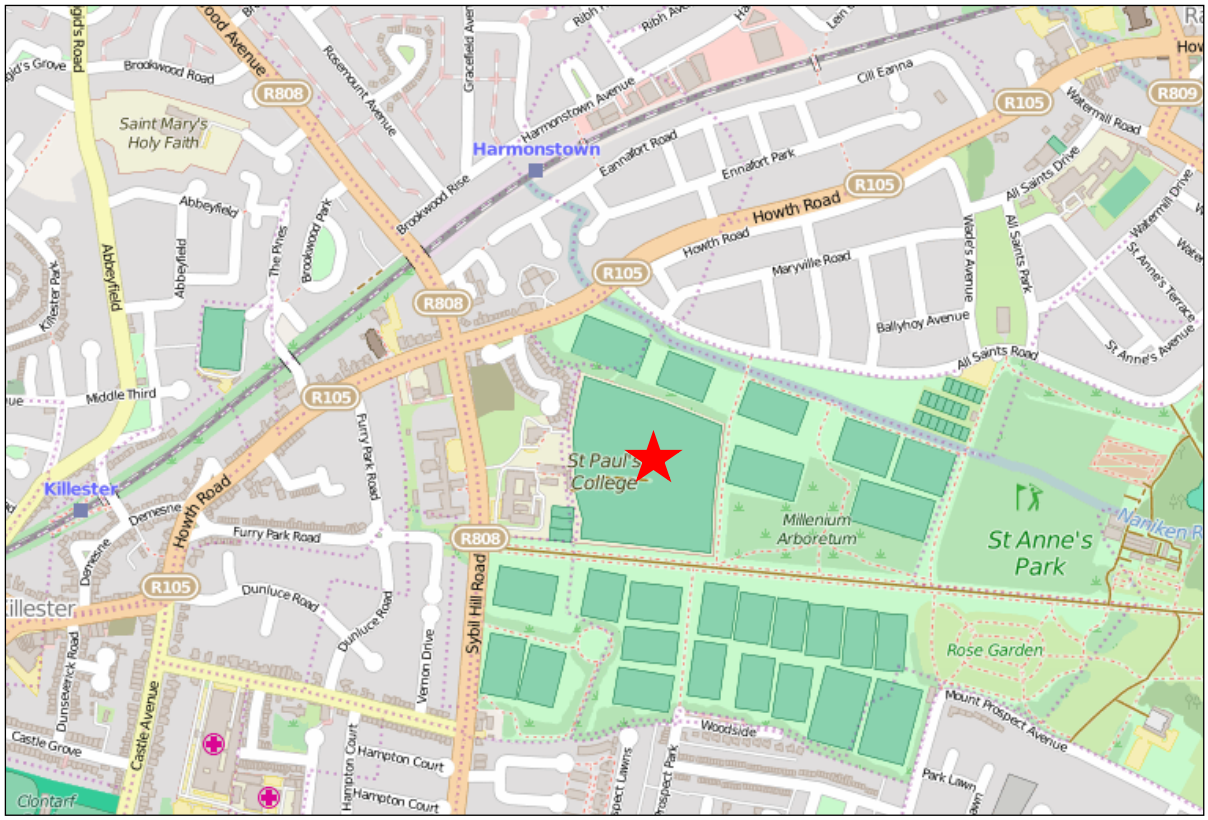

Figure 12-10: Site Location (source: Open Street Maps)

During the Construction and Operational Phases the installation of new utilities, upgrade and replacement existing services may be required to service the Proposed Development. These are described below.

Potable Water Infrastructure

A new water network will be required along the proposed spine road to service the Proposed Development. A spur connection will be required from the proposed waterman inside the site of the Proposed Development to the existing waterman on Sybil Hill Road. A Pre-Connection Enquiry Application was submitted to Irish Water and feedback indicates that local proposed connection to the Irish Water network can be facilitated.

The existing water supply utilities will be retained as part of the Proposed Development. Irish Water have advised that the network is subject to possible upgrades and/or District Metering Area (DMA) reconfiguration. These upgrades would be completed by Irish Water.

Foul Water Infrastructure

The existing foul water network will be retained as part of the Proposed Development. A Pre-Connection Enquiry Application was submitted to Irish Water and feedback indicates that local proposed connection to the Irish Water foul network can be facilitated. Irish Water have

advised that foul water connection to the existing main is to be made downstream of an identified 650mm constraint in the 1350mm wastewater main. No upgrade works are proposed by Irish Water at this time.

Surface Water Instructure

The existing surface water drainage regime is being maintained. A new drainage network for the spine road and Proposed Development will be provided including the installation of Sustainable Urban Drainage Systems (**SuDs**), as outline in detail in Chapter 7 (Hydrology, Water & Hydrogeology) and the Engineering Service Report (**ESR**). There will be no new connections to the existing surface water infrastructure as directed by DCC. All surface water from the Proposed Development will discharge to the Naniken Stream and not to the public sewer network as directed by DCC. All surface water will be limited to the greenfield runoff rate.

Gas Network Infrastructure

The existing gas utilities will be retained as part of the Proposed Development.

It is proposed to connect into the existing pipeline on Sybil Hill Road via a new pipeline route along the proposed new access road for the Proposed Development. A District Regulating Installation (**DRI**) pressure reducing unit will lower gas pressure prior to the service entering the Proposed Development. There are provisions in the local gas network for the connection of the Proposed Development. The gas main in the area is confirmed as adequately sized based on the anticipated load and density of units.

Electrical Network Infrastructure

Some works may be required for the repositioning of the existing controlled pedestrian crossing as requested by DCC, existing traffic signal installations public lighting may need to be upgraded or removed.

A new substation is proposed within the site of the Proposed Development with a connection to the ESB network on Sybil Hill Road via the new access road. When construction of the Proposed Development commences OCSC will then engage fully with ESB Networks to make appropriate applications and agree location and detail for the proposed substations and overall distribution.

A new public lighting network is required for the proposed spine access road into the Proposed Development from Sybil Hill Road. This will include new ducting and mini pillars.

Telecommunication Infrastructure

Due to the shallow nature of telecom services it is envisaged that some local diversion of services may be required with the installation of other deeper utilities. Silt trench works will be required to provide all routes to minimise disruption to existing services.

A connection will be made via the proposed ducting and chambers along the main spine road into the Proposed Development. There will be a connection via a chamber at Sybil Hill Road. A fully ducted telecommunication network is planned to be provided to each plot. Ducting will

be taken from for new connection of telecommunication providers outside the Proposed Development into the comms room situated in the basement of the Proposed Development. This will allow for the provision of telecommunication services to all plots which can be included in all units. Similar Eir networks will have to be designed in when developing the Site infrastructure.

Traffic ducting will be required for the repositioning of the controlled pedestrian crossing.

12.3.3 *The Existing Receiving Environment (Baseline Situation)*

12.3.3.1 *Sourcing Baseline Information*

The Site is within a highly urbanised region of Dublin City with a wealth of data sources are available from a variety of companies throughout the City and Greater Dublin Area. Utilities are generally buried under public roads and footpath serving domestic, commercial and industrial users via local connections from main infrastructure networks. The existing utilises of the Dublin region, including the infrastructure routes of the foul, water, gas, electricity and telecommunications are well documented and have been obtained from several public resources as follows.

Foul & Potable Water

Records within the vicinity of the site for foul and potable water have been provided by Irish Water.

Foul: The methodology used to calculate the foul water discharge rates will be based on the recommendations in Irish Water Irish Water Code of Practice for Wastewater Infrastructure and EPA Wastewater Treatment Manual, For Small Communities.

Potable: The methodology used to calculate the water demand will be based on the Irish Water average rate recommendation for domestic consumption in accordance Irish Water Code of Practice for Water Infrastructure.

Surface Water

Existing surface water infrastructure has been received from DCC records. The calculation of the surface water attenuation volumes is based on the ability to provide for up to 100-year return period in accordance with the Greater Dublin Strategic Drainage Study.

Gas

Existing gas network records have been received from GNI for the local grid network. All proposals for gas will be in line with specific GNI rules and regulations.

Electricity

The existing electrical supply for the local area has been provided by the ESB. The Proposed Development will connect to the existing cable infrastructure and supply within the Site will be in accordance with ESB guidance and regulations. The estimated electrical loading for the Proposed Development will be in accordance with ESB Code of Practise.

Telecommunications

Telecom records have been requested from Eir, BT, Vodaphone, Aurora and Virgin. Existing records adjacent to the Site have been received from Eir for the area adjacent to the Site.

Additional Information was obtained from the following sources;

- Local authority record drawings;
- Greater Dublin Strategic Drainage Study (GDSDS);

- Geological Survey of Ireland (GSI);
- Site Investigation Report (Ground Investigations Ireland);
- Site Visit (OCSC);
- Geological Survey of Ireland (GSI) online maps and databases; and
- Correspondence and meetings with DCC.

12.3.3.2 *Topography & Setting*

The existing site access to the site is off the R808 Sybil Hill Road to the north of St Paul's College and is the current access for the Vincentians Residence (Sybil House). Access to the school will remain unaltered by the Proposed Development and a gated access to the school will also be provided off the Proposed Development access to provide linkage between the Vincentians Residence and the school.

The existing site is currently greenfield with natural parkland coverage. As such there are no existing services connections associated with the existing site area. The closest services are located along Sybil Hill Road and currently serve existing dwellings and developments along Sybil

The subject site comprises approximately 6.4 hectares. The development site is located off Sybil Hill Road, Raheny on lands to the east of St. Paul's College as shown on Figure 12-12, the site's immediate surrounding area is mixed use in nature.

The site topography is generally level at c. 24.5m in the northwest to 21.5mOD in the southeast corner. The ground level falls gradually away to the east through St Anne's Park (c. 13mOD) and then to the sea at Dollymount (c.1mOD). Beyond Dollymount is Bull Island and then Dublin Bay which is c. 2.5km to the south-east of the site boundary. A detailed topographical survey has been carried out for the site and has informed the EIAR and design. The topographical survey was carried out by Precision Surveys and was completed on the 1st of January 2014.

Figure 12-11: Site Context (Source: Bing Maps)

The Site, as shown on Figure 12-11 above, bound by St Anne's Park to the north, east and south. St Anne's Park is an extensive high-quality parkland and a major amenity and public open space. St Anne's Park sits on an earlier designed parkland landscape and its central tree-lined avenue is a striking feature of the Park. The Naniken River lies to the north of the Proposed Development and flows eastwards, before discharging to Dublin Bay at Dollymount. 'The Meadows' residential estate is to the west of the Site (from the north-west corner). St Paul's College lies to the west of the Proposed Development.

12.3.3.3 *Receiving Environment*

There is a number of existing utilises to be taken into consideration for proposed connections of the Proposed Development. It would be considered to be normal to encounter infrastructure during the Construction Phase of the Proposed Development works within an urban environment and the crossing of this infrastructure will be managed in the normal way during the design and construction of the Proposed Development.

Potable Water Infrastructure

There is currently no water supply infrastructure within the site of the Proposed Development. The closest existing source of potable water supply to the Site is the 250mm diameter uPVC

water main located along Sybil Hill Road, which runs in a north-south direction as shown on figure 12-12.

Figure 12-12: Existing Water Main (Source: IW-Records)

Foul Water Infrastructure

The closest existing public foul water sewer to the Site is the 1350mm diameter sewer crossing Sybil Hill road at the south-west corner of the site and running along the southern boundary of the Site. This sewer ultimately discharges to Kilbarrack pumping Station via the North Dublin Drainage System (**NDDS**) Trunk Sewer. As the site of the Proposed Development is greenfield there is currently no foul water sewer or treatment required for the Site.

Figure 12-13: Existing Surface & Foul Water Sewer (Source: DCC-Records)

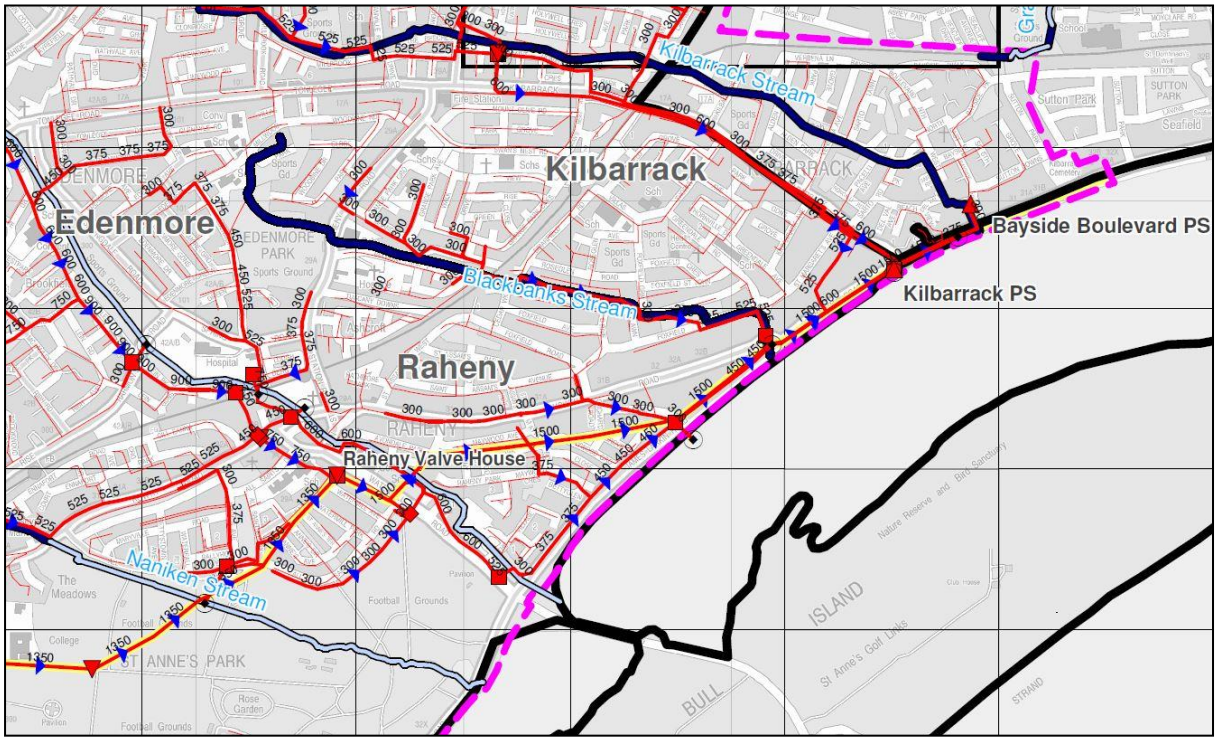

Figure 12-14: NDDS & North Fringe Catchment (Source: GDSDS - Final Report)

Surface Water Instructure

The closest existing surface water sewer to the Site is the 300mm diameter sewer located along Sybil Hill Road in the south-west corner of the Site which discharges directly to Dublin Bay. There are flooding issues in the existing public surface water network downstream of the Site as shown in the GDSDS 2031 system performance model.

Gas Network Infrastructure

There is a high-pressure gas pipeline near the Proposed Development along Sybil Hill Road as shown on Figure 12-15 below.

Figure 12-15: Gas Network Route along Sybil Hill Road (Source: Gas Networks Ireland)

Electrical Network Instructure

There is existing ESB network along Sybil Hill Road as shown on Figure 12-16 below. There is existing connections from the main infrastructure network to St Paul's College, Sybil Hill House and the 'Ardilaun Court' estate.

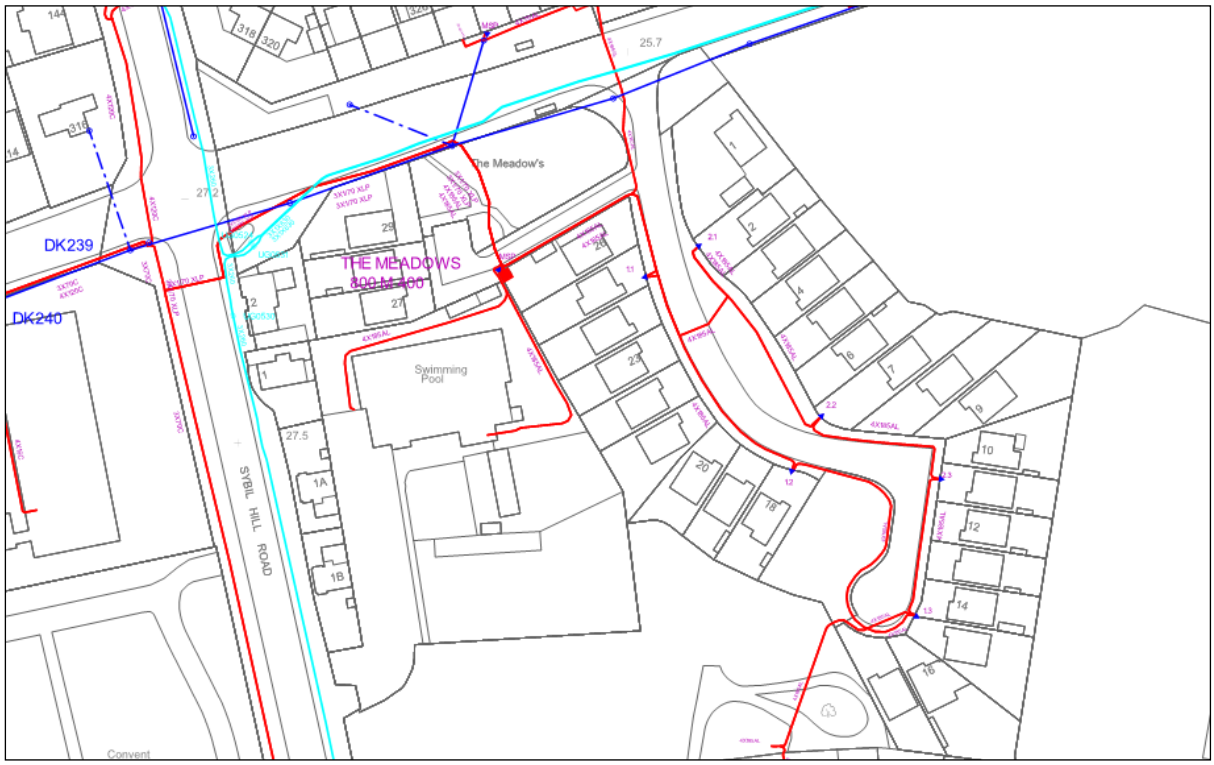

Figure 12-16: ESB Network Route Sybil Hill - Howth Road Junction (Source: ESB)

Figure 12-17: ESB Network Route Sybil Hill Road - St Anne's Park Avenue Junction (Source: ESB)

Telecommunication Infrastructure

There is existing telecoms along Sybil Hill Road is Virgin and for Howth Road is Eir and as shown on Figure 12-18 and Figure 12-19 below.

Figure 12-18: Virgin Infrastructure along Sybil Hill Road (Source: Virgin)

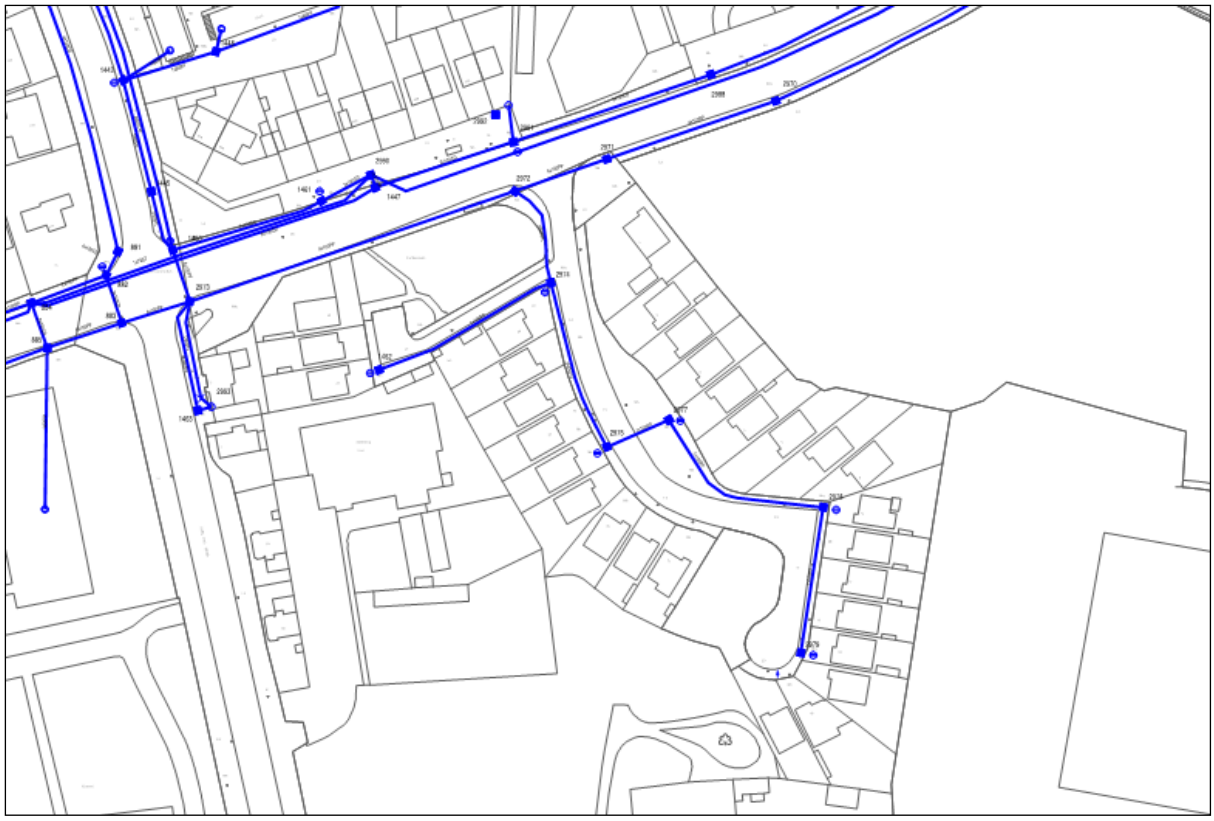

Figure 12-19: Eir Infrastructure along Howth Road (Source: Eir)

12.3.3.4 *Description of Other Related Projects*

A separate planning application (Ref: 3777/17) has been submitted by the Vincentian Fathers (trustees to St. Paul's School) for a proposed sports complex on the south-west of the lands and granted. The sports complex application consists of a 2-storey 1,584sqm sports hall, one large all-weather pitch, one small all-weather pitch and all supporting infrastructure including additional car parking and floodlighting. This project is currently at The Board awaiting a decision.

The Ardilaun Court residential development (Reg. Ref. 3383/14) on the former St. Paul's swimming pool site to the north-west of the subject site at 1 Sybil Hill Road is also in the process of being built-out and will need to be considered as part of the EIA process. This scheme and consists of 75 no. residential units comprising 7 no. houses and 68 no. apartments. This scheme is recently substantially completed on site.

12.3.4 *Potential Impact of the Proposed Development*

12.3.4.1 *Construction Phase*

There are several elements associated with both the construction of the Proposed Development which have the potential to impact on the environment with respect to utilities and infrastructure. The activities associated with the Proposed Development which have the potential for impact are as follows;

Potable Water Infrastructure

A temporary water supply will be required to supply water for the Construction Phase activities. The water supply demand is neutral, not significant and short-term impact. Potential for accidental pollution of the existing potable water network during construction is negligible. Prior to the commencement of Construction Phase activities, the potable water supply to the buildings for demolition will be disconnected. A temporary potable water connection from the mains will be requested and connected by Irish Water on inspection by Irish water of the on-site arrangement. This supply will be by way of a break-water tank. This will remove the possibility of back contamination of the water supply network.

Foul Water Infrastructure

The contractor activities have the potential to generate foul effluent waste from the Site from sanitary facilities provided for staff. Foul sewage from the Proposed Development will either be connected to the public foul sewer under a connection agreement from Irish Water or it will be collected in a holding tank on site which will be regularly emptied by a reputable company professional in such matters. As there will be an initial period for the construction of the foul outfall pipe network and the wait time for the Irish Water Connection is not known it is expected that for a period of at least three months from the start of construction foul water will be collected on site and disposed of by way of tanker removal. This is industry standard in construction.

In both cases the foul sewage will be conveyed to a sewage treatment plant and treated before being released to a watercourse. On this basis the Construction Phase impacts of foul effluent on the receiving environment are deemed negligible.

Surface Water Infrastructure

A new surface water network will be provided with an outfall to the Naniken Stream via SuDs measures. Any outflow to the Naniken Stream during the Construction Phase will be via a petrol interceptor and silt control device such as a Downstream defender as supplied by Hydro International. No discharge to the Naniken Stream will occur prior to the connection of the above.

Surface water runoff during the Construction Phase can be potentially contaminated. The most likely forms of contamination are “siltation” and spillages. Siltation is where soil and particulate matter are washed away in the storm by rainwater. Siltation will be mitigated for the Proposed Development using stilling tanks and strainers on the outfall to prevent silt being lost to the drainage network.

As fuels and oils are required in construction it is necessary to mitigate the possibility of there being an accidental leakage of these liquids to a watercourse. As per the Construction Methodology and legislative requirements all fuels stored on site will be bunded and all chemicals will be stored in an appropriate chemical storage tank. Should a spillage of fuel occur on site during the Construction Phase it is likely that there will be a localised moderate impact on the environment which will be short in duration.

Gas Network Infrastructure

There is no gas supply required during the Construction Phase of the Proposed Development and therefore no impacts.

Electrical Network Instructure

There will be power requirements during the Construction Phase for temporary lighting and construction actives. The power demand during the Construction Phase will be catered for by way of on-site power generators. This is considered to have a negligible, negative and short-term impact on air quality due to the presence of small diesel generators which will be on site.

From a Site walk and a review of the existing services drawings it is clear that there will be no major diversions of existing electrical Network Infrastructure. Based on the exact position of underground infrastructure there could be some minor movement of underground cables local to the junction with Sybil Hill Road. This is a negligible change, and which may result in a single day shut out for cable jointing by ESB Networks (ESBN). This impact is assessed as being negligible, negative and short-term.

Some local diversions may be required to supply temporary power to the Site for the Construction Phase. This is envisaged to be a slight, negative and short-term impact.

Telecommunication Infrastructure

Some local diversions may be required in the upgrade works of the controlled pedestrian crossing and new proposed ducting works. This is envisaged to be a slight, negative and short-term impact.

12.3.4.2 *Operational Phase*

There are a number of elements associated with the Operational Phase of the Proposed Development which have the potential to impact on the environment with respect to utilities. The activities associated with the Proposed Development which have the potential for impact are as follows;

The Proposed Development will not give rise to any likely significant long-term impacts. There are effects on utilities which could potentially occur due to the Proposed Development namely:

Potable Water Infrastructure

There will be an increase in the demand from the existing network. Irish Water have confirmed capacity in the network for the Proposed Development. The peak water usage for the Proposed Development has been assessed as 19.36l/s and the average has been assessed

as 3.87l/s. These figures have been assessed in accordance with the Code of Practice for Water Infrastructure (IW-CDS-5020-03 Revision December 2017).

Foul Water Infrastructure

There will be an increase in the effluent flows from the Proposed Development to the existing sewer. Irish water has confirmed capacity in the network for the additional flows. The peak wastewater usage for the scheme has been assessed as 10.23l/s and the average has been assessed as 3.41l/s These figures have been assessed in accordance with the Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03 Revision December 2017).

The increase in flows are negligible in the context of the wider City network that they flow into. They will however increase the treatment load on the Ringsend Wastewater Treatment Plant with is currently being upgraded. This is a not significant long-term impact.

Surface Water Instructure

As noted, in Section 12.4 above, a new surface water network will be provided with SuDs measures before discharging to the Naniken Stream. The greenfield run off and SuDs measures proposed are to mimic a natural drainage regime.

The current site is greenfield and a portion of which will be converted to hardstanding, roads and paved areas. There is drainage in place currently, while no as-built records of the drainage has been made available to the design team. The Civil Engineer has walked the Site and visually inspected the Site and seen evidence of an outfall to the Naniken from the existing pitches with no evidence of attenuation of runoff or treatment.

Based on the above the new storm drainage infrastructure will have a slight long-term positive impact on the receiving watercourse.

Gas Network Infrastructure

There will be an increase in the gas demand from existing resources. GNI have confirmed adequate pressure in the network for the Proposed Development. The increase in demand is considered to be not significant, negative and long-term impact.

Electrical Network Instructure

Additional power will be required from the grid for the Proposed Development. The increase in demand is considered to be not significant, neutral and long-term impact.

Telecommunication Infrastructure

The increased demand on existing telecommunications infrastructure is considered to be imperceptible.

As outlined above, the Operational Phase of the Proposed Development has few activities which would constitute a risk to the material assets of utilities.

12.3.4.3 *Potential Cumulative Impacts*

The cumulative impacts take into account the combined effects of the Proposed Development and other proposed projects in the surrounding area. Cumulative impacts occur as a result of actions taking place in the same area and within the same timeframe as the Proposed Development.

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal.

There will be an increase in the demand of existing utilities for both developments for utilities which share the same connection and or same outfall. This has been taken into account and the maximum foul discharge to the public foul sewer and ESB loading.

The MKN residential development (Reg. Ref. 3383/14) on the former St. Paul's swimming pool site to the north-west of the subject site at Sybil Hill Road is also substantially completion and has also been considered and there is no impacts on review of the developments utilities and infrastructure in the area.

12.3.4.4 *"Do Nothing" Impact*

In the 'Do Nothing' scenario the Site would not be developed there will be no impact on any of the major utilities or infrastructure nearby.

12.3.4.5 *Worst-Case Scenario*

The worst-case scenario would result if the design of the utility or infrastructure did not take account of the identified utilities and or take account of construction methodology resulting in a worst-case scenario with significant, negative and short-term impact. Based on our experience it is deemed that the worst-case scenario would most likely be due to a construction accident.
This could be:

- Accidental drowning due to a burst of a water main in a trench on site.
- Loss of life due to an accidental strike on underground utilities such as Gas or electrical cables.

Although construction accidents are on the decline and in the context of the numbers of site and the numbers employed, they are at an all-time low. It is also noted that research and data from the Health and Safety Authority (**HSA**) shows that accidents are more likely on smaller sites. The risk of this worst-case scenario will be mitigated by compliance with the Construction Regulations 2019 and other relevant safety and health legislation. The Contractor and Designers on the scheme will meet regularly continuing on the coordination currently happening and monitored by the Project Supervisor Design Process (PSDP).

Other Potential Worst-case Scenarios are:

A burst of a fuel tank on a piece of construction plant digging the outfall pipe to the Naniken Stream within St Anne's Park.

If this were to happen when an excavator was close to the outfall and the weather was wet this could lead to up to 200l of diesel being lost to the Naniken Stream. This would have an immediate negative impact on the aquatic life in the Naniken Stream and potentially into Dublin Bay. This would only happen as part of a deliberate criminal act. To mitigate against this the Contractor will be required to ensure that all unattended construction plant is kept onsite within the Proposed Development and not left within St Anne's Park as this area of the drainage is the only part which is downstream of the full retention interceptor.

Another potential outflow to Dublin Bay would be a failure in the Ringsend WWTP. Irish Water are aware of this issue and have put in place a strategy to address this which includes the following:

- Upgrade of the Ringsend WWTP – construction is currently underway and is expected to be completed in 2020;

- The Greater Dublin Drainage Project to provide infrastructure in North Dublin and reduce the pressure on Ringsend WWTP which includes:

    - A new regional wastewater treatment facility and sludge hub centre on a 30ha site at Clonshaugh (Clonshaugh);

    - An underground orbital sewer from Blanchardstown to Clonshaugh (Clonshaugh), including a new pumping station at Abbottstown;

    - A sewer to divert part of the North Fringe Sewer to the new treatment facility;

    - An outfall pipe from the wastewater treatment facility discharging the treated water to the Irish Sea; and

    - A regional biosolids storage facility located at Newtown/Kilshane, Dublin 11.

A planning application for the Greater Dublin Drainage Project was lodged in June 2018 and an oral hearing took place with An Bord Pleanála in April of this year. There does not seem to have been a decision on this as of yet, however Irish Water have advertised for procurement of Design Build teams for the construction of this work.

Notwithstanding the above, on an individual basis it can be argued that the Proposed Development will have a negligible impact in terms of flows relative to what is going into Ringsend overall at present.

It is of note that Confirmation of Feasibility from Irish Water and Design Acceptance for the foul design has been received. Irish Water are in control of this infrastructure and the whole point of the Pre-Connection Enquiry (**PCE**) is to confirm the viability of the Proposed Development with respect to the potential impact of the Proposed Development on the capacity of the receiving infrastructure. By providing a Confirmation of Feasibility Letter, Irish Water are confirming that they are satisfied that based on current projected infrastructure that the Proposed Development can be catered for.

12.3.5 *Avoidance, Remedial & Mitigation Measures*

In line with EIA guidance, each potential impact for the Proposed Development should be described in terms of its Quality, Significance and Duration. The potential impacts, mitigation measures and resulting residual impacts have been combined in a Detailed Assessment Table presented below.

Table 12-13: Impact Assessment

Impact Description	Quality	Significance	Extent	Likelih.	Duration	Mitigation	Residual Impact
CONSTRUCTION STAGE							
Temporary potable water supply	Neutral	Not Significant	Local	Certain	Short-term	Water saving devices to be used on site such as aerated taps and low flow flushes on toilets	Imperceptible
Temporary foul water from site	Negative	Imperceptible	Local	Certain	Short-term	Water saving devices to be used on site such as aerated taps and low flow flushes on toilets	Imperceptible
Siltation of runoff	Negative	Moderate	Local	Likely	Short-term	The use of a full retention separator on the drainage network during construction and in the final scheme will remove the possibility of siltation affecting the Watercourse.	Imperceptible
Fuel Spillage	Negative	Moderate	Local	Unlikely	Short-term	Using standard construction practices and not leaving plant unattended in proximity to the watercourse will remove this risk.	Imperceptible
OPERATION STAGE							
Increase in foul water flows	Negative	not significant	Regional	Likely	Long-term	All foul water for the site is collected in foul water sewers and discharged to Irish Water's network and treated in Ringsend prior to discharge.	Imperceptible
New Storm water network	Positive	Slight	Local	Likely	Long-term	Regular maintenance of the storm water network once constructed.	not significant

Impact Description	Quality	Significance	Extent	Likelih.	Duration	Mitigation	Residual Impact
Increase in foul water flows	Negative	not significant	Regional	Likely	Long-term	All foul water for the site is collected in foul water sewers and discharged to Irish Water's network and treated in Ringsend prior to discharge.	Imperceptible
New Storm water network	Positive	Slight	Local	Likely	Long-term	Regular maintenance of the storm water network once constructed.	not significant
Gas Consumption	Negative	Not Significant	Local	Likely	Long-term	Efficient gas boilers and high quality insulated and air tight homes are to be built in accordance with current building regulation requirements	Not Significant

12.3.5.1 *Construction Phase*

Management Plans including method statements will be developed for excavations in proximity to underground utility cables and pipelines. The Contractor will establish and implement measures to ensure that no interruptions to existing utilities occur throughout the project Construction Phase unless agreed in advance with the relevant service provider and or Local Authority. Works are to be carried out in accordance with relevant HSA Codes of Practice.

12.3.5.2 *Operational Phase*

Utility networks shall be inspected at regular intervals as advised in the Safety File to the development owner on completion of the works.

Alternative Designs Considered

There have been no other alternative designs considered for utilises as all proposed designs are constrained by existing infrastructure and to be implemented as directed by local service providers and the local authority in accordance with best practise.

12.3.6 *Residual Impacts*

The potential for the Proposed Development to impact or interrupt utility supply has been assessed. All utility services near the Proposed Development have been identified and include potable water, foul water, surface water, gas, electricity and telecoms.

The proposed locations and routes of services which cross existing infrastructure have been assessed at high level during a desktop study. Discussions are continuing with all asset

owners and their requirements have been identified which have been incorporated into the design and therefore, the potential for interruption is limited.

There is no apparent risk to human health, due to changes in utilities, resulting from this project. The Proposed Development will provide an overall positive impact to the community in area.

It is considered that once the mitigation measures discussed above are employed, the potential for residual impacts on this aspect of the environment is negligible.

12.3.7 *Monitoring*

In advance of work starting on site the works Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a CEMP. The CEMP sets out the overarching vision of how the construction of the Proposed Development will be management in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project. The CEMP is included in with this planning application. Monitoring shall be carried out as specified in any Discharge Licence associated with the Construction Phase of the Proposed Development.

12.3.8 *Reinstatement*

12.3.8.1 *Construction Phase*

It is not perceived that there will be any significant negative impacts in the event of the Proposed Development being discontinued.

12.3.8.2 *Operational Phase*

It is not perceived that there will be any significant negative impacts in the event of the Proposed Development being discontinued.

12.3.9 *Interactions*

The potential Material Assets impacts during the Construction Phase are presented in Table 12-13 and are outlined below. These impacts also relate to and interact with other Chapters within the EIAR specifically:

- Chapter 5, Biodiversity: Flora and Fauna
    - The proper maintenance of utilities during operation and maintenance will be required to ensure that there is no adverse impacts on flora and fauna.
- Chapter 6, Lands, Soils & Geology

- The excavation of the soil required for the attenuation and site services will be considered in this chapter.

- Chapter 7, Hydrology, Water and Hydrogeology
    - The management of run off is also considered in this chapter.

Specific interactions are listed below, further detail is provided in the relevant Chapters and in Chapter 14 Interaction.

12.3.10 *Difficulties Encountered In Compiling*

Records for BT, Vodafone and Aurora utilities were requested but no records have been received on the date of writing of this section of the EIAR. It is envisaged that no notable difficulties will be encountered with regard to the potential utility or infrastructure impacts of the Proposed Development as the site is currently greenfield, in a well serviced urbanised area. The lack of records provided by BT, Vodafone and Aurora in not of consequence as the Site can be served with broadband without these records.

12.3.11 *References*

Greater Dublin Strategic Drainage Study (2005) – Fingal County Council, Dublin City Council, Dun Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council

The Greater Dublin Region Code of Practice for Drainage Works (2012) – Fingal County Council, Dublin City Council, Dun Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council

I.S. EN752: 2008 *Drain & Sewer Systems outside Buildings* (2008) – National Standards Agency Ireland

Recommendations for Site Development Works for Housing Areas (1998) – Department of the Environment and Local Government

Control of Water Pollution from Construction Sites (2001) – Construction Industry Research and Information Association

Environmental Handbook for Building and Civil Engineering Projects (2000) – Construction Industry Research and Information Association

13 RISK MANAGEMENT

13.1 Introduction

This Chapter of the EIAR sets out the assessment of the vulnerability of the Proposed Development to the risks of major accidents and / or disasters. It includes the methodology used for the assessment. The Interactions and Mitigation & Monitoring Measures are included in Chapters 14 and 15 respectively. The authors, Ahmed Thamer Ahmed and Eleanor Burke are an Environmental Engineer and Environmental Scientist, respectively.

Ahmed has obtained a Bachelor of Engineering (Civil) and Master of Engineering (Environmental) degrees, with specialisation in geo-environmental engineering; and has five years' experience in ground / contaminated land investigations in Ireland.

Eleanor Burke is a Principal Consultant and Environmental Division Manager with O'Conor Sutton Cronin (**OCSC**). She obtained a Bachelor of Science in Environmental Science and a Masters of Science in Environmental Science and has over 17 years' experience. Both authors have been involved in numerous greenfield and brownfield development projects in Dublin and surrounding areas.

13.1.1 *Description of the Proposed Development*

The development will consist of the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys accommodating 657 no. apartments, residential tenant amenity spaces and a crèche. At basement level the Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas.

Landscape works will include extensive semi-private amenity areas, and a significant area of public open space. The Proposed Development also includes for the widening and realignment of an existing vehicular access onto Sybil Hill Road and the demolition of an existing pre-fab building to facilitate the construction of an access road from Sybil Hill Road between Sybil Hill House (a protected structure) and St Paul's College incorporating upgraded access to Sybil Hill House and St Paul's College and a proposed pedestrian crossing on Sybil Hill Road. The Proposed Development also includes for the laying of a foul water sewer in Sybil Hill Road and the routing of surface water discharge from the Site via St Anne's Park to the Naniken River and the demolition and reconstruction of the existing pedestrian bridge crossing in St Anne's Park with integral surface water discharge to Naniken River.

13.2 Study Methodology

13.2.1 *Scope and Context*

The relevant legislation to which this Chapter applies is Statutory Instrument (S.I.). No. 296 of 2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 and in particular Schedule 6 – Information to be contained in EIAR. The following paragraphs of Schedule 6, Paragraph 2(e)(i)(IV), specifically refers

"*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),"*

Paragraph 2(h) further expands with

"a description of the expected significant adverse effects on the environment of the Proposed Development deriving from its vulnerability to risks of major accidents and / or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events."

13.2.2 *Guidelines and Reference Material*

This assessment, of major accidents and / or disasters is a relevantly new requirement in legislation and as a result national guidelines are not yet available. Cognisance has been taken of the Draft EPA Guidelines *Information to be contained in Environmental Impact Assessment Reports* (August 2017)'. Although this document predates the 2018 legislation it follows the requirements laid out in the Directive 2014/52/EU.

Specifically page 49 of the Draft 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 / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk)… The potential for a project to cause risks to human health, cultural heritage or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g. the potential effects of floods on sites with sensitive plants. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required. The EIAR should refer to those separate assessments while avoiding duplication of their contents."

Reference has also been made to the Department of Defence (**DOD**) Publication 'A *National Risk Assessment for Ireland 2017*'. A consolidated list of national hazards for Ireland identified in the DOD report are identified in Table 13-1.

Table 13-1: Consolidated List of National Hazards

Hazard: Civil	Hazard: Natural
• Infectious Disease • Terrorist Incident • Animal Disease • Foodborne Outbreaks • Waterborne 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

Source: Table 1, page 23 of the report titled 'A National Risk Assessment for Ireland (2017)' by the Department of Defence

13.2.3 *Risk Assessment Methodology*

The risk assessment methodology has been supported by risk assessment methods. Hazard analysis and risk assessment are accepted internationally as essential steps in the process of identifying the challenges that may have to be addressed by society, particularly in the context of emergency management. Mitigation as a risk treatment process involves reducing or eliminating the likelihood and / or the impact of an identified hazard. Table 13-1 above has been used as a guideline to the Hazardous, with Tables 13-2 and 13-3 below identifying the National likelihood criteria and the National impact criteria.

Table 13-2: Classification of National Likelihood Criteria

National Likelihood Criteria		
Rating	**Classification**	**Average Recurrence Interval**
1	Extremely Unlikely	500 or more years between occurrences
2	Very Unlikely	100 - 500 years between occurrences
3	Unlikely	10 - 100 years between occurrences
4	Likely	1 - 10 years between occurrences
5	Very Likely	Less than one year between occurrences

Source: Table 2, page 25 of the report titled 'A National Risk Assessment for Ireland (2017)' by the Department of Defence

Table 13-3: Classification of National Impact Criteria

National Impact Criteria					
	Very Low	**Low**	**Moderate**	**High**	**Very High**
People[10]	Deaths less than 1 in 250,000 people for population OR Critical injuries/illness less than 1 in 250,000 OR Serious injuries less than 1 in 100,000 OR Minor injuries only	Deaths greater than 1 in 250,000 people for population OR Critical injuries/illness greater than 1 in 250,000 OR Serious injuries greater than 1 in 100,000	Deaths greater than 1 in 100,000 people for population OR Critical injuries/illness greater than 1 in 100,000 OR Serious injuries greater than 1 in 40,000	Deaths greater than 1 in 40,000 people for population OR Critical injuries/illness greater than 1 in 40,000 OR Serious injuries greater than 1 in 20,000	Deaths greater than 1 in 20,000 people for population OR Critical injuries/illness greater than 1 in 20,000
Environment[11]	Simple, localised contamination.	Simple, regional contamination, effects of short duration	Heavy contamination localised effects or extended duration	Heavy contamination, widespread effects or extended duration.	Very heavy contamination, widespread effects of extended duration
Economic[12]	Up to 1% of Government Annual Budget	Greater than 1% of Government Annual Budget	Greater than 2% of Government Annual Budget	Greater than 4% of Government Annual Budget	Greater than 8% of Government Annual Budget
Social[13]	Limited disruption to community	Community functioning with considerable inconvenience	Community functioning poorly	Community only partially functioning	Community unable to function without significant support

Source: Table 3, page 26 of the report titled 'A National Risk Assessment for Ireland (2017)' by the Department of Defence

Reference has also been made to the EPA Draft Guidelines (EPA, 2017) which identifies the terminology used for the Significance of Effects and have been summarised in Table 13-4 below.

Table 13-4: Description of Effects

Significance	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight 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 impact 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 Effects	An effect which obliterates sensitive characteristics.

13.3 Predicted Impacts

The Specialists Chapters of this EIAR identify that the Proposed Development has been designed in accordance with best practice and that the Proposed Development can be safely constructed without risk to health and the environment.

In order to understand the potential consequences and predicted impacts of any major accidents and / or disaster due to the Proposed Development and the vulnerability of the Proposed Development a desk study was undertaken. The assessment reviewed:

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

A methodology has been used including the following assessment:

- **Phase 1:** Identifying the hazards (Table 13-5);
- **Phase 2:** Screening the hazards (Table 13-5);
- **Phase 3:** (Table 13-6):
    - Identifying the impact;
    - Assessing the likelihood of the major accident and / or disaster occurring; and
    - Assessing any risks that remain.

Phase 1 Assessment

The DOD Consolidated List of National Hazards was used to identify a preliminary list of potential major accident and / or disasters. Receptors who are covered by legislation were not included within the assessment e.g. construction workers.

Phase 2 Screening

The list was screened and major events, such as volcanoes were not included given the unlikely event of one occurring. Elements already addressed as a key part of the design e.g. risks of landslides are not repeated.

Phase 3: Mitigation and Evaluation

In the event that mitigation measures included did not mitigate against the risk, then, the potential impacts on receptors are identified in the relevant Chapter.

Table 13-5 below lists the major accidents and / or disasters reviewed.

Table 13-5: List of Major Accidents and / or Disasters

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
CIVIL					
Human disease / Epidemic	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to human disease / epidemic more than any other residential development.	Extremely Unlikely	NA	NA
Terrorist Attack	N	Terrorist attacks have been on the rise in mainland Europe. However, the Irish Government assessed that its risk in Ireland is low and the Proposed Development is not considered particularly vulnerable.	Extremely Unlikely	NA	NA
Animal Disease	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to animal disease than any other residential development.	Extremely Unlikely	NA	NA
Foodborne Disease	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to foodborne disease than any other residential development.	Extremely Unlikely	NA	NA
Waterborne Disease	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA
Crowd Safety	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more	Extremely Unlikely	NA	NA

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
		susceptible than any other residential development.			
Civil Disorder	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA
Loss of Critical Infrastructure	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA
Transportation					
Road Accidents	Y	Fuel spillage may occur during the Construction Phase as refuelling of site machinery (excavators, rock breakers, etc.) takes place via a refuelling truck thus creating the potential for road accidents/incidents. Fuel spillage will impact the soils beneath the site and nearby watercourses (Naniken River). The Operational Phase will lead to an increase in passenger car traffic in the area which may increase the likelihood of occurrence of traffic accidents / incidents.	Very unlikely	Road users, land and soils, hydrology and water, aquatic environment	Chapters 6 (Land, Soils & Geology) and 7 (Hydrology, Water & Hydrogeology) assessed the potential for spillages during construction and identified mitigation measures within the Chapter including the requirement for spill kits, bunds for refuelling. There will be no deliveries of fuel to the Site during the Operational Phase, therefore removing the risk from large fuel spills during traffic accidents. Traffic impact assessment assessed the access roads and cyclist lanes proposed as part of the Proposed Development. The study concluded that the Proposed Development will not increase the likelihood of traffic incidents.

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
Rail accidents	N	The Proposed Development is over 400m from the nearest rail line, and accordingly is too far away to be affected by any rail accident	Extremely Unlikely	NA	NA
Aircraft disasters	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to aircraft disasters than any other residential development.	Extremely Unlikely	Pilots, passengers and residents	NA
Maritime Disaster	N	The Proposed Development is at least 1.1km away from the waterfront, so it is unlikely to be affected by any maritime disaster	Extremely Unlikely	NA	NA
Transport Hub	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA
Natural					
Cultural, Archaeological and Architectural Heritage	Y	The protected structure and the conservation area within St Anne's Park, adjacent to the Site.	Very Unlikely	Protected structure (Sybil Hill House) and St Anne's Park	Sybil Hill House is a protected structure, however, it is not anticipated that the Proposed Development and associated services (access road) would have any significant impact on the house or its setting. The Proposed Development is also not envisaged to have a significant impact on the character of the Park. Refer to Chapter 11 for detailed assessment.
Avalanche and landslides	Y	The potential for landslides already considered within the design therefore no future assessment or potential required.	Extremely Unlikely	Residents	The structures are designed in accordance to the latest building manuals which includes standard measures against landslides. There are also no embankments / slopes being

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
					formed as part of the Proposed Development and hence reducing the risk of landslides.
Sinkholes	N	Geology not prone to sinkholes, no karst mapped nearby and the limestone bedrock in this area is not known to contain significant amount of cavities.	Extremely Unlikely	NA	NA
Earthquakes	N	Area is not geologically active.	Extremely Unlikely	NA	NA
Floods	Y	Site bounded by the Naniken River.	Unlikely	Development and Residents	Chapter 7 of this report identifies the vulnerability of the Proposed Development to flooding (fluvial, pluvial, coastal and groundwater flooding). The Site is not mapped by the Office of Public Works (OPW) to be at risk from any type of flooding. An attenuation tank is to be constructed as part of the Proposed Development which will reduce the Site's surface water runoff to less than its current Greenfield rate.
Storm surge / tidal flooding	Y	The site is about 1.1km from the coast of the Irish Sea. Storm surges from the sea might impact development along the coasts, however, the Site location and distance from the coast does not make it directly vulnerable. The occurrence of an intense rainfall event coinciding with high tide may result in the Naniken River to overtop its banks.	Unlikely	Development and Residents	Chapter 7 of this EIAR identifies the vulnerability of the Proposed Development to fluvial, pluvial, groundwater and coastal flooding. The site is not at risk from coastal flooding and for fluvial, pluvial and groundwater flooding.
Blizzards	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to blizzards than any other residential development.	Extremely Unlikely	NA	NA

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
Droughts	N	Loss / disruption of services particularly water supply. This Site however is not particularly vulnerable compared to any other residential developments and will be supplied via an Irish Water mains supply.	Extremely Unlikely	Residents and nearby vegetation in proposed open spaces and in St Anne's Park	NA
Air Quality events	Y	There are various ways in which the Proposed Development may have an impact on ambient air quality through dust emissions during the Construction Phase (basement excavation, stockpiling and haulage of soils and machinery movement on unpaved ground). The Proposed Development can also impact air quality during the Operational Phase due to increased traffic movements by vehicles owned by future residents.	Very Unlikely	Residents and nearby residents and properties	Chapter 8 of this EIA identifies the impact of the Construction and Operational Phase of the Proposed Development on ambient air quality. The Chapter concluded that the impact is imperceptible and not significant provided the mitigation measures in the Chapter are implemented during the Construction Phase. The mitigation measures include dust suppression methods when required, and dust monitoring within 500m of Site boundary using the Bergerhoff Gauge method. Improvement and investment in public transport is expected to further reduce dependence and ownership of private cars. The roll out of hybrid cars and more fuel efficient cars will also reduce air pollution.
Wildfires	N	Not considered particularly vulnerable as the Proposed Development is not located near a large area of woodland within the Park or in an area containing a large amount of vegetation and hence it does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
Biodiversity	Y	The Proposed Development could result in potential significant impacts, which include: • Construction-related surface water discharges could result in a reduction in water quality at the European sites; • Impacts on bats as a consequence of lighting and the removal of potential bat roost trees and other vegetation; • Impacts to breeding birds via noise, physical disturbance or direct habitat loss of suitable breeding habitat; and • Localised disturbance to feeding wintering birds.	Unlikely	Nearby environment	Following the implementation of mitigation measures identified in Chapter 5, the Proposed Development will result in no significant residual impacts. The mitigation measures include: Mitigation measures for impacts include: • Specific measures to ensure no impact on downstream European sites as a consequence of construction-related surface water discharges; • Removal of potential bat roost trees under the supervision of an experienced ecologist; • Lighting during Construction and Operational Phases to follow relevant current guidance in order to minimise impacts on bats. Final lighting plan to be reviewed by a qualified bat ecologist; and • Timing of works outside the breeding bird season or a check for active nests during / immediately prior to any site clearance.

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
Invasive Species	Y	Risk to biodiversity during construction. Introduction of invasive species to other locations during Site clearance / excavation.	Very Unlikely	Surrounding environment	There were no records of rare or protected plant species within the site or environs. The non-native invasive species Winter Heliotrope Petasites fragrans and Holm oak Quercus ilex was identified within the study area and are both listed on the Invasive Species Ireland 'Amber List'. The biodiversity did not specify any special precautions to deal with the non-native invasive species identified to be present within the Site boundary as they are not on the 'red list'.
Wind	Y	The construction of buildings within an urban area environment can potentially disrupt and modify wind patterns and hence induce phenomena's such as a wind funnel and / or wind downwash.	Very Unlikely	Residents, nearby pedestrians and cyclists	A Computational Fluid Dynamics study have been carried out to advice on the orientation and spacing between buildings. The current building layout was found to be suitable to maintain and ensure safe and comfortable wind level conditions around the development for residents and pedestrians.
Dam, Bridge or Tunnel Failure	N	The development is not located close to a dam, bridge or a tunnel and hence the risk is not present.	Extremely Unlikely	NA	NA
Technological					
Fire	Y	All buildings are susceptible to the risk of fire. The risk of fire inside the apartments might lead to loss of life	Unlikely	Residents and nearby properties	Maurice Johnson & Partners (MJP) have been appointed as fire safety consultants to advise on the fire safety measures to be incorporated in the Proposed Development. The use of the Proposed Development is residential and is considered normal hazard fire risks as would be encountered in most

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
					developments and do not constitute any hazards which would be regarded as presenting an exceptional environmental fire hazard. The fire risk mitigation for the project will comprise all fire safety measures necessary to comply with the requirements of Part B (Fire) of the Second Schedule to the Building Regulations 1997-2017. It is noted that these measures will be validated under the Building Control Act 1990-2007 through the obtaining, in due course, of statutory Fire Safety Certificates under Part III of the Building Control Regulations 1997-2018 from Dublin City Counci l /Dublin Fire Brigade.
Cyber Attacks	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to cyber-attacks than any other residential development.	Extremely Unlikely	NA	NA
Utilities failure	Y	The Proposed Development will discharge sewage to a nearby public sewer and will draw potable water from a nearby Irish Water pipeline. In order to facilitate this, a series of connecting pipes will be built to connect the Proposed Development to the nearby public sewers and potable water pipeline. The Proposed Development will not discharge any foul water to the Naniken River.	Extremely Unlikely	Hydrology and Water	The Proposed Development's sewer network and the potable water pipelines will be designed and tested prior to use according to the latest applicable guidelines namely: • BS EN 752 –Drainage Outside Buildings; • The Building Regulations – Technical Guidance Document Part 'H';

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
					• The Building Regulations- Technical Guidance Document Part 'M'; • Greater Dublin Strategic Drainage Study (GDSDS); • BS EN 12056-2:2000 Gravity drainage systems inside buildings; • The SuDS Manual (Ciria C753); • Irish Water Code of Practice for Water Infrastructure; and • Irish Water Code of Practice for Wastewater Infrastructure.
Industrial accidents (defence, energy, oil and gas refinery, food industry, chemical industry, manufacturing, quarrying, mining)	N	None nearby	Extremely Unlikely	NA	NA
Disruption to electricity / gas supply	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA
Disruption to oil supply	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential	Extremely Unlikely	NA	NA

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
		development.			
Nuclear accident	Y	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible to nuclear accidents than any other residential development.	Extremely Unlikely	NA	NA
Other					
Crime or civil unrest	N	Not considered particularly vulnerable as the Proposed Development does not have any characteristics that would make it more susceptible than any other residential development.	Extremely Unlikely	NA	NA
Building Failure	Y	The Proposed Development includes for the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys. All buildings will be designed in accordance with relevant design regulations including fire safety by professional engineering consultants.	Very Unlikely	Residents and nearby properties	The Proposed Development will be designed by a professional engineering firm according to latest applicable structural and geotechnical design manuals namely Eurocode 0,1,2,3,4 and 7. The mentioned Eurocodes mitigate against a range of building failure scenarios such as structure collapse, ground collapse, landslides and earthquakes. Regular Site visits will be carried out by the Engineers to ensure that the Proposed Development is being constructed as designed.

Major Accident and / or Disaster	Relevant for the Proposed Development	Discussion	Likelihood of occurring	Potential Receptor	Covered within the EIAR?
Radon	Y	Radon inhalation. Radon is a radioactive, colourless, tasteless gas. The EPA maps indicate that less than 1% of homes in the area surrounding the St Anne's Park to have Radon levels above the trigger level of 200 bequerel per cubic metre (**Bq/m^3**).	Extremely Unlikely	Residents	Discussion with the Structural Engineer for this project revealed that where the apartment blocks are located above the car park basement, no radon protection is needed as the basement itself will be naturally and mechanically ventilated. Blocks 6-9 of the Proposed Development will not be located within the basement footprint, and hence a standby radon sump will be incorporated in the design to enable radon suction, if elevated concentrations are detected during the Operational Phase of the Proposed Development.

13.4 Mitigation Measures

Table 13-6 below identifies the assessment undertaken and the residual significance following the mitigation measures recommended for implementation by the project team.

Table 13-6: Assessment of Risks

Major Accidents and / or Disasters	Risk	Receptor	Mitigation	Residual Significance
Flooding	There is potential for the Proposed Development to be affected by flooding from the Naniken River during intense rainfall events particularly if they coincide with high tide. According to Appendix 3 of the SFRA produced for the DCDP, the Site is zoned 'Flood Zones A and B'. On review, the Site is located outside of the flood zones as shown on the map in Figure 7.16 from the DCDP SFRA. Chapter 7 of this report identifies the vulnerability of the Proposed Development to flooding.	Site and residents	All surface water infrastructure will be constructed in accordance with the best practice with to limit surface water runoff to the current Greenfield runoff values.	Not significant
Building Fire	The Proposed Development includes for the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys. All buildings have been designed in accordance with relevant design regulations including fire safety.	Residential Receptors	The Fire Safety and Access & Use Strategy is being submitted with the Planning Application to demonstrate that the proposed design is in substantial compliance with Part B (Fire Safety) & Part M (Access & Use) of the Building Regulations and that it will be possible in due course to obtain a Fire Safety and Disability Access Certificate without giving rise to changes that would require planning permission. The measures will include inter alia: • Provision of fire rated walls and floors to restrict the spread of fire within and between buildings in accordance with relevant design guidance e.g. Technical	Not significant

Major Accidents and / or Disasters	Risk	Receptor	Mitigation	Residual Significance
			Guidance Document B, BS9991, and BS9999. These measures will, in conjunction with the provision of automatic fire suppression in the taller blocks, serve to control / limit the size of conflagrations • Provision of early warning fire detection systems to ensure the earliest possible intervention in the event of fire occurrence • Use of materials which do not support fire spread with particular reference, inter alia, to internal wall and ceiling linings and external wall cladding. With specific reference to the latter it is noted that the external walls of the new blocks will all comprise an inert masonry outer skin and the externals walls of the Protected Structure are also masonry. Accordingly there is negligible risk of the external surfaces acting as path of vertical fire spread as might arise with combustible external surfaces • Facilities to assist the fire service including fire-fighting shafts, dry rising mains, and external fire hydrants. It is anticipated, having regard to the nature of the proposed uses and the extent of fire-sub-division / compartmentation which will be provided that the quantity of firefighting water which would be deployed would be in the lower end of the range of application rates i.e. of the order of 20-35L/sec. • Escape routes for the apartment blocks and basement have been designed	

Major Accidents and / or Disasters	Risk	Receptor	Mitigation	Residual Significance
			according to BS9991:2015 Fire safety in the design, management and use of residential buildings. Code of practice.	
Building Failure	The Proposed Development includes for the construction of a residential development set out in 9 no. blocks, ranging in height from 5 to 9 storeys. All buildings will be designed in accordance with relevant design regulations including fire safety by professional engineering consultants.	Residential Receptors	The Proposed Development will be designed by a professional engineering firm according to latest applicable structural and geotechnical design manuals namely Eurocode 0,1,2,3,4 and 7. The mentioned Eurocodes mitigate against a range of building failure scenarios such as structure collapse, ground collapse, landslides and earthquakes. Regular site visits will be carried out by the Engineers to ensure that the development is being constructed as designed.	Not significant
Road Accidents	The risk to Hydrology, Water & Hydrogeology and Land & Soils from spills resulting from road traffic accidents. Risk to road users due to increases in vehicle movements creating risk of conflicts.	Road users, groundwater, surface water, aquatic environment	Chapters 6 (Land, Soils & Geology) and 7 (Hydrology, Water & Hydrogeology) assessed the potential for spillages during construction and identified mitigation measures within the Chapters including the requirement for spill kits, bunds for refuelling. There will be no deliveries of fuel to the Site during the Operational Phase, therefore removing the risk from large fuel spills during traffic accidents. A Traffic Management Plan will be implemented during the Construction Phase of the Proposed Development. This will help ensure that all transport related activities are carried out as safely as possible, as well as causing minimum disruption to road users and nearby residents. The Site gate person will guide vehicles as they enter and exit the	Not significant

Major Accidents and / or Disasters	Risk	Receptor	Mitigation	Residual Significance
			Site. The use of Reversing alarms on vehicles will be encouraged. The Proposed Development will be accessed via the R808 Sybil Hill Road, at a point 200m to the south of the Howth Road junction. The proposed access for the Proposed Development is to the north of St Paul's College, and is the current access for the Sybil Hill House. It is proposed to upgrade the existing access (widening and realignment) to Sybil Hill House and extend same eastwards to provide access to the Proposed Development. A gated access to the St Paul's College will also be provided off the Proposed Development access to provide linkage between the Vincentian's Residence and the school. The proposed access road also includes for on-road cycle lanes from the junction with Sybil Hill Road to beyond the access to Sybil Hill Road. The findings of the robust cumulative traffic impact assessment confirms that the adjoining road network, including the Howth Road / Sybil Hill Road signalised junction, can satisfactorily accommodate the projected Proposed Development traffic.	

13.5 Management Plans

13.5.1 *Emergency Response Plans and Safety Files*

A Fire strategy must be put in place in advance of works starting on site, which must take into consideration emergency / fire escapes of the surrounding premises in particular St Paul's College and Sybil Hill House. The strategy must allow for the increase in labour workers on site, machinery, equipment and additional materials in place on all floors of the Site. A fire marshal will be required - full co-operation from the Site supervisors and contractors will be required.

A Fire strategy plan will be required for the duration of the works. Notification to be given to the St Paul's College in relation to excessive noise and vibrations. Sound matting is to be used during demolition works. Out of hours work may feature on the Proposed Development, the Project Supervisor Construction Stage (**PSCS**) should ensure that sufficient resources and staff is available to cover out of hours works.

13.5.2 *Traffic Management Plan*

The PSCS will develop a Traffic Management Plan (**TMP**). This will avoid back up of traffic on approach, consideration on allocation of holding area. Booking system should be considered whereby contractor deliveries and collections can be managed to avoid traffic delays. The PSCS to provide an internal TMP. The TMP will include the segregation of vehicles from staff and visitors that will be present on the Site.

Construction site vehicle incidents can and should be prevented by the effective management of transport operations throughout the Construction Phase. By creating two crane off-loading areas within the Site boundary all offloading will be possible in a manner which will minimize any risk to the public. The gate person will then assist in the entry and egress from the Site. All drivers and pedestrians will be trained to understand the routes and traffic rules on site. All standard road signs will be used where appropriate. Induction training for drivers, workers, and visitors will be implemented.

The appointed Contractor will ensure that all access routes to St Paul's College and Sybil Hill House are kept clear of obstruction and suitable warning signage is in place. There should be sufficient labour and resources arranged for the Proposed Development, along with ensuring that there are sufficient security arrangements for safe access and egress of construction staff. Co-ordination of works will be required with others in the active buildings in terms of the emergency escape arrangements as the project progress.

13.6 Residual Impacts

The EIAR Specialist Chapters have identified all potential impacts the Proposed Development might have on the environment. The Specialist Chapters also identified how to mitigate against any residual impacts during the Construction and Operational Phases of the Proposed Development. In addition to the Specialist Chapters, a Construction Environmental Management Plan (**CEMP**) has been prepared and identified best practice techniques to

implement during the Construction Phase. All potential impacts were determined to be not significant.

13.7 Monitoring

The project Environmental Consultant, Construction Director and Construction Managers of the Specialist Chapters will have a joint responsibility in ensuring the proper implementation of the mitigation measures identified in the EIAR, CEMP and in the planning conditions.

13.8 Conclusion

The design has taken into account the potential for flooding, road accidents, spreading of invasive species, building failure and fire risk within the design and construction methodology of the Proposed Development. Risks have been addressed by the design and also by the methodologies which will be adopted throughout the Construction Phase.

The vulnerability of the Proposed Development to major accidents and / or disasters is not considered significant.

14 INTERACTIONS BETWEEN IMPACTS ON DIFFERENT FACTORS

14.1 Introduction

As a requirement of the Planning Regulations and the Draft EPA Guidelines on *Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2017), not only are the individual significant impacts required to be considered when assessing the impact of a development on the environment, but so must the interrelationships between these factors be identified and assessed. This Chapter of the EIAR addresses the interactions between the various environmental aspects of the Proposed Development

The following Section is directed by Article 3 section 1(e) of the EIA Directive. The Draft EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015) 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;*

   b) *biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*

   c) *land, soil, water, air and climate;*

   d) *material assets, cultural heritage and the landscape;*

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

14.2 Study Methodology

The interactions between impacts on different environmental factors are addressed throughout the EIAR. Close co-ordination and management with the EIAR team was carried out to ensure that interactions have been adequately addressed and all likely relevant interactions were addressed at the scoping phase of the EIAR.

Following assessment of the EIAR, a matrix was produced to show where interactions between effects on different factors have been addressed. This has been carried out using the Chapter headings used in the EIAR and details any interaction during the Construction and Operational Phases of the Proposed Development.

14.3 Interactions

The construction, operational and cumulative impacts of the Proposed Development have been assessed within each Specialist Chapter of the EIAR. In practice, many impacts have slight or subtle interactions with other disciplines. This Chapter highlights those interactions which are considered to potentially be of a significant nature.

As this EIAR has been prepared by a number of specialist consultants an important aspect of the EIA process was to ensure that interactions between the various disciplines have been taken into consideration. The following matrix has been produced to show where potential significant interactions between effects on different factors have been addressed, see Table 14-1.

Table 14-1: Interactions between Effects on Different Factors

Interaction	4.0 Population and Human Health		5.0 Biodiversity		6.0 Land and Soils		7.0 Hydrology		8.0 Air Quality, Climate & Microclimate		9.0 Noise & Vibration		10.0 Landscape & Visual Amenity		11.0 Archaeology, Architecture & Cultural Heritage		12.0 Material Assets: Traffic, Waste & Utilities		13.0 Risk Management	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Population & Human Health			x	x	X	x	x	X	✓	✓	✓	✓	X	X	X	x	✓	✓	x	X
Biodiversity	✓	X			✓	x	✓	X	✓	✓	X	x	✓	X	X	x	X	x	x	X
Land & Soils	x	X	x	x			x	X	✓	X	X	x	X	X	X	x	x	x	x	X
Hydrology	x	X	✓	x	✓	x			✓	✓	X	x	✓	X	X	x	x	x	x	X
Air Quality, Climate & Microclimate	✓	X	X	x	✓	x	x	X			X	x	X	X	X	x	x	x	x	X
Noise & Vibration	✓	✓	✓	x	✓	x	x	X	✓	X			X	X	X	x	x	x	x	X
Landscape & Visual Amenity	x	X	X	x	X	x	x	X	X	X	X	x			X	x	x	x	x	X
Archaeology, Architectural & Cultural Heritage	x	X	X	x	✓	x	x	X	X	X	X	x	✓	X			x	x	x	X
Material Assets: Traffic, Waste & Utilities	x	✓	X	x	✓	x	x	X	✓	✓	X	x	X	X	X	x			x	X
Risk Management	x	X	X	x	X	x	x	X	X	X	X	x	X	X	X	x	x	x		

Con.	Construction Phase
Op.	Operational Phase
X	No Significant Interaction
✓	Potential Significant Interaction

The principal interactions requiring information exchange between the environmental specialists and the design team are summarised below.

14.3.1 *Population and Human Health*

The Chapter details the potential direct and indirect effects of the Proposed Development on population and human health, Chapter 4 of EIAR.

14.3.1.1 *Biodiversity*

There will be some localised biodiversity benefits, such as the potential positive impact with the development of a semi-private open space, which is incorporated into the design of the Proposed Development. The potential impacts and mitigation measures are addressed and described in Chapter 5: Biodiversity.

14.3.1.2 *Air*

An adverse impact due to air quality in the Construction Phase has the potential to cause health and dust nuisance issues. These potential impacts and mitigation measures are addressed in Chapter 8 (Microclimate, Air Quality & Climate). The measures that will be put in place at the Proposed Development will ensure that the impact complies with all ambient air quality legislative limits and therefore the predicted impact is long-term and neutral with respect to human beings.

14.3.1.3 *Noise & Vibration*

During the Construction Phase involving site clearance and building construction works, the assessment has determined that the construction noise criteria limits can be complied with at the nearest sensitive properties. There is potential for elevated levels of noise within St Paul's College campus during demolition works of buildings within the grounds. A schedule of noise control measures including co-ordination of working hours in agreement with the College Management, noise limits and screening will all be employed to ensure any noise and vibration impacts during this phase will not exceed the recommended limit values.

During the Operational Phase, the outward noise impact to the surrounding environment will be limited to any additional traffic on surrounding roads. The impact assessment has concluded that the impact of additional traffic from the Proposed Development will be not significant. The overall operational noise and vibration impact is determined to be not significant, with neutral, long-term effects. The potential impacts and mitigation measures are addressed in Chapter 9: Noise and Vibration.

14.3.1.4 *Materials Assets*

It is predicted that the Proposed Development will benefit the local area with the additional population helping to contribute to the economic and social development of the community.

14.3.2 *Biodiversity*

The assessment of impacts on biodiversity is addressed in Chapter 5: Biodiversity.

14.3.2.1 *Hydrology*

The Proposed Development has the potential for interactions with Hydrology however the impact will not be significant once all the proposed control measures are deployed as outlined in various Chapters in this EIAR. In particular, water quality mitigation measures during Construction and Operational Phases, as outlined in Chapter 7.

14.3.2.2 *Noise and Vibration*

Disturbance during Construction and Operational Phase is expected to impact breeding birds and foraging and commuting bats due to noise and vibration.

Following implementation of the proposed operational control measures, the Proposed Development will result in no significant residual impacts.

14.3.3 *Land, Soils & Geology*

Chapter 6 assesses the likely impacts on land and soils arising from the Proposed Development. The following interactions with other disciplines have been identified:

14.3.3.1 *Biodiversity*

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.

14.3.3.2 *Air*

There is a potential for dust from excavations or stockpiles to impact on air quality. The measures that will be put in place at the Proposed Development will ensure that the impact of the Proposed Development complies with all ambient air quality legislative limits and therefore the predicted impact is not significant with long-term, neutral effects with respect to human beings. All mitigation measures in relation to air are addressed in Chapter 8 of this EIAR.

14.3.3.3 *Noise and vibration*

Noise and vibration will be generated through the Construction Phase particularly during excavation work. Given that no rock excavation is required it is anticipated that conventional excavation techniques (i.e. hard digging) will suffice. All mitigation measures in relation to noise and vibration are addressed in Chapter 9 of this EIAR and include mitigation measures such as selection of quiet plant, noise control at source, screening and liaison with the public.

14.3.3.4 *Traffic*

The Construction Phase and any import or export of material to the site (as part of excavation or infilling works) will have implications for traffic in the surrounding road network. Full details of the impact and proposed mitigation measures are detailed within Chapter 12 of this EIAR.

14.3.3.5 *Archaeology*

A number of areas of archaeological interest have been identified close to the Site. This is discussed further in Chapter 11; Cultural, Archaeological and Architectural Heritage. Once the appropriate measures are in place these interactions can be mitigated against.

14.3.3.6 *Hydrology*

As with all construction projects there is potential for water (rainfall and / or groundwater) to become contaminated with pollutants associated with construction activity. Full details of the impact and the proposed mitigation measures are detailed with Chapter 7 (Hydrology) of this EIAR.

It is predicted that the Proposed Development will interact with the above mentioned, however the impact will not be a significant interaction once control measures are deployed as contained in the EIAR and the CEMP.

14.3.4 *Hydrology, Water and Hydrogeology*

Chapter 7 of the EIAR assesses the hydrology, water and hydrogeology impacts of the Proposed Development. The Hydrology Chapter has identified the likely effect of the Proposed Development during the Construction Phase will be additional point discharge pipe of surface water to the Naniken Stream which will not have any long-term adverse effect on the local and regional watercourses.

14.3.4.1 *Biodiversity*

As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Full impact with regards to Biodiversity is detailed in Chapter 5 of this EIAR. Full details of the impact and the proposed mitigation measures are detailed with Chapter 7 (Hydrology) of this EIAR. The completion of the Proposed Development will result in an increased point discharge of surface water from the Site, but it will be attenuated / restricted below greenfield levels in accordance with GDSDS. This flow will be discharged to the existing Naniken Stream which ultimately discharges to Dublin Bay.

14.3.5 *Microclimate, Air Quality & Climate*

Air Quality, Climate and Microclimate assessment are contained within Chapter 8 of this EIAR.

14.3.5.1 *Population & 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 Development will ensure that the impact of the development complies with all ambient air quality legislative limits and therefore the predicted impact is long-term and neutral with respect to human beings.

14.3.5.2 *Biodiversity*

The Construction and Operational Phases of the Proposed Development will lead to emissions to atmosphere which have the potential to impact on sensitive flora, fauna and water. Construction Phase mitigation measures will minimise dust emissions which have the potential to impact on flora and fauna quantity. In the Operational Phase, impacts meet the criteria set down for ecological sensitive sites and therefore the interactions between air quality and flora and fauna are neutral for both the Construction and Operational Phases. The effect of emissions is predicted to be neutral for both the Construction and Operational Phases.

14.3.5.3 *Traffic*

Interactions between Air Quality and Traffic can be significant, due to the increased traffic movements and reduced engine efficiency, i.e. due to congestion and the emissions of vehicles increase. The Proposed Development impact on air quality is assessed by reviewing the change in annual average daily traffic on roads close to the Site. In this assessment the impact of the interactions between traffic and air quality are predicted to be long-term, localised and insignificant for the Operational Phase.

14.3.5.4 *Land and Soils*

With the appropriate control measures in place for the development, it is predicted that any interactions with Soil and Geology are neutral.

14.3.5.5 *Hydrology*

Interactions with hydrology and in particular flood risk assessment occur as climate impacts have the potential to cause extreme weather events and heightened potential for flooding. As the drainage system is designed in accordance with the relevant standards and regulations, the flood risks arising from the proposed drainage infrastructure will be negligible. The flood risk represented by groundwater is negligible.

14.3.5.6 *Noise*

With the appropriate control measures in place for the Proposed Development, it is predicted that any interactions with noise and vibration are neutral.

14.3.6 *Noise and Vibration*

The likely noise and vibration impacts associated with the Proposed Development are described in Chapter 9 of this EIAR.

14.3.6.1 *Population & Human Health*

During the main Construction Phase involving site clearance and building construction works, the assessment has determined that the construction noise criteria can be complied with at the nearest sensitive properties. There is potential for elevated levels of noise within St Paul's College campus during demolition works of buildings within the grounds. A schedule of noise control measures including co-ordination of working hours in agreement with the College

Management, noise limits and screening will all be employed to ensure any noise and vibration impacts during this phase will not exceed the recommended limit values.

During the Operational Phase, the outward noise impact to the surrounding environment will be limited to any additional traffic on surrounding roads. The impact assessment has concluded that additional traffic from the Proposed Development will have an insignificant impact on the surrounding noise environment. The overall operational noise and vibration impact is determined to be neutral, long term and not significant.

14.3.7 *Landscape and Visual Amenity*

Chapter 10 of the EIAR assesses the likely landscape character and visual impacts arising from the Proposed Development.

The principal interactions of relevance to landscape and visual are with biodiversity, hydrology (particularly SuDS) and cultural heritage / archaeology. These aspects have been considered in the assessment in this Chapter and no significant adverse effects arise.

14.3.7.1 *Biodiversity*

The loss of existing trees and shrub planting is limited and mainly involves lower value non-native trees (e.g. Japanese Cherry trees in St Paul's College). Some mature trees are to be removed due to poor / dead condition; however, the majority of mature trees are retained and incorporated into the landscape design for the residential open space. The landscape scheme also provides for a wide variety of new tree, hedgerow and other planting and residual effects are not significant.

14.3.7.2 *Archaeology and Cultural Heritage*

The landscape and visual assessment has considered potential effects on Sybil Hill House (a protected structure) and on St Anne's Park, a historic landscape and conservation area. The residual landscape and visual impacts on these features is not significant.

14.3.7.3 *Hydrology*

The landscape design for the Proposed Development has incorporated surface water management proposals, taking into account the requirements to minimise adverse effects on biodiversity, mature trees and St Anne's Park, whilst also providing opportunity for enhanced biodiversity, access to the Park and upgrading of an existing poor-quality footbridge in the Park. The residual effects of surface water features on landscape and visual aspects is not significant.

14.3.8 *Archaeology, Architectural & Cultural Heritage*

This Chapter of the EIAR assesses the archaeological, architectural and cultural heritage effects of the proposed strategic housing development

No impact interactions have been identified in respect of archaeology and cultural heritage.

14.3.9 *Material Assets, Traffic, Waste & Utilities*

14.3.9.1 *Population & Human Health*

Slight impacts, with short-term negative effects will be experienced during the Construction Phase with construction traffic on the local road network which will interact with population and human health.

A planning application was lodged with DCC on 4th September 2017, ref. 3777/17, for a new Sports Hall and Playing Pitches development on the adjoining St Paul's lands. This was subsequently refused by DCC on 27th March 2018, but later appealed to An Bord Pleanála (ABP ref. 301482-18) and is currently under appeal.

The likely effect of the Proposed Development during the Operational Phase will be additional traffic which may have a slight long-term adverse effect on the adjoining road network.

The likely effect of the Proposed Development on utilities during the Construction Phase will be additional connections and infrastructure to existing utilities which will not have any likely significant impacts with long-term effects to the level of service of existing utilities and public infrastructure.

The completion of the Proposed Development will result in an increase in demand on existing utilities and public infrastructure.

14.3.10 *Risk Management*

Chapter 13 of the EIAR sets out the assessment of the vulnerability of the Proposed Development to risks of major accidents / and or disasters. It assesses the expected effects of the project to risk of major accidents and disasters relevant to the project. The Proposed Development is not projected to give rise to any likely significant impacts during the Construction or Operational Phases which would deem risk management to be a significant interaction.

14.4 References:

EIAR Chapters 4 to 13 inclusive.

15 MITIGATION & MONITORING MEASURES

15.1 Introduction

This EIAR has assessed the impacts and resulting effects likely to occur as a result of the Proposed Development on the various aspects of the receiving environment.

The Proposed Development has been designed and will be constructed in a manner that will ensure that the potential impacts on the receiving environment are avoided where possible. In cases where impacts or potential impacts have been identified, mitigation has been proposed to reduce the significance of particular impacts. These mitigation recommendations are contained in the specific environmental sections within this document.

This chapter of the EIAR collates and summaries the mitigation commitments made in chapter 4 to chapter 13. Mitigation measures as detailed in this chapter are summarised in Table 15.1 and all monitoring measures are summarised in Table 15.2.

15.2 Summary of Mitigation and Monitoring Measure

15.2.1 *Population and Human Health Mitigation*

Construction Phase

During the Construction Phase a number of mitigating measures should be considered.

- Maintain a Construction Environment Management Plan (**CEMP**) in effect for duration of works;
- Restrict working hours from 07:00 to 18:00; Monday to Friday and from 08:00 to 14;00 on Saturdays. No general works are envisaged to be carried out on Sundays. Should there be a need to work Sundays/Bank Holidays, a written request will be made to DCC for permission to do so. This may be required for tower crane erection and removal. Any conditions from DCC relating to out of hours working will be followed including any required notifications to relevant parties.
- Maintain a Traffic Management Plan (**TMP**) in effect for duration of works;
- Schedule arrivals and departures of vehicles to the Site, where practical, so that they do not coincide with times when children are entering and leaving the nearby schools;
- Where practical restrict Heavy Goods Vehicles (**HGVs**) to outside the period where school children are entering or leaving the schools and their environs;
- The CEMP will be agreed with the Planning Authority upon receipt of planning permission. The construction of the Proposed Development shall adhere to the relevant provisions of this Plan; and
- As part of the CEMP, maintain a Dust and Noise abatement plan in operation.

Operational Phase

No likely significant impacts have been identified for population, or land use, accordingly no mitigation measures are required for the Operational Phase.

The Proposed Development has been designed to avoid significant impacts in relation to local amenities and recreational facilities by:

- Incorporating the provision of a crèche within the design proposal;
- Not obstructing the extensive leisure and amenity facilities within the layout of St Anne's Park which includes multiple sport pitches; and
- The provision of c. 1.6ha area of public open space to be offered for taking-in-charge to DCC.

Accordingly, no further mitigation measures are required.

15.2.2 *Population and Human Health Monitoring*

It is considered that monitoring measures are not required for construction or operational phase of the Proposed Development. A full traffic assessment has been completed as part of Chapter 12 (Material Assets) and a Noise Impact Assessment as part of Chapter 9 (Noise and Vibration). Please refer to these specific Chapters for any proposed monitoring

Construction Phase

Monitoring is proposed for the Construction Phase in accordance with the CEMP submitted with the planning application.

Operational Phase

No additional monitoring is proposed for the Operational Phase other than that proposed in other Chapters of this EIAR.

15.2.3 *Biodiversity Mitigation*

Construction Phase

Fauna

- The removal of trees and shrubs should be completed outside the main bird nesting season where possible, i.e. 1st March to 31st August.

- Prior to the demolition of any site structures, and/or the felling of any mature trees within the site, it is recommended that a roost inspection survey is carried out at the appropriate time of year by a qualified ecologist in order to determine the presence of any potential roosts.

- Any felling of mature trees with bat roost potential within the site should be done during the autumn months. The branches should then be left *in-situ* for at least 24 hours in order to allow for the movement of wildlife from the tree prior to mulching or removal.

- Lighting proposals for this site will adhere to the advice provided in *'Bats and lighting – Guidance for Planners, engineers, architects and developers'* (Bat Conservation Ireland 2010) and '*Bats and Lighting in the UK*. Bats and the Built Environment Series' (Bat Conservation Trust, 2008).

- A suitably qualified bat ecologist or Ecological Clerk of Works shall make adjustments to directional construction lighting, for example ensuring the fitting of cowls, shields or louvres and to ensure after installation minimum light spill onto vegetated areas, All luminaires shall be energy efficient LED source fittings with sharp cut off optics, which when positioned correctly will ensure minimum light spill onto vegetation.

- As a precautionary measure, it is required that the relevant potential bat roost trees, located within the western section of the subject lands, are section-felled under the supervision of an experienced ecologist. If bats are present, all works must cease, and NPWS contacted in order to obtain the required derogation licence.

Habitats

There is a potential impact on identified habitats and associated fauna, as a result of surface water run-off containing silt, oil or other pollutants into the drainage ditch adjacent to the Proposed Development, with a potential connection with the Naniken Stream (100m north of the Proposed Development) which eventually flows into North Bull Island's south lagoon. The likelihood of any potential impact can be dramatically reduced following the implementation of suitable mitigation measures, as outlined in the surface water section below.

The CEMP will be implemented by the appointed Contractor that details the suitable precautions to be followed in relation to any potential pollution of watercourses from construction activities. The storage of materials, containers, stockpiles and waste, however temporary, must follow best practice at all times and be stored at designated areas away from watercourses.

The *Engineering Services Report* (**ESR**) submitted with this planning application, details the comprehensive Sustainable Drainage System (**SuDS**) that is to be incorporated into the Proposed Development. Similarly, the *Arboriculture Method Statement* completed by Independent Tree Surveys, details the tree protection measures that will be implemented in order to protect trees that are to be retained as part of the Proposed Development.

Any trees, adjacent to or within the development boundary, which are to be retained, shall be afforded adequate protection during the Construction Phase as follows:

- All trees along the boundary of the Proposed Development that are to be retained, both within and adjacent to the development boundary (where the root protection area of the tree extends into the development boundary), will be fenced off at the outset of works and for the duration of construction to avoid damage to the trunk,

branches or root systems of the trees. All work in relation to trees will be carried out in accordance with BS:5837 (*British Standard for trees in relation to construction* updated in 2012.)

- Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it. It will still be necessary to ensure that the area within the Root Protection Area (RPA) is not used for vehicle parking or the storage of materials (including oils and chemicals); and

- A qualified arborist shall assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Development boundary but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist.

See the Arboriculture Report submitted separately for more information on tree protection measures that will be employed on site prior to works commencing.

Surface Water

The following mitigation measures have been proposed to ensure that no potential adverse effects will arise from construction-related surface water discharges from the Proposed Development.

The appointed Contractor will be required to implement the following specific mitigation measures, all of which are set out in the CEMP submitted as a separate document, for release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters control:

- Specific measures to prevent the release of sediment over baseline conditions to the Naniken River (and subsequently the Tolka Estuary) and Dublin Bay during the construction work, which will be implemented as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. This is particularly important when undertaking any works/upgrading to the surface and foul water drainage networks at the site of the Proposed Development.
- Provision of exclusion zones and barriers such as silt fences between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the Naniken River and/or existing drainage systems and hence the downstream receiving water environment.
- Silt traps shall not be constructed immediately adjacent to the Naniken River, i.e. a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in-combination as appropriate to remove suspended matter from discharges.
- Provision of temporary construction surface drainage and sediment control measures to be in place before the construction of the pipeline and/or earthworks commence.
- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the Site.
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to the Naniken Stream and/or surface water drainage features, or drainage features connected to same. Pumped

concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to the Naniken Stream or existing surface water drainage systems. Concrete washout areas will be located remote from the Naniken Stream or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses.

- Any fuels of chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area to prevent any seepage of into the Naniken Stream, local surface water network or groundwater, and care and attention taken during refuelling and maintenance operations.
- Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams.
- All containment and treatment facilities are regularly inspected and maintained.
- All mobile fuel bowsers shall carry a spill kit and operatives must have spill response training.
- All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked.
- Implementation of response measures to potential pollution incidents.
- Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- Water supplies shall be recycled for use in the wheel wash. All waters shall be drained through appropriate filter material prior to discharge from the construction sites.
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase.
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).

Operational Phase

Bats

The presence of buildings and artificial lighting in those areas proposed for development where bats were recorded, are likely to result in significant impact to bats commuting through or feeding around the periphery of the site of the Proposed Development.

The following recommendations have been incorporated into the lighting design (developed by OCSC) of the Proposed Development in relation to the public lighting design:

- The use of LED directional lighting (using shields/cowls, masking and louvres) to restrict light to those public areas where it is needed with a light level of 3 lux or less at ground level;
- Restricted column heights of lamp posts to less than 8m (i.e. 6m in height) and angle light is emitted at (i.e. no greater than 70°) to reduce the amount of light spillage;
- Narrow spectrum lighting should be used wherever possible with a low UV component (UV filters can be used to reduce the UV component emitted by lights); and

- Consider the use of automatic sensor systems and timer-controlled system to minimise light pollution.

15.2.4 *Biodiversity Monitoring*

Construction Phase

- As a precautionary measure, it is recommended that the relevant potential bat roost trees located within the western section of the subject lands, are section-felled under the supervision of an experienced ecologist. If bats are present, all works must cease, and NPWS contacted in order to obtain a derogation licence. The CEMP submitted with this planning application provides for a Project Environmental Consultant who will supervise or appoint a suitably qualified person to supervise any work that has potential to involve risk to the environment.

Operational Phase

- It is proposed to have ongoing monitoring during the Operational Phase to assess the effectiveness of the bat boxes in relation to the suitability of their location, and use. The ongoing physical condition will also be monitored.

15.2.5 *Land and Soils Mitigation*

This section describes a range of recommendations and mitigation measures designed to avoid, reduce or offset any potential adverse geological impacts identified.

Construction Phase

In order to reduce the impacts on the soils, geology and hydrogeological environment a number of mitigation measures will be adopted as part of the Construction Phase. 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 Development;
- Fuel and chemical handling, transport and storage; and
- Control of water during the Construction Phase.

Control of Soil Excavation

- Topsoil and subsoil will be excavated to facilitate the formation of basement levels, ramp access, construction of a new sewer and water mains connections, roadways and all other associated services.

- The project will incorporate the; reduce, reuse and recycle approach in terms of soil excavations on site.

- The construction phase will be carefully planned to ensure only material required to be excavated will be excavated with as much material left in situ as possible.

- All excavation arisings will be reused on site where possible.

- Soil stripping, earthworks and stockpiling of soil will be carried out during the construction phase. Stockpiles have the potential to cause negative impacts on air and water quality.

- The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during the construction phase.

- It is anticipated that any stockpiles will be formed within the site boundary and there will be no direct link or pathway from this area to any surface water body.

- It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill.

- 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.

Export of material from Proposed Development Site

- Where material cannot be reused on site (e.g. not all topsoil will make suitable engineering fill) it will be exported for reuse off site subject to the appropriate permissions being in place at the receiving site.

- Any soil to be exported may be classified as a by-product rather than a waste via an Article 27 Declaration (or Article 28) to the EPA.

- Where material cannot be reused off site it will be sent for recovery at an appropriately permitted site.

- The control of material will be carried out in accordance with the Waste Management Act and further details are included in the CEMP.

Sources of Fill and Aggregates

- All imported fill and aggregate for the project will be sourced from reputable suppliers as per the project Contract and Procurement Procedures. All suppliers will be vetted for:
    - Aggregate compliance certificates/declarations of conformity for the classes of material specified for the project;

    - Environmental Management status;

- Regulatory and Legal Compliance status of the Company.

- The use of fill and aggregate containing recycled or recovered materials shall be considered.

Fuel and Chemical Handling

The following mitigation measures will be in place during the Construction Phase in order to prevent any spillages to ground of fuels and prevent any resulting soil and / or groundwater quality impacts:

- Designation of bunded refuelling areas on the site (if required);

- Provision of spill kit facilities across the site;

- Where mobile fuel bowsers are used the following measures will be taken:

    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump or valve will be fitted with a lock and will be secured when not in use;
    - All bowsers to carry a spill kit and operatives must have spill response training;
    - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the Construction Phase the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas;

- 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 should be secured and moved on spill pallets;

- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

Construction Environmental Management Plan (CEMP)

In advance of work starting on site the works appointed Contractor will develop a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Authority. The appointed Contractor will also update the CEMP as required. The CEMP sets out the overarching strategy for ensuring that construction of the Proposed Development will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements

and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project. The CEMP incorporating the CDWMP are included in the main submission.

Control of Water during the Construction Phase

- 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.

- There will be minimal inflow of shallow/perched groundwater into any excavation due to the very low permeability of the Dublin Boulder Clay.

- Care will be taken 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 offsite impacts

- All run-off will be prevented from directly entering into any water courses.

- Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer regulated under a Discharge Licence obtained from the Regulator (Irish Water) issued under the Water Pollution Act.

Operational Phase

- No mitigation required

15.2.6 *Land and Soils Monitoring*

Construction Phase

- Monitoring shall be carried out as specified in any discharge licence associated with the construction phase of the project.

- Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act. Regular auditing proposed mitigation measures for the construction phase will be carried out.

Operational Phase

- No requirement for monitoring in the operational phase.

15.2.7 *Hydrology Mitigation*

The following mitigation measures for the Proposed Development shall be implemented with the construction of the surface water sewer network and the wider site construction:

Construction Phase

- The filtering of surface water that is likely to be contaminated by soil particles shall be carried out in order to reduce the silting effects of these particles in the receiving downstream watercourse.

- Construction of suitable silt traps prior to the surface water out-falling to the existing watercourse shall be carried out.

- Relocation of existing services detailed construction Methods Statements; and

- The preparation of a detailed Construction & Environmental Management Plan (CEMP) to include measures to protect against contamination and runoff, building on the CEMP submitted as part of this planning application.

Operational Phase

It is proposed to implement the following mitigation measures for the surface water design for the operation phase in accordance with the GDSDS and SSFRA Volume 7 of the DCDP.

The following is a summary of proposed mitigation measures and their influence on design:

- All surface water from the proposed development will be carefully managed and provision made for significant rainfall events during high tides in accordance with the commentary and justification text in for Site 26 in the SSFRA Volume 7 of the DCDP. A one-year high tide event should be assumed during a 100-year rainfall event.

- The best practice with regard to surface water management will be implemented across the development area which is located in the catchments of the Naniken Stream and Santry Rivers, to limit surface water to the current Greenfield runoff values.

- The total attenuation provided will be 1706 cubic meters will be provided with extensive SUDs structures across the site. All SUDs structures are designed to allow surface water to be retained and flow through them.

- In addition to this, and in accordance with the Greater Dublin Strategic Drainage Strategy, provision for 5mm interception of surface water to ground will be facilitated through infiltration areas below all SuDs structures above the 5mm interception requirements.

- It is proposed to infiltrate surface water runoff to ground underneath SuDS systems where suitable.

15.2.8 *Hydrology Monitoring*

Proposed monitoring measures relate to the Construction Phase only and are summarised under the following aspects:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and Chemical handling, transport and storage;
- Control of Water during Construction.
- Monitoring shall be carried out as specified in any Discharge Licence associated with the construction phase of the project.
- Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act.

Operational Phase

- No ongoing monitoring proposed.

15.2.9 *Quality, Climate and Microclimate Mitigation*

Construction Phase

Air Quality

- 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.

- Furthermore, 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 using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.

- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.

- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

- At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to emit dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Wind and Microclimate

- As construction of the proposed development progresses the wind conditions at the site will adjust to those of the completed development, and mitigation measures will be implemented before completion and operation.

Climate

- Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works the impact on climate will be not significant and no mitigation measures are proposed.

Remedial measures during the Construction Phase in relation to daylight are not considered to be required.

Remedial measures during the Construction Phase in relation to sunlight are not considered to be required.

Operational Phase

Air Quality
No site-specific mitigation measures are required during the Operational Phase.

Wind and Microclimate

- If the wind conditions exceed the threshold, these conditions become unacceptable for favourable pedestrian activities and mitigation measures should be carried out. Mitigation measures include:

    - Landscaping - the use vegetation to protect buildings from wind. The proposed mitigation measures for this development is landscaping using tree plantings as shown in Figure 8-59, which creates a further reduced vorticity, making it possible to reduce incoming velocities, thus further reducing wind impacts on the buildings, public spaces or pedestrian paths

    - 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.

Climate

No site-specific mitigation measures are required during the Operational Phase.

There will be an imperceptible impact with a neutral, long-term effect in relation to the daylight levels experienced by the future inhabitants of the Proposed Development and to the existing inhabitants of the adjoining sites.

There will be an imperceptible impact with a neutral, long-term effect is expected in relation to the sunlight levels experienced by the future inhabitants of the Proposed Development and to the existing inhabitants of the adjoining sites, therefore no remedial or reductive measures are considered to be required.

15.2.10 *Air Quality, Climate and Microclimate Monitoring*

Construction Phase

- Construction phase dust monitoring should be put in place to ensure dust mitigation measures are controlling emissions.

- Dust monitoring should be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119.

- The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting

vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period between 28-32 days.

Operational Phase

- No ongoing monitoring required.

15.2.11 *Noise and Vibration Mitigation*

Construction Phase

- Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228 (2009 + A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:
    - selection of quiet plant;
    - noise control at source;
    - screening, and;
    - liaison with the public.
- Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring. These measures will specifically be required during any high noise activities, for example during demolition works in proximity to St. Paul's College, if works are occurring during term time.

Selection of Quiet Plant

- This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item 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 key noise generating sources during the construction phases, the following best practice migration measures should be considered:
    - For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels

over normal operation. Mobile plant should be switched off when not in use and not left idling.

- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.
- For percussive tools such as concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

- 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. Standard construction site hoarding with a mass per unit of surface area greater than 7 kg/m^2 can provide adequate sound insulation.

Liaison with the Public

- A designated noise liaison officer will 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, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, 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. If piling or breaking works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities.

Operational Phase

- No mitigation measures required.

15.2.12 *Noise and Vibration Monitoring*

Construction Phase

- The contractor will be required to ensure construction activities operate within the noise limits as prescribed by the planning permission.

- The contractor will be required to undertake regular noise 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*.

Operational Phase

- No ongoing monitoring required.

15.2.13 *Landscape and Visual Amenity Mitigation*

Construction Phase

- Retention of trees on Sybil Hill Road, on the boundaries of the site and retention of the majority of existing trees on site, which are incorporated into a western open space. All trees will be protected in accordance with BS: 5837:2012 Trees in relation to design, demolition and construction. Recommendations.

- A specific Aboricultural Method Statement shall be prepared for any works required within the root protection area of any tree to be retained. All such measures shall be prepared in consultation with the Project Arborist, who shall also supervise works for which an Aboricultural Method Statement is required.

- Provision of solid site hoarding, min 2.4m high along the access road boundary with Sybil Hill House, along the access road and site boundary with St Paul's College, and along the boundary with the avenue in St Anne's Park.

- Existing boundaries will be retained and protected – other than where existing entrances are to be widened or new entrances provided.

- The 'Ha-Ha' style feature at Sybil Hill House shall be retained and protected by fencing prior to the construction of the new access road and new boundary wall / railing.

- Construction activities, other than for services or landscape works, shall be set back a min. of 20m from the rear boundaries of properties at 'The Meadows'.

- The remnant section of the former walled garden of Maryville, which is north of the site, shall be protected and hoarded off.

- Construction works associated with the provision of new pedestrian accesses to St Anne's Park, will be fenced-off and protected from public access. These works shall be co-ordinated with the Parks Department of DCC.

- Construction works in St Anne's Park, associated with the installation of the outfall to the Naniken River and the replacement of the existing footbridge, shall be fenced off with solid hoarding and protected from public access. These works shall be co-ordinated with the Parks Department of DCC.

- A Project Arborist and Project Landscape Architect will be retained for the duration of the construction phase to ensure that mitigation measures associated with existing trees and landscape proposals outlined above are put into effect and maintained.

Operational Phase

- provision of a significant 1.6ha area of public open space to be offered for taking-in-charge to DCC;
- provision of c.12,173sqm of semi-private open space parks to the west and east of the residential development:
- provision of a significant area of c.11,356sqm of central semi-private open space incorporating landscape courtyards, and amenity spaces;
- provision of a linear open space of c.2,253sqm along the northern boundary of the Site, which provides for setback from the boundary with St Anne's Park and for connectivity of open space;
- provision of an evergreen hedgerow and tree planting along the boundary between St Paul's College sportsground and the proposed public open space and the Proposed Development;
- provision of an evergreen hedgerow along the boundary of the public open space and the St Anne's Park Avenue; and
- incorporation of the 'Ha-Ha' style feature within the retained grounds of Sybil Hill House and provision of new tree planting.
- A Project Arborist and Project Landscape Architect will be retained for a period of 12 months post-construction to ensure that landscape and visual mitigation measures outlined above are successfully established.

15.2.14 *Landscape and Visual Amenity Monitoring*

Construction Phase

- A Project Arborist and Landscape Architect will be retained for the duration of the construction phase.
- Monitoring of landscape and tree-related works is an integral aspect of the proposed scheme, and includes monitoring of:
    - Tree removal, retention and protection;
    - Topsoil stripping and storage;
    - Disturbance by site works, services etc.;
    - Excavation / alteration of ground levels;
    - Landscape build-up; profiling and cultivation;
    - Landscape finishing and implementation;
    - Proposed planting and seeding; and
    - 12 months aftercare of landscape measures to ensure establishment.

- All works associated with soil stripping and movement; landscape build-up and finishing and landscape implementation shall be reviewed and monitored by the Project Landscape Architect.

- All works associated with removal, retention and protection of existing trees and woodlands and with tree surgery works shall be approved and monitored by the Project Arborist.

Operational Phase

- Planting and seeding will continue to be monitored by the Project Landscape Architect to ensure successful establishment and appropriate management.

- Retained trees will be reviewed by the Project Arborist to ensure successful incorporation into the new landscape.

15.2.15 *Archaeology, Architecture and Cultural Heritage Mitigation*

The measures set out below will be undertaken in advance of the Construction Phase. This will allow a satisfactory timeframe in which the mitigation measures can be implemented, and the results assessed without causing delays to construction.

Pre-Construction Phase

- Based on the results of a geophysical survey at the site of Maryville House**,** archaeologically directed and targeted test trenching is recommended to further refine the nature, date, extent and significance of the remains present.

- Archaeologically directed test trenching is also recommended along the proposed access road between Sibyl Hill House (Vincentian Residence) (**AH2 –** EIAR Chapter 11) and St. Paul's College and on the townland and civil parish boundary (**AP1** EIAR Chapter 11).

- To address the archaeological potential elsewhere across the proposed development area, and any potential association of the site with the Battle of Clontarf, it is recommended that archaeologically-directed test trenching be undertaken across the footprint of the proposed development area. Insertion of machine-excavated test trenches at intervals is an effective method for locating archaeological sites in advance of construction. This allows for resolution in advance of construction, thus minimising potential delays during the construction phase.

- This work should be carried out under licence in accordance with Section 26 of the National Monuments Acts 1930 – 2014, and with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland.

- The results of this investigation will determine whether redesign to allow for preservation *in situ*, full archaeological excavation and/or monitoring are required. The investigation report will include mitigation proposals for dealing with the discovery of archaeological deposits and material during development. This work should be conducted by a suitably qualified archaeologist.

- It is envisaged that the following will apply:

- Should investigation yield evidence of archaeologically significant material or structures, preservation in situ may be recommended. Strategies for the in situ preservation of archaeological remains are conducted in consultation with the statutory authorities, and may include avoidance, if possible, of the remains during construction, or preservation through redesign.
- Should investigation yield evidence of archaeologically significant material or structures that cannot be preserved in situ, archaeological excavation and recording, to full resolution, is recommended.
- Where less substantial archaeology is anticipated, it is proposed that groundworks are monitored by a suitably qualified archaeologist, with the provision for full excavation of any archaeologically significant material uncovered at this time (if an impact cannot be avoided).
- Should archaeological features or material be uncovered, adequate funds to cover excavation, fencing (if required), post-excavation analysis and reporting, and conservation work should be made available.

- Should the removal of vegetative root systems be required, it is recommended that this work be supervised by a suitably qualified archaeologist.

Operational Phase

- It is suggested to retain 'Maryville', or a component thereof, in naming the Proposed Development.

15.2.16 *Archaeology, Architecture and Cultural Heritage Monitoring*

Construction Phase

- Based on the results of archaeologically directed test trenching archaeological monitoring of all groundworks associated with the development may be recommended, with the provision for full excavation of any archaeologically significant material uncovered at this time.

- It is envisaged that the following will apply:

    - In the event of archaeological features or material being uncovered during construction phase monitoring, it is crucial that machine work cease in the immediate area to allow the archaeologist to assess, excavate and record any such material.
    - Should archaeological features or material be uncovered, adequate funds to cover excavation, fencing (if required), post-excavation analysis and reporting, and conservation work should be made available.
    - This work should be done under licence in accordance with Section 26 of the National Monuments Acts 1930 – 2014, and with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland.

- Should the removal of vegetative root systems be required, it is recommended that this work be supervised by a suitably qualified archaeologist.

Operational Phase

- No post development monitoring is anticipated in respect of archaeology and cultural heritage as all identified impacts will be mitigated at the pre- and construction phases of the proposed development.

15.2.17 *Material Assets: Traffic, Waste and Utilities Mitigation*

Construction Phase

Identified impact: Additional HGV traffic along proposed designated haul route which will have a slight short-term negative effect on the local road network during the Construction Phase. Mitigation measures as follows;

- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive onto the adjacent roadway.

- The applicant shall at all times keep all public and private roads and footpaths entirely free of excavated materials, debris and rubbish.

- Public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.

- The applicant shall be responsible for and make good any damages to existing roads or footpaths caused by his own contractors or suppliers transporting to and from the site.

- The contractor shall confine his activities to the area of the site occupied by the works and the builders' compound, as far as practicably possible, during any particular phase of the works.

Identified impact: Additional construction personnel car / light vehicle movements which will have an insignificant short-term negative effect on the local road network during the Construction Phase. Mitigation measures as follows;

- All construction workers will be encouraged to use public transport, and also to car share.

- No daytime or night-time parking of site vehicles or construction staff vehicles will be permitted outside agreed areas.

Identified impact: Construction vehicle movements and works on Sybil Hill Road, such as the development of the new junction with the Proposed Development or when undergoing service connections on the public road, which will have a slight short-term negative effect on traffic movements on Sybil Hill Road in the vicinity of the Proposed Development. Mitigation measures as follows;

- Construction work will be limited to normal working hours; that are 07.00 – 18.00 on weekdays and 08.00 – 14.00 on Saturdays.

- All deliveries of materials, plant and machinery to the site and removals of waste or other material will take place within the permitted hours of work.

- Vehicle movements will be planned to ensure arrival and departure times are maintained inside the agreed working hours.

- Deliveries will be co-ordinated to prevent queuing of vehicles adversely affecting traffic flow and to minimise disruption to local traffic. They will be timed and coordinated to avoid conflict with collection of waste, other deliveries (particularly to adjoining owners), and rush hour traffic. Large deliveries will be scheduled outside peak traffic hours to minimise disruption.

- Properly designed and designated access and egress points to the construction site will be used to minimise impact on external traffic.

Identified impact: Construction works and construction vehicle movements on Sybil Hill Road, which will have a slight short-term negative effect on pedestrian and cycle movements on Sybil Hill Road in the vicinity of the Proposed Development, for example due to pedestrians and cyclists having to give way at the construction access to the Site and / or divert around construction works on Sybil Hill Road. Mitigation measures as follows;

- Priority to keep construction vehicles and pedestrians apart.

- Separate entry and exit gateways will be provided for pedestrians and vehicles with a gate man in attendance to interface with the traffic and public to facilitate safe access and egress of vehicles.

- Firm, level, and well-drained pedestrian walkways will be provided.

- Measures will be implemented to ensure drivers driving out onto public roads can see both ways along the footway before they move on to it.

- Footpaths will not be blocked resulting in pedestrians having to step onto the carriageway.

Waste and Utilities Construction Phase

- A detailed CEM will be in place for the proposed development and will aim to ensure the highest possible levels of waste reduction, waste reuse and waste recycling for the development.

- Any waste materials removed off site will only be removed by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007 and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments.

- A waste manager will be appointed for the proposed development

- Management Plans including method statements shall be developed for excavations in proximity to underground utility cables and pipelines.

- The Contractor will establish and implement measures to ensure that no interruptions to existing utilities occur throughout the project construction phase unless agreed in advance with the relevant service provider and or Local Authority.

Operational Phase

- A Mobility Management Plan has been prepared for the Proposed Development which includes recommended mitigation measures to reduce usage of private cars and increase the use by residents within the development of more sustainable modes of travel, such as including good cycle parking provision, use of a car club, and car sharing, will further promote the greater use of sustainable travel modes. It is projected that successful implementation of the mobility management mitigation measures included will reduce the vehicular trip generation from the proposed development.

- A Stage 3 Road Safety Audit will be undertaken post construction and pre-opening of the proposed development in accordance with RSA guidelines to address any potential road safety issues related to the completed scheme.

- During the operational phase of the development it is projected that the adjoining road network can readily accommodate the additional traffic from the Proposed Development.

- A waste and storage management plan has been developed for the proposed development.

15.2.18 *Material Assets: Traffic, Waste and Utilities Monitoring*

Construction Phase

- A site liaison officer will be identified as a single contact point for the planning authority and local community to deal in a prompt and efficient manner with any issues that may arise in relation to construction traffic and activity on the public road.

- Public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.

- Site personnel will be present on the public road at the site access junction at all times during site operational hours to facilitate the safe movement of:

    - Construction vehicles to and from the site
    - Road users along Sybil Hill Road in the vicinity of the site access or any construction works on Sybil Hill Road.

- The CEMP is a living document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in this EIAR and any subsequent conditions relevant to the Proposed Development. The CEMP incorporating the CDWMP are included in the

planning application submission. Monitoring shall be carried out for compliance with these plans.

Operational Phase

- As part of the Mobility Management Plan for the proposed development it is recommended that a Mobility Manager be appointed by the Management Company for the residential units. The Mobility Manager will also be involved in monitoring of the mode of travel from the residential development. This ideally will be done on an annual basis. Monitoring of travel patterns will facilitate the provision of sustainable transport modes and ensure that modal targets are met.

15.2.19 *Risk Management*

Construction Phase

- No mitigation measures required.

Operational Phase

- No mitigation measures required.

15.3 Summary of Residual Impacts

Residual impacts are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated. The following is a summary of residual impacts for each individual chapter, as detailed in the EIAR.

15.3.1 *Population and Human Health*

The Proposed Development will bring a new population into the area. This new population will support existing schools, shops, public transport and the local community and additional facilities such as a crèche will be provided. It is considered that there will be a moderate impact on population and human health, but with an overall long- term positive effect. No long term negative environmental effects are envisaged.

15.3.2 *Biodiversity*

Chapter 5 Biodiversity of the EIAR, Table 5-13 provides a summary of the impact assessment for the identified Key Ecological Resources (KERs) and details the nature of the impacts identified, mitigation proposed and the classification of any residual impacts.

Provided all mitigation measures are implemented in full and remain effective throughout the lifetime of the facility, no significant negative residual impacts on the local ecology or on any designated nature conservation sites, are expected from the Proposed Development.

15.3.3 *Land and Soils*

Residual impacts of the proposal are outlined in the Detailed Assessment Chapter 6 Land and Soils, Table 6.5 of the EIAR provides a summary of this assessment. The primary residual impacts from the Construction Phase is the change of use and removal of soil to facilitate the basement construction. These impacts are unavoidable given the nature, requirement and design of the Proposed Development. During the Operational Phase of the Proposed Development there is very limited to no potential impact on the geological environment of the area. There is no requirement for any fuel oil stores as all heating will the fuelled by mains gas.

15.3.4 *Hydrology*

Following the implementation of mitigation measures detailed in Section 7.6, the predicted impact on the surface water environment during the Construction Phase and Operational Phase is considered to be *likely, neutral, imperceptible and short-term*.

15.3.5 *Air Quality, Climate and Microclimate*

Construction Phase

When the dust minimisation measures detailed in the mitigation section of chapter 8 of the EIAR are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Due to the size and nature of the construction activities with appropriate mitigation measures, CO_2 and N_2O emissions during construction will have a negligible impact on climate.

Operational Phase

The results of the air dispersion modelling study indicate that the residual impacts of the Proposed Development on air quality and climate are predicted to be imperceptible and localised with respect to the Operational Phase for the long-term and therefore not significant.

Best practice mitigation measures are proposed for the Construction Phase of the Proposed Development, which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. These are addressed in the CEMP which is submitted as a separate document to this application. The mitigation measures that will be put in place during construction of the Proposed Development will ensure that the impact of the Proposed Development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the Proposed Development is likely to be negligible, short-term and imperceptible with respect to human health and therefore not significant.

There will be an imperceptible impact with a neutral long-term effect, if any, is expected in relation to the daylight levels experienced by the future inhabitants of the Proposed Development 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 daylight.

There will be an imperceptible impact with a neutral long-term effects, if any, is expected in relation to the sunlight levels experienced by the future inhabitants of the Proposed Development and to the existing inhabitants of the adjoining sites. No remedial or reductive measures are considered to be required; therefore, it is considered there will be no residual impacts from the Operational Phase in respect of sunlight.

15.3.6 *Noise and Vibration*

Construction Phase

During the construction phase of the project there is the potential for some minor to moderate impact on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum.

The residual likely impact of the Proposed Development during the Construction Phase will be of short-term minor to moderate impact[28], therefore of not significant to significant impact with short-term negative effects[29].

Operational Phase

The predicted noise level associated with additional traffic is predicted to be of insignificant impact along the existing road network. In the context of the existing noise environment, the overall contribution of traffic is not considered to pose any significant impact to nearby residential locations. It can be concluded that, once operational, noise levels associated with the Proposed Development will not contribute any significant noise impact to its surrounding environment.

The resulting likely impact of **traffic** additional along the surrounding road network is not significant with long-term neutral effects

15.3.7 *Landscape and Visual Amenity*

Construction Phase

Given the nature of the existing mature and mainly evergreen screening, taken with the proposed avoidance, remedial and mitigation measures, will ensure that there will be no likely

[12] Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)

[13] EPA Draft Guidelines 2017

significant landscape or visual impacts for St Anne's Park. The residual Construction Phase landscape and visual impact for St Anne's Park will be moderate, negative and short-term.

The residual Construction Phase landscape and visual impact for Sybil Hill House, St Paul's College and sportsground and for 'The Meadows' residential estate will be significant negative and short-term.

The residual Construction Phase landscape and visual impact for Sybil Hill Road will be slight to moderate with very localised short-term effects.

Residual impacts for other areas, such as from All Saints Road, 'Ardilaun Court' and the Convent of the Little Sisters of the Poor are generally to aspects of the upper floors of the Proposed Development. As such, avoidance, remediation and mitigation of these impacts are addressed in the layout and architectural detailing of the Proposed Development. The residual Construction Phase landscape and visual impact for these areas will be slight negative and short-term.

Operational Phase

The Proposed Development will be substantially contained, both physically and visually, within the site by the existing belt of mature trees along the site boundary with St. Anne's Park. While some glimpsed views will be possible along the Avenue, landscape proposals will reinforce the existing line of avenue trees and mitigate this effect in the short to medium-term. While the uppermost element of some blocks will be visible from areas within St. Anne's Park, these are very limited and do not detract from the Park or its characteristics. Specifically, the Proposed Development will not have an adverse effect on the Avenue as a landscape feature, or on the wider Park or its more sensitive features, e.g. Rose Gardens, the Red Stables, etc.

The Proposed Development does not impact negatively on the significant recreational amenity or sensitive features of St. Anne's Park. Specific and substantial mitigation measures are proposed throughout the scheme to take account of potential effects and when mitigation measures are taken into account, no significant adverse landscape and visual impact arises.

The residual Operational Phase landscape and visual impact for St Anne's Park will be slight, neutral and permanent.

Specific avoidance, remedial and mitigation measures have been proposed to address the likely landscape and visual impacts which will arise for Sybil Hill House, for St Paul's College and 'The Meadows' residential estate. However, the key impact arises from the considerable change from an existing open character to a built residential development. While this impact is addressed in the Site layout, in the architectural treatment, and the specific landscape proposals, some degree of residual landscape and visual impact is unavoidable. This change in character will also have a residual night-time impact.

The residual Operational Phase landscape and visual impact for Sybil Hill House will be slight neutral and permanent effects.

The residual Operational Phase landscape and visual impact for St Paul's College and sportsground will be moderate neutral and permanent.

The residual Operational Phase landscape and visual impacts for 'The Meadows' residential estate will be significant neutral and permanent.

The residual Operational Phase landscape and visual impact for Sybil Hill Road will be imperceptible neutral and permanent.

Residual impacts for other areas, such as from All Saints Road, 'Ardilaun Court' and the Convent of the Little Sisters of the Poor are generally to aspects of the upper floors of the Proposed Development. As such, avoidance, remediation and mitigation of these impacts are addressed in the layout and architectural detailing of the Proposed DevelopmentThe residual Operational Phase landscape and visual impact for these areas will be slight neutral and permanent.

15.3.8 *Archaeology, Architecture and Cultural Heritage*

Residual impacts are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated. Full details of residual impacts are contained within Table 11.4 of Chapter 11 Archaeology, Architecture and Cultural Heritage of the EIAR.

15.3.9 *Material Assets. Traffic, Waste and Utilities*

Construction of the proposed development will have slight short-term negative impacts on the adjoining road network with construction traffic on Sybil Hill Road in the vicinity of the proposed access and on the assigned dedicated haul route. The likely effect of the proposed development at operational stage will be additional traffic which may have a slight long-term adverse effect on the adjoining road network. The proposed development will not give rise to any likely significant long-term traffic impacts.

15.3.10 *Risk Management*

Chapter 13 of the EIAR details risk management. Table 13.3 assess the residual significance following mitigation.

15.4 Summary of Mitigation and Monitoring Measures Tables

Mitigation measures as detailed in this chapter are summarised in Table 15-1 and all monitoring measures are summarised in Table 15-2.

Mitigation measures in Table 15.1 are itemised and numbered based on the stage that they are relevant to (i.e. construction or operational - C or O) and the Section that they come from. For example, mitigation measure C.9.1 relates to construction mitigation measure no. 1 from the Noise and Vibration Chapter 7.

Monitoring is also listed under each Section title in Table 15-2 in order to summarise any monitoring requirements identified within this Volume of the EIAR. Monitoring items are numbered in the same way as mitigation measures.

Table 15-1: Summary of Mitigation Measures

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
Chapter 4: Population and Human Health			
C.4.1	**Construction Phase**	**All Impacts**	• A construction environmental management plan (CEMP) will be in place for the duration of works
C.4.2	**Construction Phase**	**All Impacts**	• An operational construction management plan will be agreed with the planning authority on receipt of planning permission. • Working hours will be restricted 07:00 to 18:00. Monday to Friday and from 08:00 to 14;00 on Saturdays. • Traffic Management plan will be in place for duration of the works and will include schedule arrival and departures around when children are entering and leaving schools. Heavy goods vehicles will be restricted during the periods when children are entering and leaving schools.
C.4.3	**Construction Phase**	**Air and Noise**	• As part of the CEMP a Dust and a noise abatement plan will be in operation

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
Chapter 5: Biodiversity			
C.5.1	**Construction Phase**	**Fauna**	• The removal of trees and shrubs should be completed outside the main bird nesting season where possible, i.e. 1st March to 31st August. • Prior to the demolition of any site structures, and/or the felling of any mature trees within the site, it is recommended that a roost inspection survey is carried out at the appropriate time of year by a qualified ecologist in order to determine the presence of any potential roosts. • Any felling of mature trees with bat roost potential within the site should be done during the autumn months. The branches should then be left *in-situ* for at least 24 hours in order to allow for the movement of wildlife from the tree prior to mulching or removal. • Lighting proposals for this site will adhere to the advice provided in *'Bats and lighting – Guidance for Planners, engineers, architects and developers'* (Bat Conservation Ireland 2010) and '*Bats and Lighting in the UK*. Bats and the Built Environment Series' (Bat Conservation Trust, 2008). • A suitably qualified bat ecologist or ecological clerk of works shall make adjustments to directional construction lighting (e.g. through retrofit of cowls, shields or louvres) after installation to ensure minimum light spill onto vegetated areas, and above lighting columns (reducing light spill to vegetated areas to below 3 lux where possible). • As a precautionary measure, it is recommended that the relevant potential bat roost trees, located within

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			the western section of the existing subject lands, are section-felled under the supervision of an experienced Ecologist. If bats are present, all works will have to cease, and National Parks and Wildlife Service will have to be contacted in order to obtain a derogation licence.
C.5.2	**Construction Phase**	**Habitats**	• A construction method statement will be implemented by the contractor that details the suitable precautions to be followed in relation to any potential pollution of watercourses from construction activities. The storage of materials, containers, stockpiles and waste, however temporary, shall follow best practice at all times and be stored at designated areas away from watercourses. • The *Engineering Services Report* completed for this application details the comprehensive Sustainable Drainage System (SuDS) that is to be incorporated into the proposed development. Similarly, the *Arboriculture Method Statement* completed by Independent Tree Surveys details the tree protection measures that will be implemented in order to protect trees that are to be retained as part of the proposed development. • Any trees, adjacent to or within the development boundary which are to be retained shall be afforded adequate protection during the construction phase as follows:

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			• All trees along the proposed development boundary that are to be retained, both within and adjacent to the development boundary (where the root protection area of the tree extends into the development boundary), will be fenced off at the outset of works and for the duration of construction to avoid damage to the trunk, branches or root systems of the trees. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree (National Roads Authority, 2005-2011). In general, the RPA covers an area equivalent to a circle with a radius 12 times the stem diameter (measured at 1.5m above ground level for single stemmed trees); • Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it. It will still be necessary to ensure that the area within the RPA is not used for vehicle parking or the storage of materials (including oils and chemicals); and, • A qualified arborist shall assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the proposed development boundary but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
C.5.3	**Construction Phase**	**Surface Water**	• Specific measures to prevent the release of sediment over baseline conditions to the Nanniken Stream (and subsequently the Tolka Estuary) and Dublin Bay during the construction work will be implemented as the need arises. These measures include, but are not limited to, the use of silt traps, silt fences, silt curtains, settlement ponds and filter materials. • Provision of exclusion zones and barriers (e.g. silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the Nanniken stream and/or existing drainage systems and hence the downstream receiving water environment. • Silt traps shall not be constructed immediately adjacent to the Nanniken stream, i.e. a buffer zone between the trap and the watercourse with natural vegetation must be left intact. Imported materials such as terram, straw bales, coarse to fine gravel should be used either separately or in-combination as appropriate to remove suspended matter from discharges. • Provision of temporary construction surface drainage and sediment control measures to be in place before the construction of the pipeline and/or earthworks commence. • Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the site. • Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to the

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			Nanniken Stream and/or surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to the Nanniken Stream or existing surface water drainage systems. Concrete washout areas will be located remote from the Nanniken Stream or any surface water drainage features, where feasible, to avoid accidental discharge to watercourses. • Any fuels of chemicals (including hydrocarbons or any polluting chemicals) will be stored in a bunded area to prevent any seepage of into the Nanniken Stream, local surface water network or groundwater, and care and attention taken during refuelling and maintenance operations. • Temporary oil interceptor facilities shall be installed and maintained where site works involve the discharge of drainage water to receiving rivers and streams. • All containment and treatment facilities are regularly inspected and maintained. • All mobile fuel bowsers shall carry a spill kit and operatives must have spill response training. • All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked. • Implementation of response measures to potential pollution incidents. • Emergency procedures and spillage kits will be available and construction staff will be familiar with

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			emergency procedures in the event of accidental fuel spillages. • All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points. • Water supplies shall be recycled for use in the wheel wash. All waters shall be drained through appropriate filter material prior to discharge from the construction sites. • The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same. • A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase. • Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).
O.5.1	**Operational Phase**	**Bats**	• The use of LED directional lighting (through the use of shields/cowls, masking and louvres) to restrict light to those public areas where it is needed with a light level of 3 lux or less at ground level; • Restricted column heights of lamp posts to less than 8m (i.e. 6m in height) and angle light is emitted at (i.e.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			no greater than 70°) to reduce the amount of light spillage; • Narrow spectrum lighting should be used wherever possible with a low UV component (UV filters can be used to reduce the UV component emitted by lights); and, • Consider the use of automatic sensor systems and timer-controlled system to minimise light pollution.
Chapter 6: Land and Soils			
C.6.1	**Construction Phase**	**Soil Excavation**	• Topsoil and subsoil will be excavated to facilitate the formation of basement levels, ramp access, construction of a new sewer and water mains connections, roadways and all other associated services. • The 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 excavated with as much material left in situ as possible. • All excavation arisings will be reused on site where possible. • Soil stripping, earthworks and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. • The effects of soil stripping and stockpiling will be mitigated through the implementation of an

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			appropriate earthworks handling protocol during construction. • It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. • It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill. • 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.
C.6.2	**Construction Phase**	**Waste**	• Where material cannot be reused on site (e.g. not all topsoil will make suitable engineering fill) it will be exported for reuse off site subject to the appropriate permissions being in place at the receiving site. • Any soil to be exported may be classified as a by-product rather than a waste via an Article 27 Declaration (or Article 28) to the EPA. • Where material cannot be reused off site it will be sent for recovery at an appropriately permitted site. • The control of material will be carried out in accordance with the Waste Management Act and further details are included in the CMP.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments

C.6.3	**Construction Phase**	**Materials of construction**	• All imported fill and aggregate for the project will be sourced from reputable suppliers as per the project Contract and Procurement Procedures. All suppliers will be vetted for:
			  • Aggregate compliance certificates/declarations of conformity for the classes of material specified for the project;
			  • Environmental Management status;
			  • Regulatory and Legal Compliance status of the Company.
			• The use of fill and aggregate containing recycled or recovered materials shall be considered.

C.6.4	**Construction Phase**	**Resources**	• Designation of bunded refuelling areas on the site (if required);
			• Provision of spill kit facilities across the site;
			• Where mobile fuel bowsers are used the following measures will be taken:
			
			  • Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
			  • The pump or valve will be fitted with a lock and will be secured when not in use;
			
			  • All bowsers to carry a spill kit and operatives must have spill response training;
			  • Portable generators or similar fuel containing equipment will be placed on suitable drip trays.
			
			• Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			chemical storage cabinet unit or inside concrete bunded areas; • 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 should be secured and moved on spill pallets; • Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.
C.6.5	**Construction Phase**	**Water**	• 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. • 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. • Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer regulated under a Discharge Licence obtained from the Regulator (Irish Water) issued under the Water Pollution Act. • Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			measures (silt traps, silt sacks and settlement tanks) and hydrocarbon interceptors. • Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits. Qualitative and quantitative monitoring will be implemented as per the Conditions of any Discharge Licence.
-	**Operational Phase**	-	• None
Chapter 7: Hydrology			
C.7.1.	**Construction Phase**	**Water**	• The filtering of surface water that is likely to be contaminated by soil particles shall be carried out in order to reduce the silting effects of these particles in the receiving downstream watercourse. • Construction of suitable silt traps prior to the surface water out-falling to the existing watercourse shall be carried out. • Locating existing services, use of appropriate methods statements for all contractors with regards to hydrology impacts.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
O.7.1.	**Operational Phase**	**Water**	• All surface water in the development will be carefully managed and provision made for significant rainfall events during high tides in accordance with the commentary and justification text in for Site 26 in the SSFRA Volume 7 of the DCDP. • The best practice with regard to surface water management will be implemented across the development area which is located in the catchments of the Naniken Stream and Santry Rivers, to limit surface water to the current Greenfield runoff values. • The total attenuation provided will be 1706 cubic meters will be provided with extensive SUDs structures across the site. All SUDs structures are designed to allow surface water be retained and flow through them. • In accordance with the Greater Dublin Strategic Drainage Strategy, provision for 5mm interception of surface water to ground will be facilitated through infiltration areas below all SuDs structures above the 5mm interception requirements. • It is proposed to infiltrate surface water runoff to ground underneath SuDS systems where suitable.
Chapter 8: Microclimate, Air Quality and Climate			
C.8.1.	**Construction Phase**	**Air**	• 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. • Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			• Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates. • Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. • During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. • At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to emit dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
C.8.1.	**Construction Phase**	**Wind and Microclimate**	• As construction of the proposed development progresses the wind conditions at the site will adjust to those of the completed development, and mitigation measures will be implemented before completion and operation

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
O.8.1.	**Operational Phase**	**Wind and Microclimate**	• If the wind conditions exceed the threshold, these conditions become unacceptable for favourable pedestrian activities and mitigation measures should be carried out. 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.
Chapter 9: Noise & Vibration			
C.9.1	**Construction Phase**	**Construction Noise and Vibration**	• Best practice measures set out in BS 5228 (2009 + A1 2014) Parts 1 and 2 will be complied with.
C.9.2	**Construction Phase**	**Construction Noise and Vibration**	• Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring. These measures will specifically be required during any high noise activities, for example during demolition works in proximity to St. Paul's College, if works are occurring during term time. • *selection of quiet plant* - This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			item of plant to generate noise will 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 key noise generating sources during the construction phases, the following best practice migration measures should be considered: • For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant should be switched off when not in use and not left idling. • For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			• For percussive tools such as concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries. • For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum. • For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials. • For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation. • All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures. • *Screening* - 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. Standard construction site hoarding with a mass per unit of surface area greater than 7 kg/m^2 can provide adequate sound insulation. • liaison with the public - A designated noise liaison officer will be appointed to site during construction

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.
C.9.3	**Construction Phase**	**Noise and Vibration**	• Project Programme - The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling or breaking works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
Chapter 10: Landscape and Visual Amenity			
C.10.1	**Construction Phase**	**Biodiversity**	• Retention of trees on Sybil Hill Road, on the boundaries of the site and retention of the majority of existing trees on site, which are incorporated into a western open space. All trees will be protected in accordance with BS: 5837:2012 Trees in relation to design, demolition and construction. Recommendations. • A specific Aboricultural Method Statement shall be prepared for any works required within the root protection area of any tree to be retained. All such measures shall be prepared in consultation with the Project Arborist, who shall also supervise works for which an Aboricultural Method Statement is required. • A Project Arborist and Project Landscape Architect will be retained for the duration of the construction phase to ensure that mitigation measures associated with existing trees and landscape proposals outlined above are put into effect and maintained.
C.10.2	**Construction Phase**	**Dust/Litter**	• Provision of solid site hoarding, min 2.4m high along the access road boundary with Sybil Hill House, along the access road and site boundary with St Paul's College, and along the boundary with the avenue in St Anne's Park.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
C.10.3	**Construction Phase**	**Materials Assets**	• Existing boundaries will be retained and protected – other than where existing entrances are to be widened or new entrances provided. • The 'Ha-Ha' style feature at Sybil Hill House shall be retained and protected by fencing prior to the construction of the new access road and new boundary wall / railing. • Construction activities, other than for services or landscape works, shall be set back a min. of 20m from the rear boundaries of properties at 'The Meadows'. • The remnant section of the former walled garden of Maryville, northern of the site, shall be protected and hoarded off.
C.10.4	**Construction Phase**	**Population and Human Health**	• Construction works associated with the provision of new pedestrian accesses to St Anne's Park, will be fenced-off and protected from public access. These works shall be co-ordinated with the Parks Department of DCC. • Construction works in St Anne's Park, associated with the installation of the outfall to the Naniken River and the replacement of the existing footbridge, shall be fenced off with solid hoarding and protected from public access. These works shall be co-ordinated with the Parks Department of DCC.
O.10.1	**Operational Phase**	**Population and Human Health**	• Provision of a significant 1.6 hectare area of public open space to be offered for taking-in-charge to Dublin City Council; • Provision of c.1.2 hectares of communal open space parks to the west and east of the residential development:

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			• Provision of a significant area of circa 1.1 hectares of central communal open space incorporating landscape courtyards, and amenity spaces; • Provision of a linear open space of circa 0.22 hectares long the northern boundary of the site, which provides for setback from the boundary with St. Anne's Park and for connectivity of open space.
O.10.2	**Operational Phase**	**Biodiversity**	• Provision of an evergreen hedgerow and tree planting along the boundary between St. Paul's College sportsground and the proposed public open space and residential development; • Provision of an evergreen hedgerow along the boundary of the public open space and the avenue in St. Anne's Park; and • Incorporation of the 'Ha-Ha' style feature within the retained grounds of Sybil Hill House and provision of new tree planting. • A Project Arborist and Project Landscape Architect will be retained for a period of 12 months post-construction to ensure that landscape and visual mitigation measures outlined above are successfully established.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
Chapter 11: Archaeology, Architecture, and Cultural Heritage			
C.11.1	**Pre-Construction Phase**	**Archaeology**	• Based on the results of a geophysical survey at the site of Maryville House**,** archaeologically directed and targeted test trenching is recommended to further refine the nature, date, extent and significance of the remains present. • Archaeologically directed test trenching is also recommended along the proposed access road between Sibyl Hill House (Vincentian Residence) (**AH2 –** EIAR Chapter 11) and St. Paul's College and on the townland and civil parish boundary (**AP1** EIAR Chapter 11). • To address the archaeological potential elsewhere across the proposed development area, and any potential association of the site with the Battle of Clontarf, it is recommended that archaeologically-directed test trenching be undertaken across the footprint of the proposed development area. Insertion of machine-excavated test trenches at intervals is an effective method for locating archaeological sites in advance of construction. This allows for resolution in advance of construction, thus minimising potential delays during the construction phase. • This work should be carried out under licence in accordance with Section 26 of the National Monuments Acts 1930 – 2014, and with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments

			• The results of this investigation will determine whether redesign to allow for preservation *in situ*, full archaeological excavation and/or monitoring are required. The investigation report will include mitigation proposals for dealing with the discovery of archaeological deposits and material during development. This work should be conducted by a suitably qualified archaeologist.
			• The following will apply:
			
			  • Should investigation yield evidence of archaeologically significant material or structures, preservation in situ may be recommended. Strategies for the in-situ preservation of archaeological remains are conducted in consultation with the statutory authorities, and may include avoidance, if possible, of the remains during construction, or preservation through redesign.
			  • Should investigation yield evidence of archaeologically significant material or structures that cannot be preserved in situ, archaeological excavation and recording, to full resolution, is recommended.
			  • Where less substantial archaeology is anticipated, it is proposed that groundworks are monitored by a suitably qualified archaeologist, with the provision for full excavation of any archaeologically significant material uncovered at this time (if an impact cannot be avoided).
			  • Should archaeological features or material be uncovered, adequate funds to cover excavation,

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			fencing (if required), post-excavation analysis and reporting, and conservation work should be made available. • Should the removal of vegetative root systems be required, it is recommended that this work be supervised by a suitably qualified archaeologist.
O.11.1	**Construction Phase**	**Cultural Heritage**	• It is suggested to retain 'Maryville', or a component thereof, in naming the Proposed Development.
Chapter 12: Material Assets: Traffic, Waste, and Utilities			
C.12.1	**Construction Phase**	**Traffic**	• Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive onto the adjacent roadway. • All construction workers will be encouraged to use public transport, and also to car share. • On site staff car parking can also be provided to ensure no construction workers will be required to park on adjacent roads or streets. • No daytime or night-time parking of site vehicles or construction staff vehicles will be permitted outside agreed areas. • All deliveries of materials, plant and machinery to the site and removals of waste or other material will take place within the permitted hours of work. • Vehicle movements will be planned to ensure arrival and departure times are maintained inside the agreed working hours.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			• Deliveries will be co-ordinated to prevent queuing of vehicles adversely affecting traffic flow and to minimise disruption to local traffic. They will be timed and coordinated to avoid conflict with collection of waste, other deliveries (particularly to adjoining owners), and rush hour traffic. Large deliveries will be scheduled outside peak traffic hours to minimise disruption. • Properly designed and designated access and egress points to the construction site will be used to minimise impact on external traffic. • Priority to keep construction vehicles and pedestrians apart.
C.12.2	**Construction Phase**	**Dust/Litter**	• The applicant shall at all times keep all public and private roads and footpaths entirely free of excavated materials, debris and rubbish. • Public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
C.12.3	**Construction Phase**	**Infrastructure**	• The applicant shall be responsible for and make good any damages to existing roads or footpaths caused by his own contractors or suppliers transporting to and from the site. • The contractor shall confine his activities to the area of the site occupied by the works and the builders' compound, as far as practicably possible, during any particular phase of the works.

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
C.12.4	**Construction Phase**	**Population and Human Health**	• Separate entry and exit gateways will be provided for pedestrians and vehicles with a gate man in attendance to interface with the traffic and public to facilitate safe access and egress of vehicles. • Firm, level, and well-drained pedestrian walkways will be provided. • Measures will be implemented to ensure drivers driving out onto public roads can see both ways along the footway before they move on to it. • Footpaths will not be blocked resulting in pedestrians having to step onto the carriageway. • Management Plans including method statements shall be developed for excavations in proximity to underground utility cables and pipelines.
C.12.5	**Construction Phase**	**Utilities**	• The Contractor will establish and implement measures to ensure that no interruptions to existing utilities occur throughout the project construction phase unless agreed in advance with the relevant service provider and or Local Authority.
O.12.1	**Operational Phase**	**Traffic**	• A Mobility Management Plan has been prepared for the Proposed Development which includes recommended mitigation measures to reduce usage of private cars and increase the use by residents within the development of more sustainable modes of travel, such as including good cycle parking provision, use of a car club, and car sharing, will further promote the greater use of sustainable travel modes. It is projected that successful implementation of the mobility management mitigation measures included

Mitigation Measure No.	Construction / Operational Phase	Impact / Topic	Mitigation and Environmental Commitments
			will reduce the vehicular trip generation from the proposed development.
O.12.2	**Operational Phase**	**Population and Human Health**	• A Stage 3 Road Safety Audit will be undertaken post construction and pre-opening of the proposed development in accordance with RSA guidelines to address any potential road safety issues related to the completed scheme
Chapter 13: Risk Management			
-	**Construction Phase**	**-**	• None
-	**Operational Phase**	**-**	• None

Table 15-2: Summary of Monitoring Measures

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
General			
C.Gen.1	Construction	General Construction	Any planning condition imposed by the planning authority shall be strictly observed and monitoring requirements shall be observed as conditioned.
O.Gen.1	Operational	General Operational	Any planning condition imposed by the planning authority shall be strictly observed and monitoring requirements shall be observed as conditioned.
Chapter 4: Population and Human Health			
-	Construction	-	None
-	Operational	-	None
Chapter 5: Biodiversity			
C.5.1	**Construction Phase**	**Bats**	• As a precautionary measure, it is recommended that the relevant potential bat roost trees, located within the western section of the existing subject lands, are section-felled under the supervision of an experienced Ecologist. If bats are present, all works will have to cease, and National Parks and Wildlife Service will have to be contacted in order to obtain a derogation licence.

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
-	**Operational Phase**	-	None
Chapter 6: Land and Soils			
C.6.1	**Construction Phase**	**Water**	• Monitoring shall be carried out as specified in any discharge licence associated with the construction phase of the project.
C.6.2	**Construction Phase**	**Waste**	• Record keeping and monitoring of import and export of materials shall be carried out in accordance with the Waste Management Act.
-	**Operational Phase**	-	None
Chapter 7: Hydrology			
C.7.1	**Construction Phase**	**Water**	• Monitoring shall be carried out as specified in any discharge licence associated with the construction phase of the project.
-	**Operational Phase**	-	None

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
Chapter 8: Microclimate, Air Quality and Climate			
C.8.1	**Construction Phase**	**Dust**	• Construction phase dust monitoring should be put in place to ensure dust mitigation measures are controlling emissions. Dust monitoring should be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119.
-	**Operational Phase**	**-**	• None
Chapter 9: Noise & Vibration			
C.9.1	**Construction Phase**	**Noise and Vibration**	• Noise monitoring will be carried out as per conditions of planning and the contractor will be required to undertake regular noise monitoring at locations representative of the closest sensitive location to ensure the relevant criteria are not exceeded.
-	**Operational Phase**	**-**	• None

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
Chapter 10: Landscape and Visual Amenity			
C.10.1	**Construction Phase**	**Landscape and Biodiversity**	• An Arborist and Landscape Architect will be retained for the duration of the construction works.
C.10.2	**Construction Phase**	**Landscape and Biodiversity**	• Monitoring of landscape and tree-related works is an integral aspect of the proposed scheme, and includes monitoring of: ○ Tree removal, retention and protection; ○ Topsoil stripping and storage; ○ Disturbance by site works, services etc.; ○ Excavation / alteration of ground levels; ○ Landscape build-up; profiling and cultivation; ○ Landscape finishing and implementation; ○ Proposed planting and seeding; and ○ 12 months aftercare of landscape measures to ensure establishment.
C.10.3	**Construction Phase**	**Landscape and Biodiversity**	• All works associated with soil stripping and movement; landscape build-up and finishing and landscape implementation shall be reviewed and monitored by the Project Landscape Architect.
C.10.4	**Construction Phase**	**Landscape and Biodiversity**	• All works associated with removal, retention and protection of existing trees and woodlands and with tree surgery works shall be approved and monitored by the Project Arborist.

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
O.10.1	**Operational Phase**	**Landscape and Biodiversity**	• Planting and seeding will continue to be monitored by the Project Landscape Architect to ensure successful establishment and appropriate management.
O.10.2	**Operational Phase**	**Landscape and Biodiversity**	• Retained trees will be reviewed by the Project Arborist to ensure successful incorporation into the new landscape.
C.10.3	**Construction Phase**	**Land and Soils**	• All works associated with soil stripping and movement; landscape build-up and finishing and landscape implementation shall be reviewed and monitored by a qualified Landscape Architect.
O.10.1	**Operational Phase**	**Biodiversity**	• Planting and seeding will continue to be monitored to ensure successful establishment and appropriate management. Retained trees will be reviewed to ensure successfully incorporation into the new landscape.
Chapter 11: Archaeology, Architecture, and Cultural Heritage			
C.11.1	**Construction Phase**	**Archaeology**	• Based on the results of archaeologically directed test trenching archaeological monitoring of all groundworks associated with the development may be recommended, with the provision for full excavation of any archaeologically significant material uncovered at this time. • It is envisaged that the following will apply:

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
			• In the event of archaeological features or material being uncovered during construction phase monitoring, it is crucial that machine work cease in the immediate area to allow the archaeologist to assess, excavate and record any such material. • Should archaeological features or material be uncovered, adequate funds to cover excavation, fencing (if required), post-
			• excavation analysis and reporting, and conservation work should be made available. • This work should be done under licence in accordance with Section 26 of the National Monuments Acts 1930 – 2014, and with a method statement agreed in advance with the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) and the National Museum of Ireland.
C.11.2	**Construction Phase**	**Archaeology**	• Should the removal of vegetative root systems be required, it is recommended that this work be supervised by a suitably qualified archaeologist.
-	**Operational Phase**	**-**	• None

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
Chapter 12: Material Assets: Traffic, Waste, and Utilities			
C.12.1	**Construction Phase**	**Traffic**	• A site liaison officer will be identified as a single contact point for the planning authority and local community to deal in a prompt and efficient manner with any issues that may arise in relation to construction traffic and activity on the public road.
C.12.2	**Construction Phase**	**Dust/Litter**	• Public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
C.12.3	**Construction Phase**	**Traffic**	• Site personnel will be present on the public road at the site access junction at all times during site operational hours to facilitate the safe movement of: • Construction vehicles to and from the site • Road users along Sybil Hill Road in the vicinity of the site access or any construction works on Sybil Hill Road

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
O.12.1	**Operational Phase**	**Traffic**	• As part of the Mobility Management Plan for the proposed development it is recommended that a Mobility Manager be appointed by the Management Company for the residential units. The Mobility Manager will also be involved in monitoring of the mode of travel from the residential development. This ideally will be done on an annual basis. Monitoring of travel patterns will facilitate the provision of sustainable transport modes and ensure that modal targets are met.
Chapter 13: Risk Management			
-	**Construction Phase**	**-**	None
-	**Operational Phase**	**-**	None