ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME 2:

MAIN REPORT

MIXED USE DEVELOPMENT

AT

CLAREMONT, HOWTH, COUNTY DUBLIN

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In Association with:

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Chapter 1
Introduction and Methodology

1.0 INTRODUCTION AND TERMS OF REFERENCE

This Environmental Impact Assessment Report (**EIAR**) has been commissioned by the applicant, Atlas GP Limited, in respect of an application for a proposed mixed-use development on lands at Claremont, Howth, Co. Dublin.

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) comprises:

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.
The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;
The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

This EIAR and Natura Impact Assessment (**NIS**) will be submitted to An Bord Pleanála with the planning application.

The central purpose of the EIA process is to undertake an assessment of the likely and significant impact on the environment of the proposed development in parallel with the project design process, and to document this process in an EIAR; which is then submitted to the competent/consent authority, to enable it to assess the likely significant effects on the environment. This will inform the subsequent decision as to whether the development should be permitted to proceed.

A description of the proposed development lands together with description of the proposed development is provided in Chapter 2 of this EIAR.

This EIAR document has been prepared in accordance with Directive 2011/92/EU as amended by Directive 2014/52/EU (together the **EIA Directive**); as well as implementing legislation i.e. Part X of the *Planning and Development Act, 2000*, as amended, Part 10 of the Planning and Development Regulations as amended and the *European Union (Planning And Development) (Environmental Impact Assessment) Regulations* 2018.

The EIAR has also been prepared in accordance with the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment,* 2018 and *Draft Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports,* Environmental Protection Agency, 2017 The EIAR also takes account of the *Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report* EC (2017)

1.1 DEFINITION OF EIA AND EIAR

The EIA Directive defines '*environmental impact assessment'* as a process, which includes the responsibility of the developer to prepare an EIAR, and the responsibility of the competent authority to provide reasoned conclusions following the examination of the EIAR and other relevant information.

Article 1(2)(g) of the EIA Directive states that "environmental impact assessment" means a process consisting of:

- *(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
- *(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*

(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;

(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and

(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a.

The amending Directive (Directive 2014/52/EU) uses the term EIAR rather than environmental impact statement (**EIS**).

A definition of EIAR has not been included in the EIA Directive; however the EPA Guidelines (2017)[1] provide the following definition:

> *"A statement of the effects, if any, which proposed development, if carried out, would have on the environment.*
>
> *The EIAR is prepared by the developer and is submitted to a CA (Competent Authority) as part of a consent process. The CA uses the information provided to assess the environmental effects of the project and, in the context of other considerations, to help determine if consent should be granted. The information in the EIAR is also used by other parties to evaluate the acceptability of the project and its effects and to inform their submissions to the CA.*
>
> *The EIAR consists of a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment. The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and **these factors must be addressed in the EIAR.***
>
> ***The EIAR should be prepared at a stage 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".***

In summary, EIA is a process for anticipating the effects on the environment caused by development. An EIAR is the document produced as a result of that process and provides information which the competent / consent authorities use in deciding whether the environmental impacts of a proposed development are acceptable or not. Where significant and likely environmental effects are identified that are adverse, the EIA process aims to quantify and minimise the impact specified development projects have on the environment through appropriate mitigation measures. The preparation of an EIAR requires site-specific considerations and the preparation of baseline assessment against which the likely impacts of a proposed development can be assessed by way of a concise, standardised and systematic methodology.

[1] *Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Environmental Protection Agency, 2017*

1.2 EIA LEGISLATION

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from the EIA Directive. The purpose of these requirements is to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

The Department of Housing, Planning, and Local Government (the **Department**) has brought forward amendments to the Planning and Development Act 2000, as amended (the **Planning Acts**), and the Planning and Development Regulations 2001-2018 (the **Planning Regulations**) to provide for the transposition of the EIA Directive into the Irish planning code. To this effect, the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 have now transposed the EIA Directive into Irish law.

The Department has also provided an update to the 2018 "*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*" to provide practical guidance on legal and procedural issues arising from the requirement to undertake EIA in accordance with the EIA Directive.

The *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* were published in August 2018. These, as well as the aforementioned *Draft Guidelines on the information to be contained in environmental impact assessment reports,* EPA, 2017 have informed the preparation of this EIAR.

1.3 EIA GUIDELINES

EIA practice has evolved substantially since the introduction of the first EIA Directive in 1985. Practice continues to evolve and take into account the growing body of experience in carrying out EIAs in the development sector. Table 1.1 sets out the relevant key EIA Guidance which has been consulted in the preparation of this EIAR document. In addition, the individual chapters of this EIAR should be referred to for further information on the documents consulted by each individual consultant.

TABLE 1.1 – EIA GUIDELINES CONSULTED AS PART OF THE PREPARATION OF THIS EIAR
Irish
• Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018, DPHLG • Draft Guidelines on the information to be contained in environmental impact assessment reports, EPA, August 2017 • Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper, Department of Environment, Community and Local Government, 2017. • Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017). • Development Management Guidelines (DoEHLG, 2007). • Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).

- Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).

European Union / European Commission (in addition to Directives referenced above)

- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (2017)
- Environmental Impact Assessment of Projects – Guidance on Screening (2017)
- Environmental Impact Assessment of Projects – Guidance on Scoping (2017)
- Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002).
- EU Guidance on EIA Screening (DG Environment 2001).
- Guidance on EIA Scoping (DG Environment 2001).
- EIA Review Checklist (DG Environment 2001).

The most recent guidelines are the *Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment* 2018.

The *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports* 2017 were prepared to help practitioners interpret the amended EIA Directive and in advance of the transposing Irish regulations becoming available. They provide practical guidance to planning authorities, An Bord Pleanála, and other relevant stakeholders, on procedural issues and the EIA process; and outline the key changes introduced by Directive 2014/52/EU. Updated Guidelines from the EPA will be published following the transposition of the 2014 EIA Directive via the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Updated EPA guidance had not yet been published at time of writing.

The EIA Process

The main purpose of the EIA process is to identify the likely significant impacts on the human environment, the natural environment and on cultural heritage associated with the proposed development, and to determine how to eliminate or minimise these impacts. The EIAR summarises the environmental information collected during the impact assessment of the proposed development.

Several interacting steps typify the early stages of the EIA process and include:

- Screening
- Scoping
- Consideration of alternatives and
- Assessing and evaluating.

Screening: Screening is the term used to describe the process for determining whether a proposed development requires an EIA.

Scoping: This stage firstly identifies the extent of the proposed development and associated site, which will be assessed as part of the EIA process, and secondly, it identifies the environmental issues likely to be important during the course of completing the EIA process through consultation with statutory and non-statutory stakeholders. Scoping request letters were issued to a range of stakeholders at the commencement of this EIA process and the responses received have been considered as part of the compilation of the EIAR.

Consideration of alternatives: This stage outlines the possible alternative approaches to the proposed development. Consideration of alternative sites and layouts within the final chosen site are set out in Chapter 2 of this EIAR.

Assessing and evaluating: The central steps of the EIA process include baseline assessment (desk study and field surveys) to determine the status of the existing environment, impact prediction and evaluation, and determining appropriate mitigation measures where necessary.

1.4 SCREENING – REQUIREMENT FOR AN 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 by reference to the type and scale of the proposed development and the significance or the environmental sensitivity of the receiving baseline environment – subthreshold EIA.

Annex I of the EIA Directive requires as mandatory the preparation of 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 land use planning legislation. The EIA Directive prescribes mandatory thresholds in respect to Annex 1 projects.

Annex II of the EIA Directive provides EU Member States discretion in determining the need for an EIA on a case-by-case basis for certain classes of project having regard to the overriding consideration that projects likely to have significant effects on the environment should be subject to EIA.

Schedule 5 (Part 2) of the Planning Regulations sets mandatory thresholds for each project class. Sub-section 10(b) (iii) and (iv) addresses *'Infrastructure Projects'* and requires that the following class of project be subject to EIA:

(b) (i) Construction of more than 500 dwelling units.

Category 10(b)(iv) refers to 'Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere.'

An EIA is therefore mandatory, as the proposed development at Claremont, Howth includes provision of 512 units, exceeding the threshold of 500 dwelling units.

In relation to Screening, EIA Directive introduces a new mandatory section, Article 4(4). Article 4(4) introduces a new Annex IIA to be used in the case of a request for a screening determination for Annex II projects. This is information to be provided by the developer on the projects listed in Annex II.

1.5 SCOPING

The 2017 EPA draft Guidelines state that 'Scoping' is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is stated in the EC guidance[2] that:

> *'The Directive provides that Developers may request a Scoping Opinion from the Competent Authority which identifies the content and the extent of the assessment and specifies the information to be included in the EIA Report.".*

The applicant is committed to ensuring that all of its developments are conducted in a responsible and sustainable manner. A scoping process to identify the issues that are likely to be most important during the EIA process was carried out by the applicant, design team and EIAR consultants and informed the format of this EIAR.

The EIAR prepared for the proposed development has endeavoured to be as thorough as possible and therefore the provisions included in the EIA Directive and all of the issues listed in Schedule 6, Sections 1, 2 and 3 of the Planning Regulations and in recent guidance documents have been addressed.

In this context the following topics/issues have been reviewed and addressed in the context of the proposed development:

- Introduction and Methodology
- Project Description and Alternatives Examined
- Population and Human Health
- Land, Soil, Geology & Hydrogeology
- Water
- Air Quality and Climate including Microclimate
- Noise and Vibration
- Biodiversity
- Archaeology, Architecture and Cultural Heritage
- Landscape and Visual Impact
- Material Assets (Traffic, Utilities and Waste)
- Risk Assessment
- Interactions
- Principal Mitigation and Monitoring Measures
- Non-Technical Summary

In addition to the above, a series of standalone reports have been prepared to accompany the application. These reports can be found on the www.claremontshd.ie website.

The purpose of the scoping exercise is to shape and mould the EIAR so as not to dismiss any potential impacts that may in fact be significant, and to focus on issues which need to be resolved.

The scope of this EIAR has been informed by the following:

[2] Guidance on EIA Scoping, EC, 2017

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, 2017
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (2017) – European Commission
- Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper, Department of Environment, Community and Local Government, 2017
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017)
- The requirements of Part X of the Planning Acts, and Part 10 of the Planning Regulations
- The Fingal Development Plan 2017-2023
- National and Regional Planning Policy Documents
- The input from prescribed bodies
- The likely concerns of third parties
- The nature, location and scale of the proposal
- The existing environment together with any vulnerable or sensitive local features and current uses
- The planning history and environmental assessments associated with the subject site and adjoining lands
- The likely and significant impacts of the proposed development on the environment
- Available methods of reducing or eliminating undesirable impacts

A series of meetings have taken place with the technical staff of Fingal County Council which assisted in the preparation of this EIAR and planning application. Other consultations were held with An Bord Pleanála, Irish Water, Iarnrod Eireann and the Department of Culture, Heritage and the Gaeltacht and the Irish Aviation Authority. These informed the scoping of the application.

The content of this EIAR has been prepared in accordance with the provisions of Article 5(1) and Annex IV of the EIA Directive. Article 5(1) states:

"The information to be provided by the developer shall include at least:
(a) a description of the project comprising information on the site, design, size and other relevant features of the project;
(b) a description of the likely significant effects of the project on the environment;
(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
(e) a non-technical summary of the information referred to in points (a) to (d); and
(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."

Annex IV states:
"1. A Description of the project, including in particular:
(a) a description of the location of the project;
(b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;

(c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;

(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.

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

3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

4. A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

5. A description of the likely significant effects of the project on the environment resulting from, inter alia:

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

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

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

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

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

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

(g) the technologies and the substances used.

The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.

6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

8. *A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this 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 such emergencies.*
9. *A non-technical summary of the information provided under points 1 to 8.*
10. *A reference list detailing the sources used for the descriptions and assessments included in the report."*

1.6 PURPOSE OF THE EIAR

The objective of the EIAR is to identify and predict the likely significant environmental impacts of the proposed development; to describe the means and extent by which they can be reduced or ameliorated; to interpret and communicate information about the likely impacts; and to provide an input into the decision making and planning process. As provided for in the *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports,* EPA, 2017, the EIAR focuses on:

- *Impacts that are both likely and significant;*
- *Impact descriptions that are accurate and credible'*

The definition of EIA is clarified within the EIA Directive and is as follows:

"(g) 'environmental impact assessment' means a process consisting of:
the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);
the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;
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;
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
the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."

The intention of this EIAR document is to provide transparent, objective and replicable documentary evidence of the EIA evaluation and decision-making processes which led to the selection of the final project configuration. The EIAR documents the consideration of environmental effects that influenced the evaluation of alternatives. It also documents how the selected project design incorporates mitigation measures, including impact avoidance, reduction or amelioration; to explain how significant adverse effects will be avoided.

It is intended that this EIAR will assist An Bord Pleanála, statutory consultees and the public in assessing all aspects of the application proposals.

1.7 OBJECTIVES OF THIS EIAR

The *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports,* EPA, 2017 list the following fundamental principles to be followed when preparing an EIAR:

- Anticipating, avoiding and reducing significant effects
- Assessing and mitigating effects
- Maintaining objectivity
- Ensuring clarity and quality
- Providing relevant information to decision makers
- Facilitating better consultation.

This EIAR document describes the outcomes of the iterative EIA process which was progressed in parallel with the project design process. This forms the first part of the EIA process which will be completed by the competent authority, which in turn will be required to examine, analyse and evaluate the direct and indirect effects of the proposed development on the various factors listed under Section 171A of the Planning Acts.

The EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and the environmental impact assessment should 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 prescribed environmental factors which are:

(a) population and human health;
(b) biodiversity, with particular attention to species and habitats protected under the EIA 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).

This EIAR documents the assessment process of the prescribed environmental factors in relation to the proposed mixed-use development at Claremont, Howth.

The EIA process was based on the following four key objectives:

- Pursuing Preventative Action
- Maintaining Environmental Focus and Scope
- Informing the Decision
- Public & Stakeholder Participation

1.7.1 Pursuing Preventative Action

Pursuing preventative action is the most effective means by which potential negative environmental impacts can be avoided. An consideration of anticipated likely and significant impacts was undertaken during the screening, informal scoping and the considerations of alternatives stages of the EIA process.

This involved forming a preliminary opinion, in the absence of complete data, with respect to the approximate magnitude and character of the likely environmental impacts. This assessment was based on the knowledge, experience and expertise of the EIA and project design team with reference to the EIA Directive, EIA guidance material and local precedents.

Avoidance of impacts has been principally achieved through the consideration of alternatives and through the review of the project design in light of identified key environmental constraints. This is outlined in greater detail in Chapter 2.

1.7.2 Maintain Environmental Scope and Focus

It is important that the EIAR remains tightly focussed. This minimises delays and the potential for a confusing mass of data to obscure relevant facts. The EIA process has been project-managed and steered, so as to ensure that the EIAR addresses those topics and issues which are explicitly prescribed in the legislation, and where environmental impacts may arise. Evaluation and analysis has been limited to topics where the indirect, secondary or cumulative impacts are either wholly or dominantly due to the proposed development and remain focused on issues that:

- Are environmentally based;
- Are likely to occur; and,
- Have significant and adverse effects.

1.7.3 Informing the Decision

The EIAR enables An Bord Pleanála to reach a decision on the acceptability of the proposed development in the full knowledge of the project's likely significant impacts on the environment, if any.

1.7.4 Public & Stakeholder Participation

Decisions are taken by competent/consent authorities through the statutory planning process which allows for public participation and consultation while receiving advice from other key stakeholders and statutory authorities with specific environmental responsibilities.

The structure, presentation and the non-technical summary of the EIAR, as well as the arrangements for public access, all facilitate the dissemination of the information contained in the EIAR. A core objective is to ensure that the public and local community are aware of the likely environmental impacts of projects prior to the granting of consent.

Scoping of potential environmental impacts was undertaken with An Bord Pleanála and prescribed bodies through pre-application meetings and written communication. Direct and formal public participation in the EIA process will be through the statutory planning application process. Pre-application consultation has been conducted with Fingal County Council, An Bord Pleanála, Irish Water, Iarnrod Eireann, the Department of Culture, Heritage and the Gaeltacht and the Irish Aviation Authority. Information on the EIAR has been issued for the Department of Housing, Planning and Local Government's EIA Portal. A dedicated website for the proposed development contains all of the planning application documentation, including the EIAR. This can be found at: www.claremontshd.ie

1.8 FORMAT AND STRUCTURE OF THIS EIAR

The preparation of an EIAR requires the assimilation, co-ordination and presentation of a wide range of relevant information in order to allow for the overall assessment of a proposed development. For clarity and to allow for ease of presentation and consistency when considering the various elements of the proposed development, a systematic structure is used for the main body of this EIAR document. The Non-Technical Summary and Appendices are produced in separate volumes.

The structure used in this EIAR document is a **Grouped Format** structure. This structure examines each environmental topic[3] in a separate chapter of this EIAR document. The structure of the EIAR is set out in Table 1.2 below.

TABLE 1.2: STRUCTURE OF THIS EIAR

Ch.	Title	Content
1	Introduction and Methodology	Sets out the purpose, methodology and scope of the document.
2	Project Description and Alternatives Examined	As required under Article 5(1)(a), this chapter sets out the description of the site, design and scale of development, considers all relevant phases from construction through to existence and operation. As required by Article 5(d) a description and evaluation of the reasonable alternatives studied by the developer is provided including alternative locations, designs and processes considered; and a justification for the option chosen taking into account the effects of the project on the environment.
3	Population and Human Health	Describes the demographic and socio-economic profile of the receiving environment and potential impact of the proposed development on population, i.e. human beings, and human health, as required under Article 3(1)(a).
4	Land Soils and Geology	Provides an overview of the baseline position, the potential impact of the proposed development on the site's soil and geology and impacts in relation to land take and recommends mitigation measures, as required under Article 3(1)(c).
5	Water, Hydrology and Hydrogeology	Provides an overview of the baseline position, the potential impact of the proposed development on water quality and quantity and recommends mitigation measures, as required under Article 3(1)(c).
6	Air Quality and Climate, including Microclimate	Provides an overview of the baseline air quality and climatic environment, the potential impact of the proposed development, the vulnerability of the project to climate change and the microclimate of the proposed development (daylight and sunlight and wind), as required under Article 3(1)(c).
7	Noise and Vibration	Provides an overview of the baseline noise environment, the potential impact of the proposed development and recommends mitigation measures, as required under Article 3(1)(a) on Human Health.

[3] In some instances, similar environmental topics are grouped.

Table 1.2: Structure of this EIAR		
Ch.	**Title**	**Content**
8	Biodiversity	Describes the existing ecology on site and in the surrounding catchment and assesses the potential impact of the proposed development and mitigation measures incorporated into the design of the scheme, as required under Article 3(1)(b).
9	Archaeology, Architecture and Cultural Heritage	Provides an assessment of the site and considers the potential impact of the proposed development on the local archaeology and cultural heritage; and recommends mitigation measures, as required under Article 3(1)(d).
10	Landscape & Visual Impact Assessment	Provides an overview of the baseline position, the potential impact of the proposed development on the landscape appearance and character and visual environment and recommends mitigation measures, as required under Article 3(1)(d).
11	Material Assets	Describes the existing services and infrastructural service requirements of the proposed development and the likely impact of the proposed development on material assets, as required under Article 3(1)(d). Article 5(1), Annex IV, point 1(d) requires estimates of quantities and types of waste produced during construction and operation phase. This chapter will also present an assessment of how resources and waste will be managed for the proposed development.
12	Risk Management	Provides an overview of the potential risks to the proposed development from Seveso sites and to the environment from a major accident arising from construction or operation of the proposed development, as required under Article 3(2).
13	Interactions	Describes the potential interactions and interrelationships between the various environmental factors referred to in the EIAR, as required under Article 3(1)(e).
14	Mitigation and Monitoring Measures	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 and proposed monitoring arrangements.

This systematic approach described above employs standard descriptive methods, replicable assessment techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration. Due to the length of the document, a separate volume of appendices has been produced.

An outline of the methodology employed in most chapters to examine each environmental topic is provided in Table 1.3.

TABLE 1.3: METHODOLOGY EMPLOYED TO EVALUATE EACH ENVIRONMENTAL TOPIC
• Introduction: Provides an overview of the specialist area and specifies the specialist who prepared the assessment, together with details of their qualifications and expertise. • 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): In describing the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the proposed development will fit is assessed. This also takes account of any proposed developments that are likely to proceed. • 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 area of study are described; for example the chapter on landscape and visual impact addresses issues such as height and impact on the surrounding landscape. • The characteristics of projects must be considered, with particular regard to: (a) the size and design of the whole project; (b) cumulation with other existing and/or approved projects; (c) the use of natural resources, in particular land, soil, water and biodiversity; (d) the production of waste; (e) pollution and nuisances; (f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; (g) the risks to human health (for example due to water contamination or air pollution). • Potential Impact of the Proposed Development: This section provides a description of the specific, direct and indirect impacts that the proposed development may have. This is provided with reference to both the 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. Impact assessment addresses direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions. • 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: Avoidance, remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential impacts. 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. • Predicted Impacts of the Proposed Development: This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions which

the proposed development may have, assuming all mitigation measures are fully and successfully applied.

- 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 need to be proposed to ensure that in the event of the proposal 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: This section provides an indication of any difficulties encountered by the environmental specialist in compiling the required information.

1.9 DESCRIPTION OF IMPACTS IN THE EIAR

The EPA *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* 2017 require that the direct, indirect, cumulative and residual impacts of the proposed development for both the construction and operational stages are described. The identified quality, significance and duration of effects for each aspect are categorised, as set out below. Quality refers to the nature of the impact, significance of effects refers to the degree that these will impact on the site and surrounding area and duration refers to how long the effects are likely to last for. A direct impact is an impact the development will give rise to. An indirect impact is similar to a secondary impact – it may result in consequences not in the immediate vicinity of the site. Cumulative impacts are impacts that arise in conjunction with other consented developments. Residual impacts are those which remain after mitigation measures have been applied.

Table 1.4 Quality of Potential Effects

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 as follows:

Table 1.5 Significance of Effects

Significance of Effects on the Receiving Environment	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:

Table 1.6 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

1.10 EIA PROJECT TEAM

1.10.1 EIA Project Management

This EIA was project managed, co-ordinated and produced by John Spain Associates. John Spain Associates' role was to coordinate the EIA process and to liaise between the design team and various environmental specialist consultants. John Spain Associates were also responsible for editing the EIAR document to ensure that it is cohesive and not a disjointed collection of disparate reports by various environmental specialists. John Spain Associates does not accept responsibility for the input of specialist consultants or the design team.

1.10.2 EIA Environmental Specialists

Environmental specialist consultants were also commissioned for the various technical chapters of the EIAR document which are mandatorily required as per the EIA Directive and the Irish implementing regulations.

Under Article 5(3) of the EIA Directive, it is expressly required that the developer must ensure that the EIAR is prepared by competent experts. Each of the chapters of this EIAR for the proposed development have been prepared by experts with the requisite qualifications and competences.

The EIA Directive states the following in relation to the persons responsible for preparing the environmental impact assessment reports;

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

In order to outline compliance with this requirement and in line with emerging best practice the EIAR states the names of the environmental consultants who have prepared each element of the EIAR and lists their qualifications and relevant experience; demonstrating that the EIAR has been prepared by competent experts. This is also in accordance with the 2018 EIA Guidelines for Planning Authorities and An Bord Pleanála.

Each environmental specialist was commissioned having regard to their previous experience in EIA; their knowledge of relevant environmental legislation relevant to their topic; familiarity with the relevant standards and criteria for evaluation relevant to their topic; ability to interpret the specialised documentation of the construction sector and to understand and anticipate how their topic will be affected during construction and operation phases of development; ability to arrive at practicable and reliable measure to mitigate or avoid adverse environmental impacts; and to clearly and comprehensively present their findings.

Each environmental specialist was required to characterise the receiving baseline environment; evaluate its significance and sensitivity; predict how the receiving environment will interact with the proposed development and to work with the EIA project design team to devise measures to mitigate any adverse environmental impacts identified.

The relevant specialist consultants who contributed to the EIAR and their inputs are set out in Table 1.7 following.

TABLE 1.7: EIAR SPECIALIST CONSULTANTS					
Chapter	**Name**	**Company**	**Experience (Years)**	**Professional Qualifications**	**Professional Affiliations**
1 Introduction and Methodology	Mary Mac Mahon	JSA	27 Years	MSc Town and Country Planning Pg. Dip Marine Spatial Planning Pg. Dip Environmental Engineering Pg. Dip Environment Impact Assessment Dip. Planning and Environmental Law Dip. Management	MIPI
2 Project Description and Alternatives Examined	Mary Mac Mahon	JSA	27 Years	MSc Town and Country Planning Pg. Dip Marine Spatial Planning Pg. Dip Environmental Engineering Pg. Dip Environment Impact Assessment Dip. Planning and Environmental Law Dip. Management	MIPI
3 Population and Human Health	Mary Mac Mahon	JSA	27 Years	MSc Town and Country Planning Pg. Dip Marine Spatial Planning Pg. Dip Environmental Engineering Pg. Dip Environment Impact Assessment Dip. Planning and Environmental Law Dip. Management	MIPI
4 Land, soils, and geology	Gareth Carroll	Enviroguide Consulting	8 Years	BAI	
	Clare Clifford	Enviroguide Consulting		Msc., PGeo	Professional Geologist with the Institute of Geologists of Ireland
5 Water	Gareth Carroll	Enviroguide Consulting	8 Years	BAI	

	Clare Clifford	Enviroguide Consulting		Msc., PGeo	Professional Geologist with the Institute of Geologists of Ireland
6 Air and Climate	Dr. Avril Challoner	AWN Consulting	6 Years	PhD Environmental Engineering (Air Quality), BEng (Hons) (Environmental Engineering), HDip Statistics	Full member IAQM and IES
Wind Microclimate	Dr. Christina Paduano	B-Fluid Limited	10 Years	PhD in Mechanical Engineering, M.Eng & B.Eng in Aerospace Engineering	Engineers Ireland
	Dr. Arman Safdari	B-Fluid Limited	10 years	PhD in Mechanical Engineering, a M.Sc. and B.Sc. in Mechanical Engineering.	Engineers Ireland
	Dr. Eleonora Neri	B-Fluid Limited	4 Years	PhD in Aeroacoustics branch of Mechanical Engineersing, M.Eng & B.Eng in Aeronautical Engineering	Engineers Ireland
Daylight Sunlight	Rory Burke	JV Tierney &Co.	Over 30 years	B.E.(Eng), C.Eng MIEI, Dip. Proj. Man., Dip. Strategic HR	M.I.E.I, A.CIBSE, BRE Academy, BREEAM AP, LEED Green Associate.
7 Noise and Vibration	Jennifer Harmon	AWN Consulting	18 years	BSc	MIOA
8 Biodiversity	Donnacha Woods	Synergy Environment Ltd., T/A Enviroguide Consulting	6 Years	M.Sc. (Biodiversity and Conservation)	CIEEM
	Liam Gaffney	Synergy Environment Ltd., T/A Enviroguide Consulting	1 year	M.Sc. (Wildlife Conservation and Management)	
	Jim Dowdall	Synergy Environment Ltd., T/A Enviroguide Consulting	40 years	B. Sc. M. Sc. Dip. Env. Plg. Law LL.M Env. Nat. Resources	MCIWM, MIELA, Board Member, Birdwatch Ireland
9 Archaeology, Architectural,	Franc Myles	Archaeology and Built Heritage	30 Years	BA (Mod.) MUBC	MIAI

and Cultural Heritage	Rob Goodbody	Historic Building Consultants	16 years	MA Local History, MUBC, Pg Dip Environmental Planning DipABRC	MIPI, ICOMOS
10 Landscape and Visual Impact	Mark Salisbury	The Paul Hogarth Company	14 years	BA Landscape Architecture with Town and Regional Planning PG.Dip Landscape Architecture	LI
	Andrew Haley	The Paul Hogarth Company	28 years	BA Landscape Architecture	LI, Ministerial Advisory Group Design Council
	Mark Brophy	Model Works Ltd.	20 years	B.Des Industrial Design	
11 Material Assets - Traffic	Martin Rodgers	Barrett Mahony Martin Rogers Consulting Ltd.	21 years	BE, MEngSc, PhD	Transport Planning Society institute of civil engineer, RTPI
Utilities	Rory Burke	JV Tierney &Co.	Over 30 years	B.E.(Eng), C.Eng MIEI, Dip. Proj. Man., Dip. Strategic HR	M.I.E.I, A.CIBSE, BRE Academy, BREEAM AP, LEED Green Associate.
Waste	Gillian Free	Enviroguide	15 years	LL.M. Environmental and Natural Resources Law BSc. Environmental Management Dip. Environmental and Planning Law Dip. Environmental Resources Management	MCIWM (Chartered member of the Chartered Institution of Wastes Management). MIELA (Member if the Irish Environmental Law Association).
12 Flood Risk Management	Margaret Costello	Barrett Mahony Consulting Engineers	9 years	BEng Civil Eng BEng (Hons) Structural Eng CEng InstructE CEng MIEI	Institute of Structural Engineers Engineers Ireland
Risk Management	Tom Sweeney	ORS	6 years	MSc. Environmental Health and Safety Management	Graduate Member of the Institute of Occupational Hygiene

13 **Interactions**	Mary Mac Mahon	JSA	27 Years	MSc Town and Country Planning Pg. Dip Marine Spatial Planning Pg. Dip Environmental Engineering Pg. Dip Environment Impact Assessment Dip. Planning and Environmental Law Dip. Management	MIPI
14 **Mitigation and Monitoring Measures**	Mary Mac Mahon	JSA	27 Years	MSc Town and Country Planning Pg. Dip Marine Spatial Planning Pg. Dip Environmental Engineering Pg. Dip Environment Impact Assessment Dip. Planning and Environmental Law Dip. Management	MIPI

1.11 NON-TECHNICAL SUMMARY

The EIA Directive requires 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 Guidelines on the information to be contained in Environmental Impact Assessment Reports*, EPA, 2017 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 the Competent Authority.

The *Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment* 2018 state that the Non-Technical Summary "*should be concise and comprehensive and should be written in language easily understood by a lay member of the public not having a background in environmental matters or an in-depth knowledge of the proposed project.*"

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 – Volume 1.

1.12 LINKS BETWEEN EIA AND AA

Article 6(3) of Directive 92/43/EEC (the **Habitats Directive**) provides that any project not directly connected with or necessary to the management of a Natura 2000 site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to the AA procedure of its likely implications for the site in view of the site's conservation objectives.

In January 2010, the Department of Environment, Housing and Local Government issued a guidance document entitled 'Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities'. This guidance document enshrines the 'Source-Pathway-Receptor' into the assessment of plans and projects which may have an impact on Natura 2000 sites.

Accordingly, an **AA Stage 1 Screening and NIS Stage 2** exercise was undertaken by Enviroguide in accordance with *'Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC)'*. In accordance with these Guidelines, the AA may be a separate document or form part of the EIAR. In the case of the proposed development a separate AA Screening and NIS is submitted with this application.

1.13 AVAILABILITY OF EIAR DOCUMENTS

A copy of this EIAR document and Non-Technical Summary of the EIAR document is available for purchase at the offices of An Bord Pleanala and Fingal County Council (the relevant Planning Authority) at a fee not exceeding the reasonable cost of reproducing the document. It also available at www.claremontshd.ie

1.14 IMPARTIALITY

This EIAR document has been prepared with reference to a standardised methodology which is universally accepted and acknowledged. Recognised and experienced environmental specialists have been used throughout the EIA process to ensure the EIAR document produced is robust, impartial and objective.

It should be noted that, as highlighted above, an important part of the EIA process is preventative action which causes the project design team to devise measures to avoid, reduce or remedy significant adverse impacts in advance of applying for consent. As a result, where no likely significant impacts have been identified where they might reasonably be anticipated to occur, the design and layout of the proposed development has generally been amended to minimise the potential of any likely significant adverse impacts.

1.15 STATEMENT OF DIFFICULTIES ENCOUNTERED

No particular 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.

1.16 QUOTATIONS

EIAR documents by their very nature contain statements about the proposed development, some of which are positive, and some negative. Selective quotation or quotations out of context can give a very misleading impression of the findings of this EIAR.

The EIAR study team urge that quotations should, where reasonably possible be taken from the conclusions of specialists' chapters or from the non-technical summary and not selectively.

1.17 EIAR QUALITY CONTROL & REVIEW

John Spain Associates is committed to consistently monitoring the quality of EIAR documents prepared both in draft form and before they are finalised, published and submitted to the appropriate competent authority taking into account latest best-practice procedure, legislation and policy.

1.18 ERRORS

While every effort has been made to ensure that the content of this EIAR document is error free and consistent there may be instances in this document where typographical errors and/or minor inconsistencies do occur. These typographical errors and/or minor inconsistencies are unlikely to have any material impact on the overall findings and assessment contained in this EIAR.

Chapter 2
Project Description and Description of Alternatives

2.1 INTRODUCTION AND TERMS OF REFERENCE

This chapter of the EIAR has been prepared by Mary Mac Mahon MSc Town and Country Planning, Pg. Dip Marine Spatial Planning, Pg. Dip Environmental Engineering, Pg. Dip Environment Impact Assessment, Dip. Planning and Environmental Law, Dip. Management of John Spain Associates, Planning & Development Consultants, and provides a detailed description of the proposed development and also explains the evolution of the scheme design through the reasonable alternatives examined. The description of the proposed development is one of the two foundations upon which an EIAR is based (the other being the description of the existing environment described in this chapter and by each of the specialist consultants in the subsequent chapters).

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.

A systematic approach in accordance with the *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2017), Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018)*, and other EIA guidance documents was used to ensure all relevant aspects of the development are accurately and fully described. The objective is to provide a description of the proposed development in sufficient detail, which when taken together with the description of the existing environment provided, will allow an independent reader without acquired technical environmental knowledge, to understand the significant impacts likely to arise from the proposed development.

The description of the proposed development is set out in this chapter and the following chapters by each specialist consultant in terms of those environmental topics which will form the basis of the impact assessment process and the characteristics of the proposed development which could potentially affect population, human health, cultural heritage and archaeology, biodiversity, landscape, land and soil, water, air quality, climate, noise, vibration, wind, risk assessment, material assets and the interaction between the aforementioned factors. The EIA Directive also requires that the description of the site, design, size or scale of the development, considers all relevant phases of the existence of the project from its construction through to its existence and operation (and where applicable its restoration or decommissioning).

This EIAR fully reflects the key environmental factors of the proposed development which were recognised from the scoping carried out by the design team and the level of detail required will vary considerably according to the sensitivity of the existing environment and the potential of the project for significant effects.

This chapter of the EIAR also sets out the alternatives considered by the design team during the process of the preparation of the current planning application. Under the EIA Directive, Article 5(1) requires that the developer shall include at least:

- A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
- Any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

Annex IV, Point 2 of 2011/92/EU, as amended by Directive 2014/52/EU Directive provides further clarity on the assessment of alternatives in stating:

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

The Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (2017) – European Commission states that "*within the context of the EIA process, Alternatives are different ways of carrying out the project in order to meet the agreed objective. Alternatives can take diverse forms and may range from minor adjustments to the Project, to a complete reimagining of the Project*".

The European Commission guidance further notes that the consideration of alternatives is an important part of the overall EIA process, "*which ought to be reflected in the effort and resources allocated to this part of the EIA process*".

The consideration of alternatives provides for an opportunity to adjust a project's design in order to minimise environmental impacts (or risks thereof). The Commission guidance document on the preparation of EIARs notes that the selection and consideration of alternatives is limited in terms of feasibility (i.e. an alternative should not be discounted solely on the basis that it would inconvenience a developer; however, if an alternative is "*very expensive or technically or legally difficult*", it would be unreasonable to consider it as an alternative).

In compliance with the requirements of 2011/92/EU, as amended by Directive 2014/52/EU Directive, this chapter presents a description of the *'reasonable'* alternatives studied and considered by the applicant and design team, and sets out the main reasons for selecting the chosen option with regards to the environmental impacts of the chosen option and the alternatives considered.

2.2 SITE LOCATION AND DESCRIPTION

The site of the proposed development is located at Howth, County Dublin. It is located at the entrance. It is approximately 75 metres to the west of Howth railway station and lies between Howth Road and the railway line. It is bounded by a railway line to the north, Howth Road to the south, a private dwelling to the east, "Ashbury" and local authority lands to the west which continue as Baltray Park. The site covers a total area of c.2.68ha and encompasses the former Howth Garden Centre, Beshoff Motors and Techrete premises, all of which front on to the Howth Road. The Techcrete premises has been used for the production of concrete products and has been vacant for over a decade. The garden centre was a former petrol filling station.

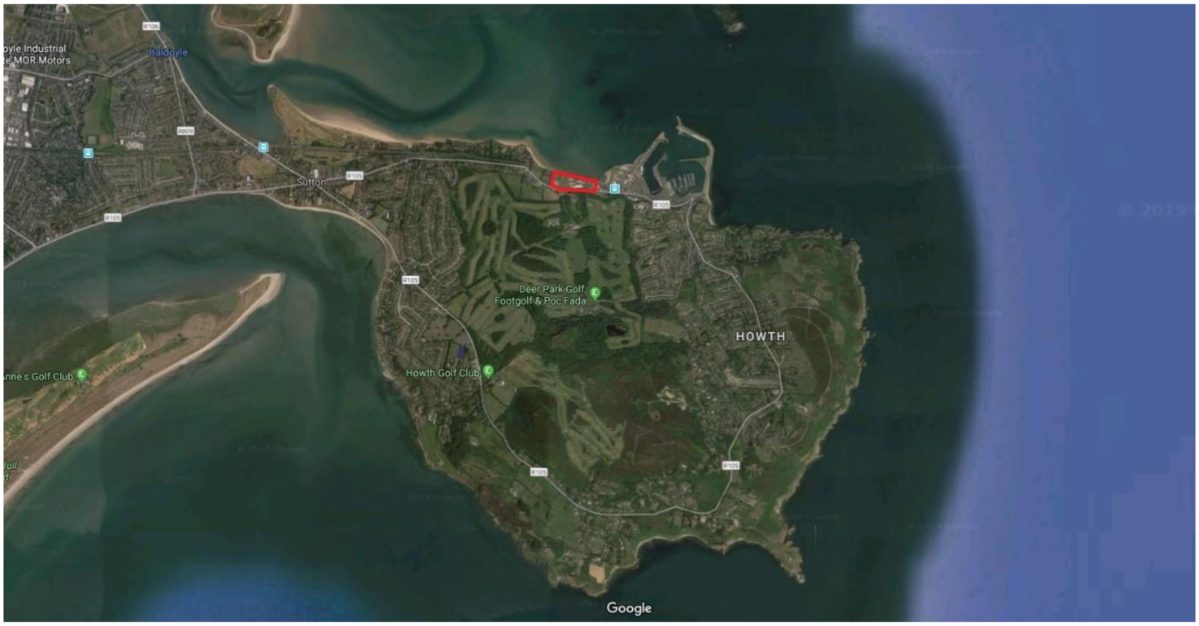


Figure 2.1 Site Context – Source: Google.ie

Figure 2.2 Site Location – Source: Google.ie

Figure 2.3 View of site from Howth Road – Source: Modelworks

Figure 2.4 View of site from entrance to Howth Castle, St. Mary's Church opposite Source: Modelworks

Figure 2.5 View of site from Howth Road, looking west – Source: Modelworks

Figure 2.6 View of site, station master's house in the foreground – Source: Modelworks

Figure 2.7 View of site from the western pier – Source: Modelworks

2.3 PROJECT OVERVIEW

The proposed development relates to the provision of a mixed-use scheme to complement and enhance the existing mix of uses in the town centre, containing 512 no. residential units, creche (236 sqm), 4 no. commercial units with 2,637 sqm gross floor area, including 1,705 sqm retail anchor unit, restaurant (243 sqm), café (86 sqm) and a retail unit of 603 sqm; along with residential amenity floorspace of c. 7-8 sqm.

The design for the scheme provides for a mix of uses, having regard to the current land use zoning context (Town and District Centre) and will provide residential, retail and café/restaurant uses all framed within a strong active urban edge along the Howth Road which will address a new civic plaza space.

The objective is to improve the Claremont site which will have a significant positive impact on the wider public realm, all to enhance the experience for residents, visitors, and the stakeholders within the town centre, and to reinforce the sense of place as you approach Howth.

At ground floor level it is proposed to provide a mix of retail and restaurant uses as well as a multi-level plaza area between Blocks C and D, which will act as a focal point for the scheme. The anchor unit will front onto both the proposed plaza area and the Howth Road, as will the restaurant unit. The café will face onto the plaza. The other retail unit will front onto the Howth Road. The creche will be located at the railway side of Block B. An important element of the ground floor is the creation of a new civic space, parkland areas, and podium looping walk around the proposed development.

2.4 STATUTORY PLANNING CONTEXT

The subject lands are subject to national, regional, county and local planning policy. The following outlines the key planning documents of relevance to the future development of the subject lands.

National Policy

- National Planning Framework - Project Ireland 2040 (2018);
- Urban Development and Building Height Guidelines (2018);
- Sustainable Urban Housing: Design Standards for New Apartments (2018);
- Design Manual for Urban Roads and Streets (2013);
- Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009);
- The Urban Design Manual (A Best Practice Guide) (2009);
- Delivering Homes, Sustaining Communities (2008) and the accompanying Best Practice Guidelines - Quality Housing for Sustainable Communities (2007);
- Smarter Travel: A Sustainable Transport Future - A New Transport Policy for Ireland (2009);
- The Planning System and Flood Risk Management – Guidelines for Local Authorities (2009).
- Architectural Heritage Protection Guidelines for Planning Authorities (2005)

Regional Policy

- Eastern and Midland Regional Assembly – Regional Spatial & Economic Strategy (RSES), (2018);

County Policy

- Fingal Development Plan 2017-2023;

2.5 ALTERNATIVES EXAMINED

As set out within the introduction to this chapter, the EIA Directive requires that EIARs include "*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*."

The presentation and consideration of various alternatives investigated by the project design team is an important requirement of the EIA process. This section of the EIAR document provides an outline of the main alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison the environmental effects. For the purposes of the European Union (Planning and Development)(Environmental Impact Assessment) Regulations 2018, alternatives may be described at three levels:

- Alternative Locations
- Alternative Designs
- Alternative Processes

The Department of Housing, Planning and Local Government 2018 EIA Guidelines state:

> *"Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. <u>A 'mini- EIA' is not required for each alternative studied</u>."* [emphasis added]

Pursuant to Section 3.4.1 of the *Draft Guidelines of the Information to be Contained in an Environmental Impact Assessment Report,* 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'…"*

The *Draft Guidelines of the Information to be Contained in an Environmental Impact Assessment Report,* EPA 2017 are also instructive in stating:

> *"Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR… It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics'".*

As alternative locations or alternative processes are not relevant to this application, the alternatives considered are confined to the alternative uses the site could be put to. The different uses require a different design response and some different environmental impacts arise. All alternatives assume that works to demolish the structures on site will take place, save for the protected structure.

The key environmental and practical considerations which influenced the design of the proposed development and alternative layouts on the subject lands included the following:

- The extant permissions on site which helped establish footprint, volume and height of proposed buildings;
- The *Fingal Development Plan* 2017-2023, has a Local Objective Point Development shall be between three and five storeys. The three storey aspect of the development shall be on the western side of the site and a maximum of 30% of the overall development shall be five storeys;
- The need to consider the interaction of the proposed development with existing adjacent residential development, and the need to preserve the amenity, privacy and security of these properties;
- The quality of the urban environment to be delivered and the associated impact on human health;
- Access, permeability and connectivity with surrounding areas and land uses.

A '*do-nothing'* scenario is not considered viable or appropriate, to continue the underutilised use of the site proximate to the town centre of Howth. The suitability of the lands for development, being zoned as town and district centre and located close to high quality public transport services and pedestrian/cycle infrastructure, were also key considerations.

2.5.1 Description of Alternative Uses on the site

This site has two extant planning permission. One for mixed-use development consisting of residential, retail office, leisure, restaurant and community uses under Reg. Ref. F11A/0028 (PL 06F.240171). The first permission was set out in a similar footprint and comprised of 255 no. residential units including 250 apartments and 5 no. 2 storey traveller residential units, offices, retail, leisure centre, creche, community centre, sports facilities, public park, open spaces, and parking for 462 cars and 464 bicycles. The Gross Floor Area was 37,359.6 sqm. This is Option 2 in the table below. The permission expires 23/03/2023.

Figure 2.8 F11A/0028 (PL 06F.240171) – Source Duignan Dooley Architects

A subsequent application was made on the site for residential units, commercial units, community centre and open spaces under Reg. Ref. F15A/0362 (PL 06F.246151). This expires 03/08/2021. The second permission provides for 200 no. residential units, 6 no. commercial units, community centre, open spaces, and parking for 487 no. cars and 332 no. bicycles. The gross Floor Area was 34,500 sqm. This is Option 3 in the table.

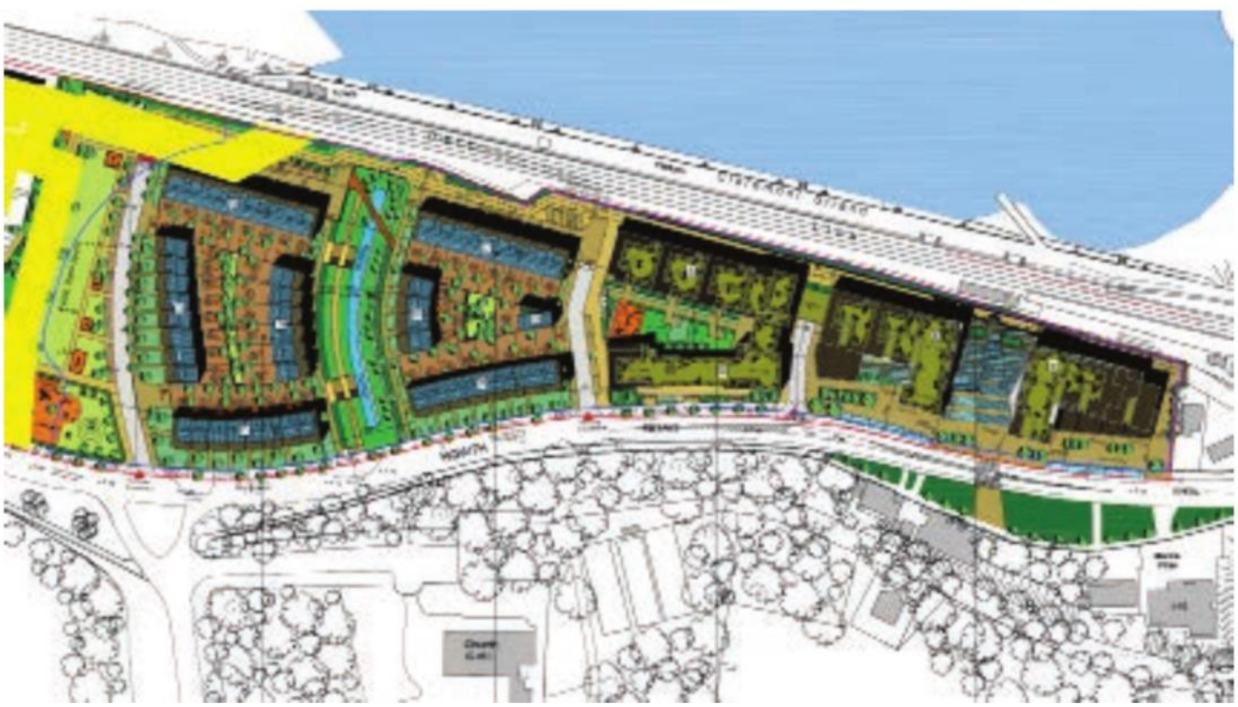


Figure 2.9 F15A/0362 (PL 06F.246151) – Source Duignan Dooley Architects.

A previou planning application for the site was made for residential, hotel, community uses, sports facilities and open spaces under Reg. Ref. F08A/1172 (PL 06F.235083). This application was refused by both the council and An Bord Pleanala after appeal. This comprised 386 no. residential units, hotel, 6 no. commercial units, community centre, sports facilities, open spaces, and parking for 935 no. cars and 548 no. bicycles. The GFA was 56,133 sqm. This is Option 1 in the table below.

Figure 2.10 F08A/1172 PL06F.304637 Source Fosters + Partners

The application for the proposed development (the subject of this EIAR) comprises 512 no. residential units, a crèche, 4 no. commercial units with 2,637 sqm gross floor area including 1,705 sqm anchor unit, restaurant (243 sqm), café (86 sqm) and a retail unit of 603 sqm. This Option 4 in the table below.

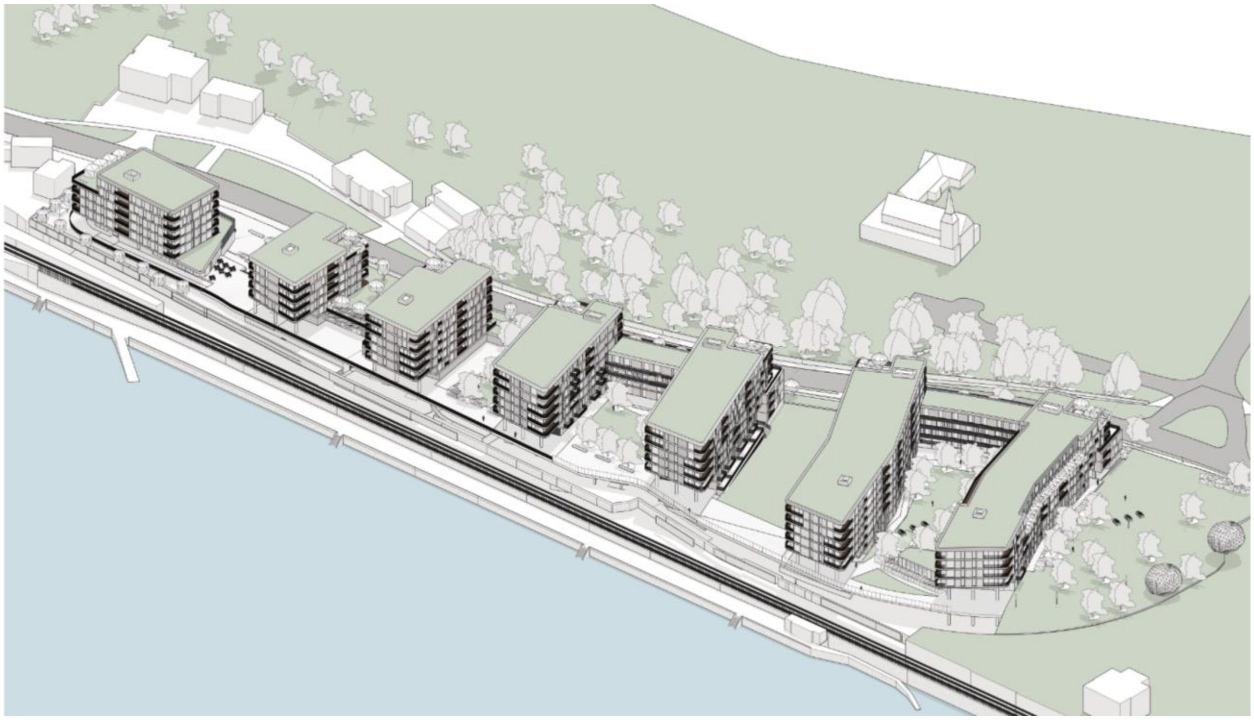


Figure 2.11 Current proposal Source Henry J Lyons Architects

The next section considers these alternatives from an environmental perspective.

2.5.2 Environmental Considerations arising from the Alternative Projects

The purpose of this section is to examine how the alternative projects perform against each other from an environmental perspective.

Table 2.1 Environmental Impacts of the Alternative Projects

Application	**F08A/1172 304637 (Option 1)**	**F11A/0028 240171 (Option 2)**	**F15A/0362 246151 (Option 3)**	**Proposed development (Option 4)**	**Environmental impact**	**Assessment**
Projects	Residential, hotel, leisure centres, commercial, community centre, sports facilities, and open spaces.	Residential, retail, office, leisure, restaurant and community uses.	Residential, commercial, community and open space	Residential, commercial, retail, restaurant, café, creche and community.	Option 1 is the largest development and includes hotel use. Option 2 includes office use. Both of these are likely to increase additional traffic flows to Howth. Option 3 is the smallest development Option 4 is the second largest but has the smallest amount of parking	Options 1 and 2 include more employment generating uses, but may introduce greater traffic flows into Howth. Option 3 provides the least development, but has a high car parking component. Option 4 provides more residential use and the least car parking. It is more sustainable from a transport planning perspective
GFA	56,133 sqm	36,477 sqm	34,500 sqm	48,252 sqm	Options 1 and 4 are the two largest developments. Both will generate more construction traffic but both offer significantly more residential use	Options 1 and 4 provide for more compact development
No. of residential units	386 units + 5 traveller units	250 units + 5 traveller units	127 apartments, 106 houses + 4 traveller units	512 units	Option 4 offers the highest number of residential units	Option 4 provides the most housing. In this current housing crises, this is a sustainable use of scarce residentially zoned lands

Commercial floor space	11,036 sqm	3,275 sqm	2,391 sqm	2,637 sqm	Options 1 and 2 provide for hotel, office and leisure uses. Options 3 and 4 are more modest, Option 4 provides for a larger convenience retail unit, allowing for an alternative to travelling to Sutton Cross for a weekly shop	The provision of a hotel or office use or leisure centre would provide employment generating use. However, the level of demand for these uses has not be justified. The high risk of vacancy has to be weighed against the certainty of occupation of residential units. The provision of a retail unit sufficient to provide for a weekly shopping reduces the necessity travel to other, more congested centres.
Creche	305 sqm	274 sqm	227 sqm	236sqm	Option 4 provides the second smallest creche with the largest residential units	
Height range	3-11 storeys	2-5 storeys	2-6 storeys	3.5 to 7 storeys	Options 2 and 3 are most consistent with Local Objective 108. However, the site has been tested against national criteria for higher buildings and has been found suitable for greater height	The height of the development generally reflects the associated size of the development. Normally, more development is more sustainable. In this sensitive coastal and heritage location, the visual impact of the

						developments also have to be assessed. In this case the balance has to be stuck between these two issues. It is considered that Option 4 represents good use of zoned, serviced land without significantly detracting from the visual amenities or the heritage of the area.
Size of basement	36,600 sqm (double)	8,692 sqm (double)	c. 8,064 sqm (double)	c. 9,038 sqm (single)	Option 4 has the smallest basement.	The smallest basement requires less extraction and associated less construction traffic. Option 4 is therefore the best alternative
Materials	Pre-cast buff concrete, ceramic, composite stone panels, glass and steel	Stone, brick, render, aluminium, timber, metal cladding, glass	Stone, brick, render, aluminium, timber, metal cladding, ply membrane, solar panels and glass	Brick, ceramic, aluminium, steel, concrete, glazing	Options 1 and 2 use the most glass. Option 4 has the highest energy rating, as it complies with current construction standards.	Environmentally, Option 4 provides the most sustainable option, while still providing a high standard of visual amenity. Option 4 has also been designed to minimise the risk of bird collision with the buildings.
Car Parking	935 spaces	462 spaces	487 spaces	439 spaces	Option 4 has the lowest car parking provision	Option 4 is the most sustainable.
Cycle spaces	548 spaces	464 spaces	332 spaces	1,335 spaces	Option 4 has the highest cycle parking provision	Option 4 is the most sustainable

Plot ratio	1:1.28	1:0.83	1:0.78	1:1.81	Option 4 is the most efficient use of land	Option 4 is the most efficient use of land

Overall, Options 1 and 4 perform better from an environmental perspective. They represent the most dense project on a Town Centre zoned site, in terms of scarce zoned and serviced lands, which is more sustainable. While Option 4 is predominately residential in nature, its commercial offer adds a convenience store that will reduce the need for the local population to travel to other centres. Option 1 has greater employment uses, but runs the risk of remaining vacant over a prolonged period of time. Option 4 would generate significantly less traffic and have less impact on the surrounding road network. The emphasis on walking, cycling and public transport is much more environmentally friendly. Option 4 has also been designed to A rating energy standards for residential units. Therefore it will require less energy to heat and cool the proposed development than the other three options. The carbon footprint of Option 4 would be less per unit than the other three alternatives.

2.5.3 Description of Alternative Designs

The proposed design underwent a series of design development through the Pre-Application Consultation Process with Fingal County Council, attended by John Spain Associates, which took place on the following dates: 08/11/2018, 18/12/2018, 26/02/2019, 18/04/2019 and 05/06/2019.

At the first meeting, a scheme of 550 residential units was proposed. Fingal County Council considered that: (i) the height was concerning and a maximum of 7 / 8 storeys could be achieved on the site; (ii) the design was monolithic; (iii) the proposed development should be more reflective of the land form; (v) the provision of a bridge across the railway line was positive – however this should be closer to the town centre. A lift was not supported by the council.

Another meeting was held on 18/12/2018, where a revised scheme was presented with a maximum height of 9 storeys, with 552 residential units. The planning authority looked for animation of the sea walk. A visual impact showing block massing was presented.

A meeting was held on 26/02/2019. The scheme was for 550 residential units and maximum height was 9 storeys. The western part of the site was considered problematic because of size, scale, mass and views from Howth castle. The council requested that facades be animated and that materials suitable for a saltwater location should be use. The council indicated that the doubling quantum of development in terms of residential units should be reflected in the quality of the units and that the preferred parking ratio was one space per residential unit (0.5:1 was presented by the applicant). The council noted that visitor parking can be accommodated in the commercial parking.

On the 18/04/2019, a more detailed scheme was presented. The maximum height was now 8 storeys. The layout had changed to allow for more permeability. Overshadowing of the beach was to be considered. The visual impact on the gated of Howth Castle was noted. A Landscape and Visual Assessment (**LVIA**) was presented. The car parking provision was increased to 0.7 spaces per unit. The issue of the railway bridge was discussed. The council indicated that Irish Rail would only agree to the bridge if Fingal County Council agreed to take it in charge. The council agreed to examine the issue.

The final meeting was held on 05/06/2019. The current scheme was presented. Generally the scheme was considered an improvement on the permitted apartment scheme. Outstanding issues were the size of the residential units, the need to ensure privacy of adjoining properties, ensure ground floor ceiling heights are high enough to allow future conversion and show that access to the residential parking area is controlled. A schools' capacity report was to be submitted with the application. No comment was made on the LVIA at that stage. The future bridge was still being considered. It was noted that the red line for the application should include the public footpath and road.

The following diagrams show how the design developed over time and interaction with the council. The final scheme submitted for Pre-Application Consultation with An Bord Pleanala was considered by An Bord Pleanala as constituting a reasonable basis for an application.

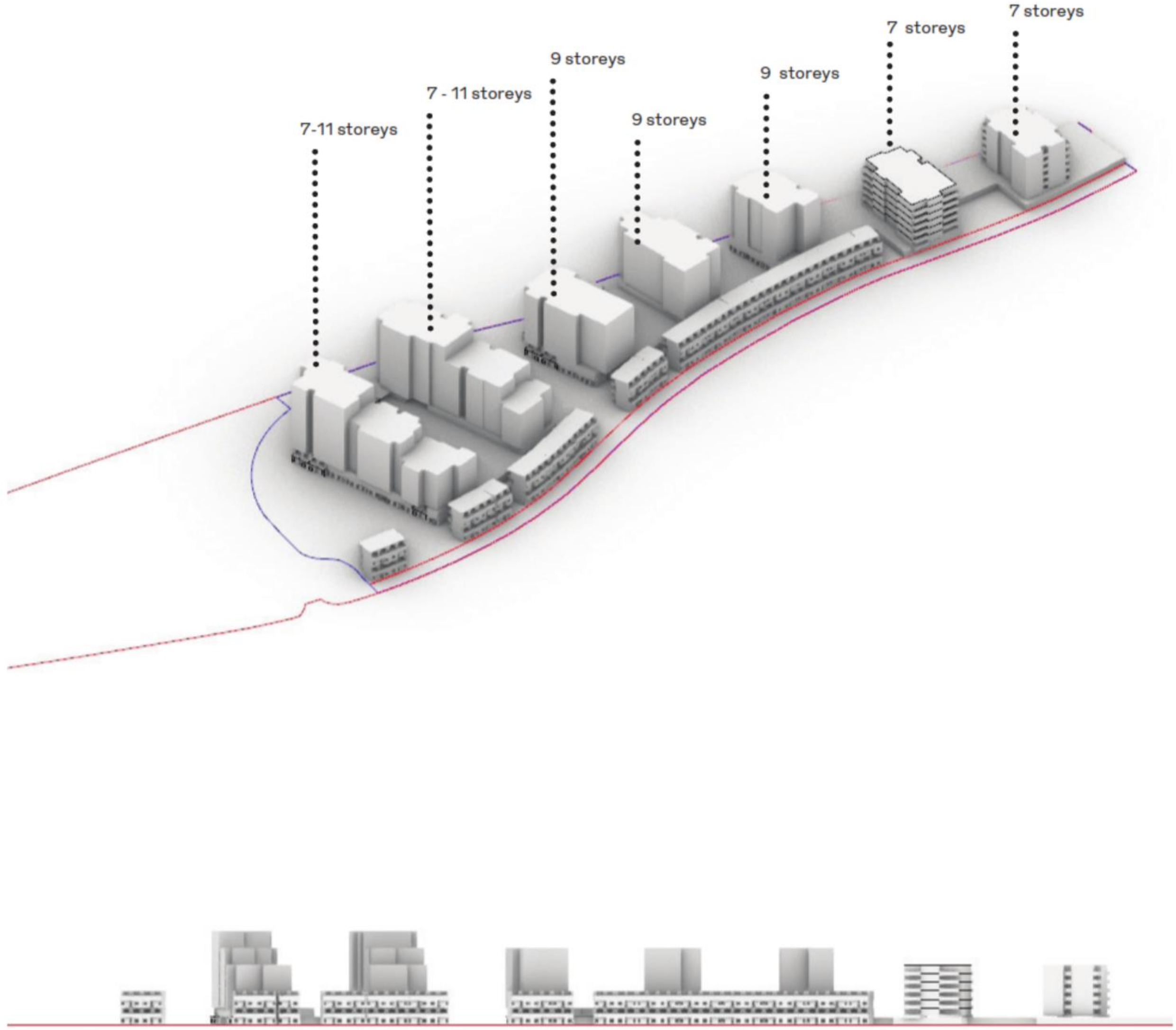


Fig 2.12: PAC 08/11/2018 Source Henry J Lyons Architects

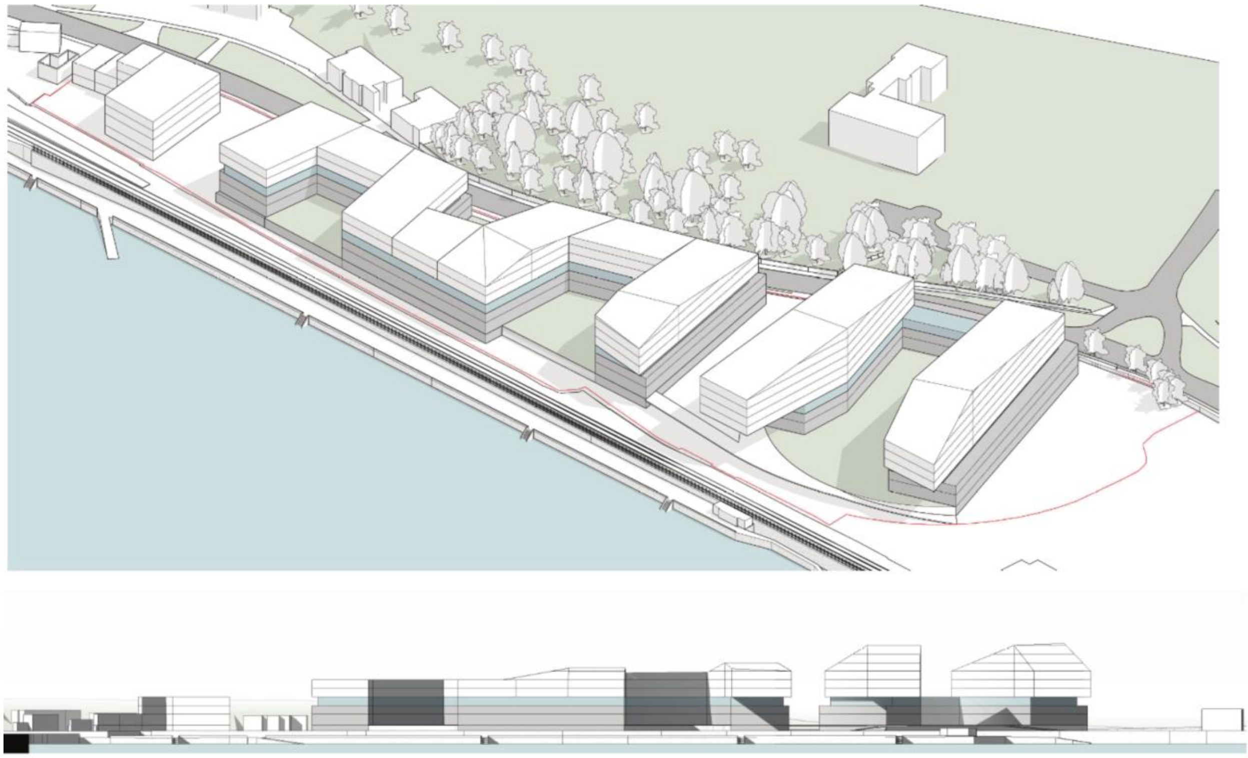


Figure 2.13 PAC 18/12/2018 Source Henry J Lyons Architects

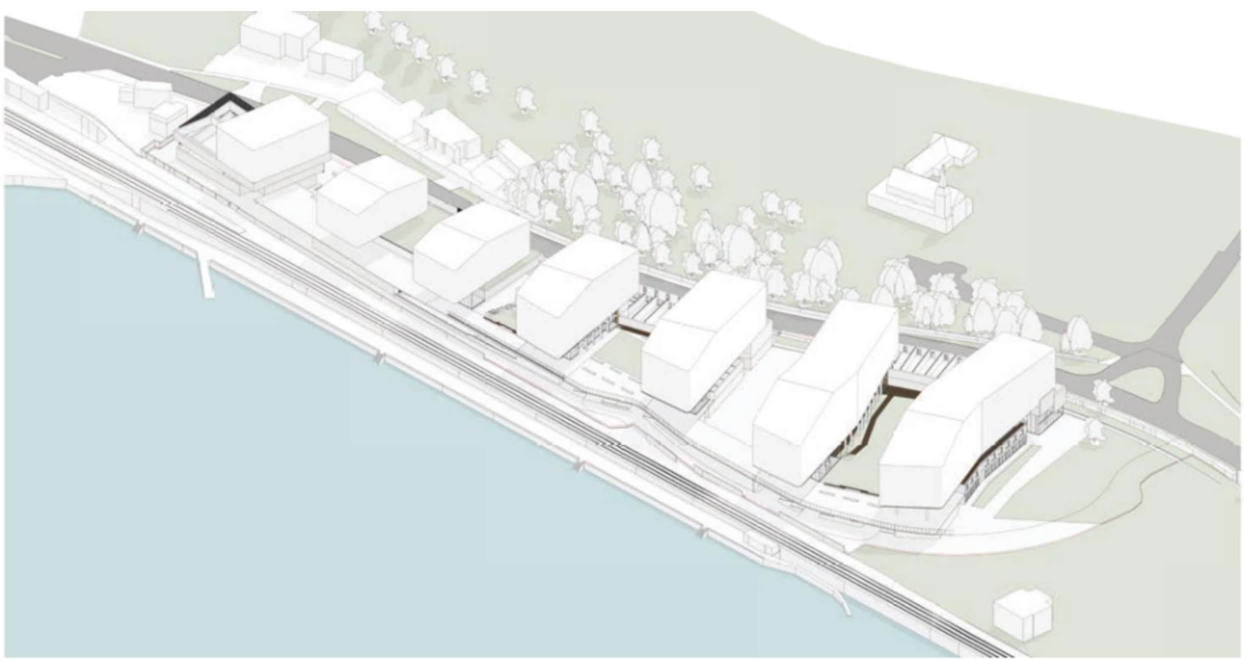


Figure 2.14 PAC 26/02/2019 Source Henry J Lyons Architects

Figure 2.15 PAC 26/02/2019 Source Henry J Lyons Architects

This was then reduced to 538 units, with reduced height on Block A, the most westerly block.

Figure 2.16 PAC 18/04/2019 Source Henry J Lyons Architects

Figure 2.17 Final design for this application Source Henry J Lyons Architects

2.5.4 Description of Alternative Processes and Technologies

This is not considered relevant to this EIAR having regard to the nature of the proposed development.

2.5.5 The 'Do Nothing' Alternative

The site is currently unoccupied. The 'Do Nothing' alternative would result in this key town centre site falling into further decay and dereliction. Due to the prominent location of the site at the entrance to Howth, the existing buildings currently detract from this attractive area and would continue to do so in the 'do nothing' scenario. The existing buildings form a visual blockage between the road and sea.

2.6 Characteristics of the Project

The proposed development consists, in brief, of the following, as set out within the public notices:

- The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands.

- The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motor showroom, and the former Howth Garden Centre.

- The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement.

- The proposed development comprises of the provision of a mixed use development of residential, retail/non retail uses and a childcare facility in 4 no. blocks (A to D), over part basement. Blocks A, B, and C range in height from part three and a half storeys with further floors setback of up to seven storeys in ‘U’ shaped blocks. Block D is part single storey and part six storey.

The proposed development will consist of:

- Provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at ground floor, to provide for a total of 439 no. spaces.

- 1,335 no. bicycle parking spaces shall be provided, including 49 no. bicycle spaces to cater for the retail units and crèche.

- One vehicular access is located at Block A, serving surface car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and the main vehicular entrance at Block C.

- A public walkway/cycleway to the north of the site shall be provided at podium level.

- A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A.

- A channel to the sea for the Bloody Stream with associated riparian strip shall be opened up and incorporated as a feature within a designed open space between Blocks A and B.

- Communal gardens will be provided for Blocks A, B and C.

- The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations.

- Block A, with a maximum of seven storeys, will provide for 234 units, a gym, residents’ lounge, residents’ support office, and 2 no. multi-purpose rooms. Own door access will be provided to ground floor units.

- Block B, with a maximum of seven storeys, shall provide for 154 no. units, residents’ lounge, multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor.

- Block C, with a maximum of seven storeys will provide for 83 no. residential units in two wings over retail units.

- Block D, with a maximum of 6 storeys, shall provide for 41 no. residential units over retail units.

- The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C it consists of 1,705 sqm anchor unit at ground floor. In Block D it consists of a restaurant (243 sqm) and retail unit (603 sqm), and café (86 sqm) at first floor.

- The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

- The gross floor area of the proposed development is 48,252 sqm on a site of 2.68 ha.

Density
The density of the site is 191 units per hectare.

Plot Ratio and Site Coverage
The plot ratio is 1:1.81. The site coverage is 29%.

Gross Floor Area
The gross floor area is 48,252 sqm.

Residential Unit Mix
The unit mix is 4 no. studios, 222 no. one bed apartments, 276 no. two bed apartments and 10 three bed apartments. This constitutes 0.78% studio units, 43.35% one-bed units, 53.9% two-bed units and 1.95% three-bed units.

Building Heights
Building heights range from the three storeys to a maximum of 7 storeys over a part basement.

The maximum height of the buildings are similar to those permitted under F11A/0028 and lower than those granted under F08A/1172. This shows a desire from Fingal County Council, in accordance with the *National Planning Framework,* which places much higher importance on compact urban growth, for growth to be located in the cities on underutilised brown field sites and the *Urban Development and Building Height Guidelines 2018*. An assessment of the visual impact of the height is provided in Chapter 8.

It is considered that the proposal introduces a high quality development at an underutilised and vcant brownfield site on town centre zoned lands. The sensitive design and scale of development is considered to make a positive contribution to the urban neighbourhood through the provision of public open space and future permeability beyond the subject site. The layout of the development serves to enhance the streetscape and integrates appropriately.

Chapter 9 concerns the archaeological and architectural heritage of the site. It finds that there are no significant adverse effects on the setting of the protected structure arising from the proposed heights.

Uses
The uses combine residential with commercial spaces as well as retail, café, childcare, restaurant and residents' services and amenities at ground and first floor. The ground floor uses are intended to provide for an active frontage. The westerly part of the site is considered the more public open end, where the public open space is provided. The civic space in the centre of the development is also aimed at providing a public open space amongst residential and retail units.

Open Space Provision

Public Open Space
33% of the site is public open space.

The western parkland is a key area of public open space that has been designed to complement the proposed built form at the principle gateway into Howth. The western parkland will incorporate a gently sweeping path that would provide a universally accessible route between Howth Road and the elevated seafront walkway around the western area of open space.

The riparian strip in the centre of the proposed development will feature the restoration of a natural heritage asset within Howth, that being the Bloody Stream. This space would be designed with a natural character, with high ecological value and will provide significant amenity to both future occupants and the wider public. The space would include universally accessible north - south connectivity between Howth Road and the seafront walkway. A key feature of this space that has been considered in the layout of the development is the creation of a vista towards St. Mary's Church Spire.

Private Open Space
The overall site coverage of the proposed development is 29% and therefore has led to generous private spaces being provided throughout the development (3,802m^2). These comply with, and generally exceed, the sizes set out under the *Sustainable Urban Housing: Design Standards for New Apartments* 2018.

Communal Open Space
Communal gardens will be provided for Blocks A, B and C. Generous amounts of communal spaces have been provided (2,764m^2) due to the aforementioned low site coverage of 29%. Communal open spaces are provided at podium level and are clearly separated from the public walkways and routes through the use of architectural and landscaping features. Podium-level communal courtyards benefit from improved sea views and daylight exposure. Separation between public walkway and communal open space will be created through hard and soft landscaping. The 'finger-block' configuration allows for a series of generous south-facing courtyards, each with sea views to the North. All courtyards are overlooked by the surrounding apartments, providing passive surveillance.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road.

Apartments
All apartments comply with *Sustainable Urban Housing: Design Standards for New Apartments — Guidelines for Planning Authorities* 2018. All units meet or exceed minimum standards. The majority of units are 10% larger than minimum standards. 36.3% of units are Dual or Triple Aspect. The Housing Quality Assessment lodged with the planning application for the proposed development provides more detail. The

arrangement of the blocks allows for the majority of single aspect apartments to overlook a significant amenity such as a public park, garden or formal space, or the Irish Sea.

Commercial uses

The commercial component in Blocks C and D consists of 4no. units with 2,637 sqm gross floor area; including 1,705 sqm anchor unit, restaurant (243 sqm), café (86 sqm) and 1no. retail unit (603 sqm).

Car Parking

Car parking (439 no. spaces) is to be provided at basement level and at ground floor under a podium with cycle parking at ground floor. At basement level it is proposed that 80 car spaces would serve the commercial element of the scheme, with the remaining car spaces reserved for the residential element. This level would also provide a delivery area for the anchor retail unit.

Delivery and Service Arrangements

A delivery area for the anchor retail unit will be provided at basement level. There are two vehicular entrances (priority junctions) provided to the site at the Howth Road. One to the east, provides access to a basement car park and the delivery area to the rear of the commercial units in Blocks C and D.

Mobility Measures

Mobility measures will be made available to future residents and workers to inform them of walking routes, public transport, bike and car sharing.

Cycle Parking

The level of bicycle parking is in excess of Fingal County Development Plan. A total of 1,335 no. bicycle parking spaces are provided at ground floor level under podium with the aim of promoting sustainable transport modes.

Phasing of Development

The proposed development will be carried out in a single phase.

Character Areas

This part of the Howth Road consists of a mix of residential, undeveloped and brownfield lands. The approach to the town lacks coherence and does not provide a strong gateway. The proposed development is designed to take advantage of the site's location on the seafront through views from open spaces and residential units where possible.

The proposed development has been designed to respond positively to the prominent position of the site at the entrance to Howth town. The western elevation is of a scale that befits its gateway status. The Howth Road frontage has been designed to reflect the character of Howth town centre, with 3 storey own-door units providing animation and active frontages on the approach to the established town.

The layout of the proposed dwellings links the proposed streets and spaces through the architectural design and overall landscaping of the development. The proposed development provides for suitable separation distances to adjoining development and provides appropriate boundary treatments on site to protect the residential amenity and landscape character of the area.

The proposed development will be finished in materials of a high-quality design to ensure it represents its own character while at the same time integrating sympathetically with the surrounding residential areas.

The character of the open spaces has been designed to transition from a more vegetated, natural and suburban character at the western end of the scheme, to a more civic character towards the eastern part of the site where it's more closely associated with the village centre.

The material palette is designed to create a unified 'neighbourhood' feel, with brick in complementary tones being the primary material. Visual interest and a sense of individual building identity is created through subtle changes in brick colour from block to block. The brick facades work in harmony with areas of concrete and ceramic tiling (or polished recon stone). Brick is a traditionally residential material and is highly durable. Window frames, balustrades, copings and gates are in tonal greys to tie these elements into the wider material strategy. Metalwork composition and finishes are chosen to be suitable for the coastal nature of the site.

Biodiversity & Green Infrastructure
Although the site is currently hard standing, the proposed development introduces trees, landscaping and green roofs. The application has also been subject to an Appropriate Assessment Screening and a Natura Impact Statement has been prepared.

2.7 THE EXISTENCE OF THE PROJECT

2.7.1 Introduction

The purpose of this section is to provide a description of the proposed development and consider all relevant aspects of the project life cycle both during construction and post construction (and decommissioning if applicable). These include the following:

- Construction Stage (Land Use Requirements, Construction Activity & Significant Effects).
- Operation Stage (Processes, Activities, Materials Used).
- Changes to the Project.
- Secondary and Off-Site Developments.

2.7.2 Description of Construction Stage

This section of the EIAR summarises the construction and phasing of the proposed development and summarises the measures to be taken to ensure that the impact of construction activity is minimised. The *Preliminary Construction Management Plan* and *Preliminary Construction and Demolition Waste Management Plan* by DBFL, which are included as standalone reports with this application, should be referred to for a more detailed assessment of the construction, waste and indicative phasing proposals for this development.

Construction Stage
As noted previously, the construction of this development is likely to take place in a single phase of development as described below:

Construction Activities
There are a number of construction activities involved in a project such as this. The activities (independent of phasing) can be divided into five general categories:

- Excavation: This includes site clearing and earthworks – soil / rock removal – required to prepare the site for the foundations and residential floorspace above.
- Structure: Structure includes the foundations and the physical frame of the buildings. The foundations will be piled.
- Enclosures: The enclosures for the buildings will be formed from brick, stone, cladding, block work, and glass. The roofs will all have the required levels of insulation and waterproof membranes.
- Services: The requisite services will be provided including drainage and lighting.
- Landscaping: The landscaping works include hard landscaping, roads, footpaths, cycle paths, bed and tree planting, and a significant water feature, capable of being used for other activities as well when the water is turned off. Landscaping will take place at different heights across the site.

Geotechnical Investigation

The ground conditions are described in further detail in Chapter 5 Land and Soils and Chapter 8 Water.

Predicted Impact of the Construction Stage

There are a number of aspects that will be impacted upon due to the construction of this development. This list is non-exhaustive but covers the major issues to be considered in the assessment of possible impacts of the development:

- Construction methods – duration and phasing.
- Construction traffic, parking and site working hours (see standalone Preliminary Construction Plan).
- Health and Safety issues.
- Noise & Vibration due to construction work.
- Air quality (principally dust)
- Construction waste and demolition waste management (see separate standalone report).

Construction Methods – Phasing of development

The construction methodology that will be utilised on the site will have three main attributes to minimise the impact of the construction phase.

- Phasing of construction
- Efficiency
- Minimisation of waste generated

Construction methods will use techniques that afford safe, efficient, and cost-effective methods of working. In order to minimise the traffic impact associated with the removal of material from the site and the construction phase in general, the Contractor will prepare and implement a Construction Traffic Management Plan.

Construction Traffic, Parking and Site Working Hours

The *Outline Construction Environmental Management Plan* (**OCEMP**) addresses these issues in greater detail. It advises that the works associated with the proposed development will develop additional traffic on the public road network associated with the removal of excavated material and the delivery of new materials and concrete trucks.

The vehicles associated with the construction activities are as follows:

- Excavators;
- Dump trucks;
- Concrete delivery trucks;
- Concrete pumps;
- Mobile tower cranes; and

- Mobile hoists.

It is proposed that standard construction working hours will apply.

It will be necessary for the appointed contractor to prepare a detailed construction traffic management plan to ensure the smooth operation of the local road network during the course of the construction project. It will be necessary to agree this construction traffic plan with Fingal County Council in advance of the project. The management of this plan will also need to be reviewed throughout the duration of the project.

Health and Safety Issues

The proposed development will comply with all relevant Health and Safety legislation and best practice during the construction of the project. The project has been designed with input from a Project Supervisor Design Process Consultant, ORS Consultants. Where possible potential risks have been omitted from the design so that the impact on the construction phase is reduced. A Risk Assessment can be found in Chapter 12.

Noise and Vibration due to Construction Work

The potential impacts associated with noise and vibration due to construction work, are addressed in Chapter 7 Noise & Vibration.

Air Quality

The potential impacts associated with air quality due to construction work are addressed in Chapter 6 Air Quality and Climate, including Microclimate.

Construction Waste Management

A standalone Construction and Operational Phase Waste Management Plan for the proposed development is included with this application. The purpose of this report is to ensure the best practice is followed in terms of waste and environmental management during the construction and operational phases of the proposed development, and to ensure adverse impacts on the receiving environment – including local residents - are minimised.

2.7.3 Description of the Operation Stage of the Project

Pursuant to the EIA Directive, an EIAR is required to set out a description of the project processes, activities, materials and natural resources utilised; and the activities, materials and natural resources and the effects, residues and emissions anticipated by the operation of the project.

The proposed development is a mixed-use development, but primarily residential in character. The primary direct likely significant environmental effects will arise during the construction stage. As a result, post-construction, the operation 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 population and human health, biodiversity, soils, water, air, climate, or landscape.

The primary likely and significant environmental impacts of the operation of the proposed development are fully addressed in the EIAR document.

The proposed development also has the potential for cumulative, secondary and indirect impacts, particularly with respect to such topics as traffic. Each chapter within this EIAR addresses the cumulative, secondary and indirect impacts which the development may have. On the basis of the assessment carried out as part of this EIAR, it is considered that all cumulative secondary and indirect impacts are unlikely to be significant; and where appropriate, have been addressed in the content of this EIAR document.

2.7.4 Description of Changes to the Project

The *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports*, EPA, 2017 state in relation to change:

> *'Very few projects remain unaltered throughout their existence. Success may bring growth; technology or market forces may cause processes or activities to alter. All projects change and- like living entities - will someday cease to function. The lifecycles of some types of projects, such as quarries, are finite and predictable. Such projects often consider their closure and decommissioning in detail from the outset, while for most projects a general indication of the nature of possible future changes may suffice. While the examination of the potential consequences of change (such as growth) does not imply permission for such growth, its identification and consideration can be an important factor in the determination of the application.*
> *Descriptions of changes may cover:*
> - *Growth*
> - *Decommissioning*
> - *Other Changes'.*

As per the *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports*, EPA, 2017 and in the interests of proper planning and sustainable development it is important to consider the potential future growth and longer-term expansion of a proposed development in order to ensure that the geographical area in the vicinity of the proposed development has the assimilative carrying capacity to accommodate future development.

The design development process saw the site examined in terms of additional height and residential units. The additional height was up to 11 storeys and 550 units. The scale of such an increase in units is less than 10% of the total proposed. This limited increase of 38 units could be accommodated in terms of the assimilative capacity of the area. Potential changes of use of the ground floor units which will have a negligible impact.

The parameters for the future development of the area in the vicinity of the subject site are governed by the Fingal County Development Plan. Lands in the vicinity will be the subject of separate planning applications in the future, where they are identified as being suitable for development, and where the provision of the requisite physical and other infrastructure is available.

2.7.5 Description of Secondary and Off-Site Developments

No significant secondary enabling development is necessary to facilitate the proposed development. The planning application includes details of the necessary road works, which are required to facilitate this development. These works are assessed within this EIAR.

2.8 RELATED DEVELOPMENT AND CUMULATIVE IMPACTS

Crevak Trading GP Limited has applied for planning permission for a mixed-use application proposed for the lands between Balscadden Road and Main Street in Howth. This proposed development will consist of the demolition of a currently disused sports building, the construction of 163 no. residential units in 3 separate apartment blocks along with commercial/retail space. This was granted by An Bord Pleanala in September 2018, ABP–301722-18. The decision of An Bord Pleanála is subject to judicial review proceedings.

The company is now seeking a new permission on this site for an increased residential component of 177 units. See www.rennieplaceshd.ie for details.

The cumulative impacts from the permitted development is assessed where relevant.

Two permissions have also been granted for sites to the north of the current site on the west pier. These were for an extension to an existing fish processing factory (F17A/0553) and for industrial units (F18A/0267). A third permission (F18A/0074) provides for a new quay wall on the east side of the middle pier and associated berthing.

Permission has been granted for a new Regional Wastewater Treatment Plant of 500,000 P.E in Clonsaugh, including a sludge hub centre, regional biosolids storage facility, orbital sewer and outfall pipe under ABP-301908-18 and ABP 302039-18.

2.9 REFERENCES

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, 2017
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (2017) – European Commission
- Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment Guidelines for Regional Authorities and Planning Authorities DOELG, 2004
- AuthoritiesTransposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper, Department of Environment, Community and Local Government, 2017
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017)
- The requirements of Part X of the Planning Acts, and Part 10 of the Planning Regulations
- The Fingal Development Plan 2017-2023

Chapter 3
Population and Human Health

3.1 INTRODUCTION

The 2014 EIA Directive (2014/52/EU) has updated the list of topics to be addressed in an EIAR and has replaced 'Human Beings' with 'Population and Human Health'. This chapter brings together information pertaining to population and how population is affected by environmental issues. The information on health impact is prepared by the same consultants who prepared the individual chapters within this EIAR (Please see Chapter 1 for a list of authors and their qualifications). The potential impacts arise from changes to the population size, construction, traffic, air and noise emissions and risk assessment. The section on population has been prepared by Mary MacMahon, MSc Town and Country Planning, Pg. Dip Marine Spatial Planning, Pg. Dip Environmental Engineering, Pg. Dip Environment Impact Assessment, Dip. Planning and Environmental Law, Dip. Management.

Population and Human Health comprise an important aspect of the environment to be considered. Any significant impact on the status of human health, which may be potentially caused by a development proposal, must therefore be comprehensively addressed.

Population and Human Health is a broad ranging topic and addresses the existence, activities and wellbeing of people as groups or 'populations'. This EIAR document concentrates on health issues affected by the environment, arising from the proposed development.

3.2 STUDY METHODOLOGY

The *Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report* (2017) – European Commission - states the following in relation to Population and Human Health:

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

Any assessment of population and human health will necessarily be context and project specific, although there are certain overarching human health consideration that should be considered for any EIA project. This chapter of the EIAR document has been prepared with reference to recent national publications which provide guidance on the 2014 EIA Directive including the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (2018) and the *Guidelines on the information to be contained in environmental impact assessment reports (Draft)*, published by the EPA in August 2017.

The Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, DPHLG 2018 state that there is a close interrelationship between the SEA Directive and the 2014 EIA Directive. The document state that the term 'Human Health' is contained within both of these directives, and that a common interpretation of this term should therefore be applied. The *Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment Guidelines for Regional Authorities and Planning Authorities* 2004 DOELG refers to the need to consider the risk of serious accident, air pollution, water (particularly pollution of water sources) impact of noise, vibrations and emissions from traffic, industry, extractive industry.

To establish the existing receiving environment / baseline, four site visits were undertaken from November 2018 to April 2019 to appraise the location and likely and significant potential impact upon human receptors of this proposed development. A desk based study of published reference documents such as Central Statistics Office Census data, the ESRI Quarterly Economic Commentary, the *Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly, 2019* and the *Fingal Development Plan 2017-2023* was also carried out in September 2019.

It should be noted that there are numerous inter-related environmental topics described throughout this EIAR document which are also of relevance to Population and Human Health. Issues such as the potential likely and significant impacts of the proposed development on air quality and climate, noise and vibration, water, land and soils, material assets including traffic and transport impacts, residential amenity etc. are of intrinsic direct and indirect consequences to human health, such as landscape and visual impact, biodiversity, archaeology and cultural heritage. For detailed reference to particular environmental topics please refer to the corresponding chapter of the EIAR.

Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, 2017, states that '*in an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc'.*

This chapter of the EIAR document focuses on bringing together the potential likely and significant impact on Population, which includes Human Beings, and Human Health in relation to direct health effects/issues and environmental hazards arising from the other environmental factors. There is therefore a degree of repetition between this and the standalone topic related chapter.

3.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

3.3.1 Introduction

A description of the relevant aspects of the current state of the environment (baseline scenario) in relation to population and human health is provided below. Specific environmental chapters in this EIAR provide a baseline scenario relevant to the environmental topic being discussed. Therefore, the baseline scenario for separate environmental topics is not duplicated in this section; however, in line with guidance provided by the European Commission, the EPA and the DHPLG, the assessment of impacts on population and human health refers to those environmental topics under which human health effects might occur, e.g. noise, water, air quality etc.

An outline of the likely evolution without implementation of the project as regards natural changes from the baseline scenario is also provided. This is the "Do Nothing" scenario.

The existing environment is considered in this section under the following headings:

- Population and Age Structure;
- Existing Housing Provision;
- Employment and Education;

- Income;
- Commuting pattern;
- Existing Community Facilities;
- Land Use Zoning;
- Proximity to SEVESO sites and
- Risk of Major Accidents.

3.3.2 Population

The site in question is located at Howth, County Dublin. This section explores the characteristics of the Howth area from a socio-economic perspective, drawing on the most recently available statistical information from Census 2016 and other sources. The socio-economic profile also informs the identification of accommodation needs and other benefits arising from the development proposal as discussed in Section 5 of this Chapter.

Study Area

The proposed development site on the land of the former Techrete site in Claremont, Howth is situated within the Electoral Division (ED) of Howth. The study area for this profile deals specifically with the Howth ED, which is located within the Howth-Malahide Local Electoral Area (LEA).

Fingal Electoral Districts

Electoral Districts

Figure 3.1: Electoral Districts

Population and Age Structure

The CSO data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.8%, bringing the total population of the Irish State to 4,761,865. The rate of growth slowed from 8.1% in the previous intercensus period of 2005-2011, attributable to the slower economic activity in the early part of the census period resulting in a reduced level of immigration, albeit offset to a degree by strong natural increase.

The economy has recovered in recent years with consequent population growth predominantly attributed to natural increase, greater economic activity, increased job opportunities and continued immigration.

Table 3.1: Population change in the State, Fingal and Howth ED 2011-2016 (Source: CSO)

Area	Number of Persons		
	2011	2016	% change 11-16
Ireland – State	4,588,252	4,761,865	3.8
Fingal	273,991	296,020	8.0
Howth ED	8,256	8,294	0.5

Population growth within Fingal at 8.0%. was double than the State average during the 2011-2016 intercensal period at 3.8%. However, population growth in Howth ED, 38 persons (0.5%) was very low in comparison with the State and Fingal. In contrast, the housing stock increased from 3,473 dwellings to 3,527, an increase of 1.6%. The number of housing units increased by 54 units. The difference (16 more houses than persons) is unusual but may be reflective of the increase in the ageing population in Howth between 2011 and 2016.

Population Change Over Time

Population in Howth has fluctuated since 1996, but has seen from the figures below, has been in decline for the most part since 1996. The figures demonstrate that Howth has the capacity to cope with a larger population than it currently enjoys.

Table 3.2: Population growth in the study area (Source: CSO)

Census Year	1996	2002	2006	2011	2016
Population	9,008	8,706	8,196	8,256	8,294
Percentage Increase		-3.4%	-5.9%	0.7%	0.5%

An important indicator for future development requirements is the age profile of the area. Census 2016 that indicate that c.23% of the population is of school going age (5-19). There were 2,043 persons over 65 years of age – approximately 25% of the population.

Table 3.3: Age Profile in the study area (Source: CSO)

2011

Age	Male	Female	Total
0	36	39	75
1	33	43	76
2	44	51	95
3	58	50	108
4	44	59	103
5	58	30	88
6	53	44	97
7	46	54	100

2016

Age	Male	Female	Total
0	29	28	57
1	46	53	99
2	28	35	63
3	47	39	86
4	46	50	96
5	38	50	88
6	52	55	107
7	48	62	110

8	44	57	101
9	33	46	79
10	43	42	85
11	49	41	90
12	47	57	104
13	50	47	97
14	58	37	95
15	53	41	94
16	51	51	102
17	59	47	106
18	52	56	108
19	56	50	106
20-24	257	231	488
25-29	171	178	349
30-34	179	190	369
35-39	233	249	482
40-44	247	323	570
45-49	303	319	622
50-54	243	270	513
55-59	265	289	554
60-64	269	323	592
65-69	268	309	577
70-74	233	252	485
75-79	167	204	371
80-84	98	113	211
85+	54	110	164
Total	3,954	4,302	8,256

8	58	48	106
9	45	60	105
10	58	26	84
11	56	46	102
12	46	55	101
13	49	60	109
14	36	58	94
15	50	48	98
16	57	45	102
17	52	65	117
18	57	53	110
19	46	36	82
20-24	215	216	431
25-29	169	152	321
30-34	170	163	333
35-39	204	225	429
40-44	290	303	593
45-49	267	322	589
50-54	296	314	610
55-59	240	266	506
60-64	253	270	523
65-69	261	293	554
70-74	260	292	552
75-79	205	236	441
80-84	132	163	295
85+	76	125	201
Total	3,982	4,312	8,294

Existing Housing Provision

Table 3.4: Permanent private households by type of occupancy

Electoral District	Total Households	Households Rented from Private Landlord	Total Persons	Persons in Households Rented from Private Landlord
Howth	3,067	355	8245	939

There are 3,527 residential units in the area. Census 2011 identified that the number of apartments in Howth was 351 units and there was no increase in 2016. The average occupancy per apartment was 1.75

persons in both census. This was lower than the national average of 1.98 persons in 2011 and 2.1 persons in 2016.

An analysis of the Electoral Division finds that 11.3% of people living in the area are renting from a private landlord. The percentage of private rental households is similar at 11.5%.

3.3.3 Economic and Employment Activity

National

The CSO's Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q1 2019, indicated that there was an annual increase in employment of 3.7% or 81,200 in the year to the first quarter of 2019, bringing total employment to 2,301,900. On a seasonally adjusted basis, employment increased by 35,200 (+1.5%) over the previous quarter. This follows on from a seasonally adjusted increase in employment of 18,400 (+0.8%) in Q4 2018, an increase of 10,900 (+0.5%) in Q3 2018, an increase of 15,400 (+0.7%) in Q2 2018 and an increase of 7,400 (+0.3%) in Q1 2018. In Q2, 2019, the increase had slowed to 3.4%.

The increase in total employment of 81,200 in the year to Q1 2019 was represented by an increase in full-time employment of 62,600 (+3.5%) and an increase in part-time employment of 18,600 (+4.1%), representing an improvement in the quality and quantity of employment in the economy. In Q2, the full time employment increase was 45,000 and an increase in part-time employment of 5,700 persons.

Unemployment decreased by 18,600 (-14.0%) in the year to Q1 2019 bringing the total number of persons unemployed to 114,400. In Q2, the number unemployed continued to contract by 13,600 persons. This is the twenty eighth quarter in succession where unemployment has declined on an annual basis. The seasonally adjusted unemployment rate showed an increased from 5.0% in Q1 2019 to 5.2% in Q2 2019. The ESRI's latest *Quarterly Economic Commentary* states that unemployment is expected to decline to 4.5 per cent in 2019 and 4.1 per cent in 2020.

Employment increased in 11 of the 14 economic sectors over the year. The largest rates of increase were recorded in the *Transportation and storage* (+8.6% or +8,400) and the *Education* (+7.8% or 13,000) sectors.

The above sources demonstrate that the national economy and employment levels were expected to improve further through 2019, with the Government faced with the challenge of sustaining economic activity and competitiveness during a period of likely full employment. This in turn results in increased demand for residential dwellings particularly within the Dublin region.

The *ESRI Quarterly Commentary for Winter 2019* notes that economic growth has been at around 5% this year to date. With the uncertainty in regard to Brexit, this could fall to 3% or 1% depending how Britain leaves the EU. It notes that even with Britain leaving, this could still be stimulus for the economy, as investment decisions which have been postponed will now be made. An increase in value in sterling would improve the attractiveness of Irish products in the UK. The review notes that housing completions will not hit the expected 23,500 units but instead will likely be 21,500 units. Increasing the supply of housing is needed and this can only be done by reducing the cost of producing a residential unit.

Study Area

As shown in Table 3.5 below, the CSO results from 2016 found that ‘Commerce and Trade’ was the largest category of the workforce, with 34.41% of workers choosing this option. The next largest category was ‘Professional Services’ with 22.16%, followed by ‘Other’ which accounted for 15.85% of the workforce. Such a broad range of employment activities can be expected from the central location of the study area, reflecting the proximity of the location to many varied employment sectors.

Table 3.5: Study area employment categories

Electoral District	Agriculture, Forestry, and Fishing	Building and Construction	Manufacturing Industries	Commerce and Trade	Transport and Communications	Public Administration	Professional Services	Other	Total
Howth	22	106	208	1,109	416	136	714	511	3,222
% Total	0.68%	3.28%	6.45%	34.41%	12.91%	4.22%	22.16%	15.85%	100%

The level of education attainment achieved by the population of the study area is comparatively high, with a third level qualification earned by 65.31% of the workforce. The area also has a higher percentage of people who have completed the Leaving Certificate at 85%.

Table 3.6: Study area education attainment

Electoral District	No Formal Education	Primary Education	Lower Secondary	Upper Secondary	Technical or Vocational	Advanced Certificate/ Completed	Higher Certificate	Ordinary Bachelor Degree or National	Honours Bachelor Degree, Professional	Postgraduate Diploma or Degree	Doctorate (Ph.D.) or higher	Not Stated	Total
Howth	40	326	508	1151	345	227	308	616	997	1013	120	194	5845
% Total	0.68%	5.57%	8.69%	19.69%	5.90%	3.88%	5.26%	10.53%	17.05%	17.33%	2.05%	3.31%	100%

Income

Average Household Income

In 2016, the CSO found the average total household income for the resident population of the study area is €68,442 (Table 3.7). By comparison, the average total household income for Dublin is €78,838. The average household incomes for each of the four local authority areas in Dublin are substantially higher than that recorded for the study area, with the lowest average rate, recorded for South Dublin at €71,252, 4% higher than that of the study area (Table 3.8). This lower level of income is likely to reflect the older population of Howth, which would be more reliant on pension income.

Table 3.7: Average Gross Household Income by E.D.

Electoral District	Average Gross Household Income
Howth	€68,442

Table 3.8: Average Gross Household Income by L.A. Area

Local Authority Area	Average Gross Household Income
Dun Laoghaire-Rathdown	€94,561
Dublin City	€77,178
Fingal	€76,953
South Dublin	€71,252
Average Household Income	€78,838

Commuting pattern

The following table was prepared by Dr. Martin Rodgers. The number of car drivers in Howth is 54% of the population.

Mode	CAR DRIVER (%)	BUS (%)	DART/TRAIN (%)	CYCLING (%)	WALKING (%)
Howth	54	4	20	2	5
Sutton	47	4	29	5	3
Baldoyle	48	5	26	4	4
Average	49	4	25	4	4

Table -022 - Modal splits for electoral districts in vicinity of subject site

Dr. Rodgers considers that the future residents of the proposed development will have a similar level of car use. Therefore the impact on the local road network is likely to be less than that predicted in the traffic assessment for the proposed development.

3.3.5 Existing Community Facilities

An audit was carried out of the existing social infrastructure in the defined LAP area under the following headings:

- Open Space, Sport and Recreation
- Education
- Health Facilities and Social Services
- Cultural Facilities

- Religious and Community Facilities

The audit consisted of a combination of desktop analysis and an on the ground analysis of the study area.

Howth is an area rich in green space. Howth Castle Demesne lies north of the site. Baltray Park lies west of the proposed development. Claremont beach is north of the site. The site is opposite the Howth Head Special Amenity Area and is within close proximity to Howth Head Park. Sutton Park and Seagrange are located within the area. There are also numerous walks and trails that lead around the outskirts of the peninsula which are situated to the east of the site. The proposed development is directly opposite the Deer Park Golf Club and next to the Howth Yacht Club which is in the marina. On the western side of the site are the Baltray Tennis Courts. A local football and GAA club are also located within 1.5km of the site in the central part of the peninsula.

The area is very well served by childcare places with the Deerpark Montessori located directly across the road from the site. There are also two more child day care centres located to the east and west of the proposed development. There are two primary schools located within close proximity to the site, one to the east and one to the west. There are more primary and post-primary schools located on the Howth peninsula and in the Sutton ED to the west of the site. There are no third level institutions located with the Howth ED or the Sutton ED. There are 12 Schools serving c. 4,593 no. students within the 5 kilometre catchment of the subject site (based on the 2019/2020 figures).

Figure 3.2 Schools within 5 km of the site Source - Schools Capacity Report by John Spain Associates

The area is well serviced by healthcare facilities. The Howth Health Centre is located to the east of the proposed development along Main Street. There is also the Baldoyle Health Centre located to the north of the Sutton ED.

There are a variety of cultural facilities in the surrounding area such the National Transport Museum and Howth Castle located directly opposite the site. There are more historical monuments dotted around Howth town centre to the east of the site, and the Claremont Church Tower on the western side.

Catholic, Anglican, and Presbyterian worshippers are very well catered for in the area. St. Mary's Church and Howth Presbyterian Church are both located within the Howth area. A number of other religious institutions are located in the Sutton ED.

In summary, Howth is well served with open space, community facilities and schools. The area previously catered for a larger population in the 1990's, therefore it will be able to cope with additional population from the proposed development at Claremont and the permitted development in Balscadden. The proposed development will provide for an additional creche, retail units and public open space, so will contribute to Howth as well as relying on existing facilities.

3.3.6 Land Use Zoning

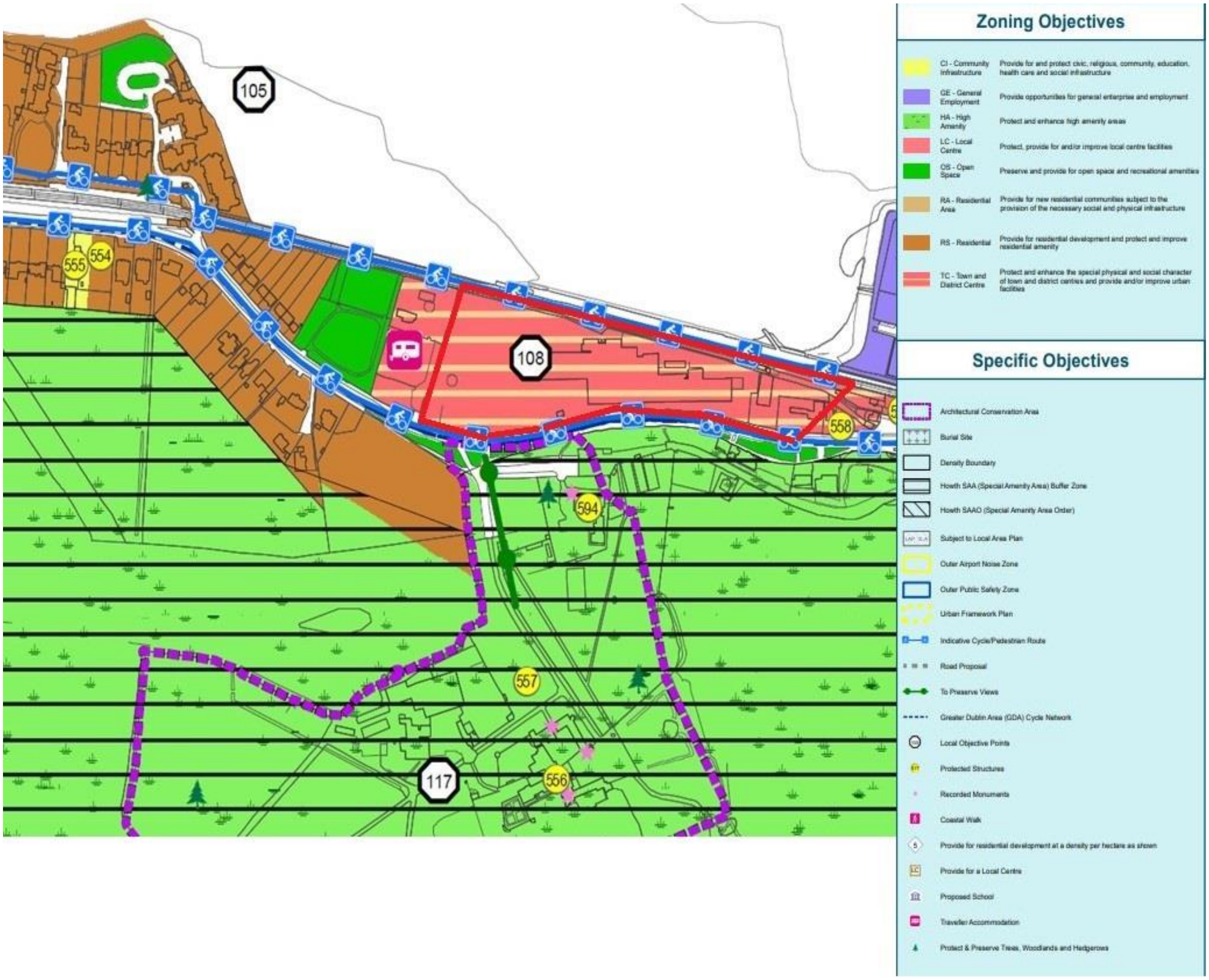


Figure 3.3 Land Use Objectives of Fingal County Council (Source: Fingal Development Plan 2017–2022 Sheet 10)

The subject site is brown field in nature. It is zoned TC – Town and District Centre; '*Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities'.* The proposed development will consolidate the town centre by providing additional population, and retail facilities. It will enhance the town centre by removing the current buildings on site and replace these with a high quality development and additional public spaces at the plaza and western parkway. It is the most northerly extent of the town and district centre zoning and is located next to the Claremont Beach which will make it such an attractive place to live. It is also located next to the Howth DART station and along the indicative cycle/pedestrian route providing with good access routes to the site. There is a Local Objective on the site, which limits the height of future development to between 3 and 5 storeys. There is a proposal for a cycleway both south and of north of the site. The site is north of an Architectural Conservation Area. It is visible from a number of protected views.

3.3.7 Proximity to SEVESO sites

The surrounding context consists of a mix of residential, employment, recreational and open space public amenity lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which might result in a risk to human health and safety. It is not within the catchment area of a SEVESO Site.

3.3.8 Risk of Major Accidents and Disasters

The Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, DHPLG 2018 state that an EIAR must include the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project. Chapter 12 deals with Risk Management. As well as flooding it also considers accidents during construction, fire following occupation or falls following occupation. The risks are identified, the consequences and the likelihood of this happening is examined.

The site is located on the coast, with the railway line between it and the sea. The issue of flooding is examined in Chapter 12. As demonstrated in Chapter 12 the site is located in Zone C and therefore outside of the 1:1000 year flood level. The site is defended from the sea by the railway line (which has its own defence) and the proposed development also has its own sea defence. The possibility of sea breach has also been examined, albeit a very unlikely event, as the railway line lies between the site and the sea. Flooding from the newly created Riparian Strip has also been considered. Mitigation measures have been provided, which also take account of sea rise arising from climate change. In this respect, taking cognisance of the other chapters contained within this EIAR document, it is considered that the proposed development site has been designed to take account of natural disasters.

3.4 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. In this chapter the potential impact on population and human health is assessed.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises the provision of a mixed use development of residential, retail/non retail uses and a childcare facility in 4 no. blocks (A to D), over part basement. Blocks A, B, and C range in height from part three and a half storeys with further floors setback of up to seven storeys in ‘U’ shaped blocks. Block D is part single storey and part six storey. The residential component will consist of 512 no. residential units. The proposed development will consist of;

Provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at ground floor, to provide for a total of 439 no. spaces. 1,335 no. bicycle parking spaces shall be provided, including 49 no. bicycle spaces to cater for the retail units and creche. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and the main vehicular entrance at Block C;

A public walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be opened up and incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 944 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum of seven storeys, will provide for 234 units, a gym, residents' lounge, residents' support office, and 2 no. multi-purpose rooms. Own door access will be provided to ground floor units. Block B, with a maximum of seven storeys, shall provide for 154 no. units, residents' lounge, multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum of seven storeys will provide for 83 no. residential units in two wings over retail units and Block D, with a maximum of 6 storeys, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C it consists of 1,705 sqm anchor unit at ground floor. In Block D it consists of a restaurant (243 sqm) and retail unit (603 sqm), and café (86 sqm) at first floor;

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm on a site of 2.68 ha.

3.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

3.5.1 Introduction

This section provides a description of the specific, direct and indirect, impacts that the proposed development may have during both the construction and operational phases of the proposed development. As stated, guidance documents from the EPA, the European Commission, and the Department of Housing, Planning and Local Government outline that the assessment of impacts on population and human health should focus on the health issues and environmental hazards arising from the proposed development. A wider consideration of human health effects which do not relate to the factors identified in the EIA Directive is not required.

Additionally, this section addresses the population and socioeconomic impacts of the proposed development. For a more detailed assessment of potential impacts associated with other environmental factors, please refer to specific chapters of the EIAR which assess the environmental topics outlined in the EIA Directive.

3.5.2 Population and Socioeconomic Impacts

Construction Phase

Direct Impacts

The construction phase of the proposed development will result in increased traffic, particularly HGV traffic. There will be increased noise and dust emissions. Cranes will be visible on the skyline. However, these negative impacts will be short term in duration, as construction is expected to be completed in 2024. There are some positive impacts arising from construction. There is likely to result in a positive net improvement in economic activity in the area of the proposed development site particularly in the construction sector and in associated and secondary building services industries. The construction sector (including associated services) was documented as one of the most adversely impacted sectors of the Irish economy following the economic downturn in 2008. The sector has recovered in recent years and this development will help to further enhance growth.

The construction of the proposed development will precipitate a positive impact on construction-related employment for the duration of the construction phase.

It is difficult to estimate the number of employees who will be engaged on a mixed-use development such as this. A considerable amount of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction period.

The positive impacts from construction is likely to be short term in relation to the local Howth economy, but will contribute to the viability of the wider construction industry.

Indirect Impacts

The short term indirect negative impacts of the construction period will be an increase in the number of HGVs passing through congestion at Sutton Cross. This increase will have a negligible impact. Claremont beach will be less attractive due to the noise and dust emissions arising from the development. Again, these negative impacts, while moderate, will be short term.

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

In the construction phase, the proposed development will give rise to an increased working population in the area. This will increase local spend. However, there will be disturbance to the local community, arising from additional traffic, noise and dust. Such impacts will be short term and in the longer term, the completed scheme will have beneficial impacts for local businesses, residents and the wider community. Any disturbance is predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently, sensitively and properly managed having regard to neighbouring activities. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts to nearby residents. A Construction Management Plan has been prepared and is submitted with this planning application. This sets broad emission limits on noise, dust and working hours. Deviance from these hours will require approval from the planning authority.

Secondary Impacts

Please see section on Indirect Impacts.

Cumulative Impacts

There may be an overlap between the construction of this site and that of Balscadden, a permitted development of 163 residential units and retail development. The main cumulative impact will be in relation to construction traffic. This will be mitigated through the use of different haul routes. A new application for a development of 177 residential units has been sought (plus 14 units over that already permitted). See rennieplaceshd.ie. for further details.

Two permissions have also been granted for sites to the north of the current site on the west pier. These were for an extension to an existing fish processing factory (F17A/0553) and for industrial units (F18A/0267). A third permission (F18A/0074) provides for a new quay wall on the east side of the middle pier and associated berthing.

Permission has been granted for a new Regional Wastewater Treatment Plant of 500,000 P.E in Clonsaugh, including a sludge hub centre, regional biosolids storage facility, orbital sewer and outfall pipe under ABP-301908-18 and ABP 302039-18.

Operational Phase

Direct Effects

The proposed development will increase the population of Howth. The projected population increase for the development is anticipated to lie between the range of 896 persons (assuming an average occupancy similar to the Census 2011 Howth occupancy figure of 1.75 persons) to 1,075 persons (assuming the Census 2016 national occupancy figure of 2.1 persons). For conservative purposes, in this EIAR, the higher figure has been assumed. This would increase the population for Howth to 9,369 persons. Therefore, after the proposed development is constructed, Howth would exceed its 1996 population by 361 persons.

Once operational, the proposed development will give rise to much needed additional residential accommodation. Residents will spend a portion of their income locally which would not happen without the proposed development. The proposed development provides for shops, cafe, childcare and retail, which will also enhance local economic spend, thus having a multiplier effect, as it will add to final income in businesses in Howth. The new units will provide job opportunities for people living in the area.

Indirect Effects

The operational phase of the proposed development has the potential to lead to positive impacts on population and human health. The proposed development provides a new civic plaza, to encourage socialising. It will have a new cycleway and walkway with views to the sea and two new areas of public park at the western end of the development and in the riparian strip. As a result of the open space and recreational provision which will help provide a high quality residential environment with provision for exercise and play for residents and the public, and will be a valuable amenity to surrounding residential areas. The proposed development incorporates design principles such as permeability and a layout which prioritises walking and cycling and therefore has the potential to positively impact on population and human health. The provision of retail facilities locally will also help reduce the necessity to drive to Sutton Cross for shopping. This in turn would reduce congestion at this junction.

Secondary Impacts

The proposed development will give rise to a higher demand for school places in Howth. However, there are 12 schools available within 5 km of the site, that can cater c. 4,593 no. students. The proposed development could generate a demand of c.120 school places with c.98 of these of primary school age. That represents a 2.6% increase on the number of school attendance currently in the catchment area. The numbers attending primary school in Ireland are predicted to fall from current high numbers by 2020 by the Department of Education. The increase in demand for primary school places from the proposed development will not occur until the proposed development is completed in 2024. Therefore there will be adequate primary school places available for the proposed population increase. The impact will not be significant and will be of medium term duration.

Cumulative Increase

The referenced apartment development has been permitted under ABP 301722-18 for 163 units. This would give rise to an additional population of between 285 to 342 persons in the Howth area. Again for conservative purposes, in this EIAR, the higher figure has been assumed. The combination of both the proposed development and the permitted development may increase the population to approximately 9,711 persons. This would constitute an 8% increase on the Census 1996 population.

During operation, traffic from this development will also use Sutton Cross junction. The impact of both developments on this junction have been assessed from a traffic perspective and the impact is It is considered acceptable.

The cumulative impact of demand for school places from the proposed development would be approximately 149 school places. The number of school places in the area is 4,593. There would be a negligible impact on the demand for school places.

In terms of school provision, there are sufficient school places to cater for both developments in the Howth area.

Residual Impacts

The proposed development will increase the population in Howth. This is considered a significant positive, long term impact. It will redress the population decline that Howth has experienced from a population high of 9,369 persons in 1996. It will provide additional services, such as a creche and convenience store large enough to provide for a weekly shop for the citizens of Howth. This will reduce the need to travel by car to Sutton Cross.

The additional parks and civic space, walkways and cycleways will improve the recreational opportunities in Howth and enhance public health by providing more opportunities for exercise.

It is considered that the proposed development offers significant positive, long term impacts on the population and social and economic patterns of the area.

3.5.3 Land, Soils and Geology

No general public health issues associated with the land, soil, geology and hydrogeology conditions at the Site have been identified for the construction phase of the Proposed Development in regard to management of contaminants.

Procedures for dealing with potentially contaminated material during bulk excavations and the movement of materials including asbestos contaminated soils and Asbestos Containing Materials (ACMs) on-site that will prevent any potential public health issues are outlined in the MMRP (Golder, 2019c) and proven, robust, site specific procedures will be implemented for the works by the Contractor taking account of the recommendations set out in the CDWMP (BCME, 2019d), the OCEMP (Enviroguide, 2019a), the CMP (BCME, 2019a), the Asbestos Demolition Survey Report (OHSS safety Consultants, 2019a) and the Risk Assessment for Mechanical Handling of Soils/Stones Containing Asbestos (OHSS Safety Consultants, 2019b) for the Proposed Development. (These can be found in EIAR Volume 3 Chapter 4 Appendices).

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

With regards to contaminated soils containing asbestos the following mitigation measures, in addition to those as outlined in Chapters 4 (Land, Soils and Geology) and 14 (Mitigation Measures), will be implemented across the Site to ensure the protection of site workers and the general public.

- Measures will be in place to prevent workers transferring mud from the site to their cars and/or homes including appropriate personal protective equipment, welfare and changing facilities, separation of work wear from non-work wear and washing of boots before leaving the site.

- Workers will also receive awareness training in relation to the possibility that ACMs may be present in soil in order that they know what to look out for and what to do, if they encounter any suspect materials and also in order that they appreciate the importance of implementing the required hygiene measures.

The design of the Proposed Development includes remedial measures to adequately address any potential human health issues associated with the baseline land, soil, geology and hydrogeology site condition as outlined in the MMRP (Golder, 2019c). The design of the Proposed Development will ensure that the Site will be suitable for use for the operational phase as a residential and mixed-use commercial / retail development of the proposed end-use of the development. No residual long term impacts on human health are expected.

3.5.4 Water, Hydrology and Hydrogeology

No public health issues associated with the water (hydrology and hydrogeology) conditions at the site of the Proposed Development have been identified for the Construction Phase or Operational Phase of the Proposed Development in regard to management of contaminants.

Construction Phase

Procedures for dealing with potentially contaminated groundwater during the required dewatering for the construction of the basement are outlined in the MMRP (Golder, 2019c) and proven, robust, site specific procedures will be implemented for the works by the Contractor taking account of the recommendations set out in the CDWMP (BCME, 2019d), the OCEMP (Enviroguide, 2019a), the CMP (BCME, 2019a) the Dewatering Plan (Minerex, 2019) for the Proposed Development. (These can be found in EIAR Volume 3 Chapter 4 Appendices).

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

The design of the Proposed Development includes remedial measures to adequately address any potential human health issues associated with the baseline water conditions at the Site as outlined in the MMRP (Golder, 2019c). The design of the Proposed Development will ensure that the Site will be suitable for use for the Operational Phase as a residential and mixed-use commercial / retail development of the proposed end-use of the development and that there are no residual issues associated the water environment at the Site.

Operational Phase

The impact of the operational phase of the proposed development on the public water supply will increase the demand on the existing supply. The estimated maximum daily water demand for the proposed development would be 13.01 litres per second as set out within the *Civil Infrastructure Report* prepared by Barrett Mahony Consulting Engineers.

Irish Water states that a new connection is possible subject to the construction of a new 300mm trunk main between the North Fringe Water Supply pipeline and Corr Bridge PS to be constructed and in function.

The Site-Specific Flood Risk Assessment finds the site is located in Flood Zone C – outside of areas at risk of flooding. The new channel in the riparian strip has ben designed to mitigate against flooding. The design of the new channel has been designed to minimise the risk of drowning.

The potential impact on population and human health as a result of the elements of the development associated with water is therefore considered to be negligible.

3.5.5 Air Quality & Climate

Construction Phase

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, with a temporary medium risk to human health. However, the potential construction phase impacts shall be mitigated as detailed in Chapter 6 (Air Quality and Climate, including Microclimate) of this EIAR to ensure there is a medium temporary impact on ambient air quality for the duration of all construction phase works. However, a programme of dust monitoring shall be implemented throughout the construction phase to assess compliance with the air quality limits and to ensure local residents, workers, property and amenities are not adversely impacted by construction related dust emissions. Therefore, the overall risk is considered low. 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. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be negative, short-term and imperceptible with respect to human health.

Operational Phase

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the 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 both with and with-out the proposed development and therefore, will not result in a significant impact on human health.

Due to the proximity of the Irish Water pumping station to the west of the site, the potential odour impacts from the pumping station on the proposed development have been qualitatively assessed.

The predominant wind direction in the region is south-westerly (see Figure 6.1 in Chapter 6) which would indicate that dispersal of any potential odours from the pumping station would be blown out to sea the majority of the time. In addition, the odour exposure criteria (1.5 OU_E/m^3 for pumping station, see Table 6.6 in Chapter 6) is expressed as a 98^{th} percentile of hourly means at the worst-case sensitive receptor and is averaged over a one-year period – this allows a total of 175 exceedances per year before it is considered an issue.

Overall, there is the potential for odour impacts to occur during the operational phase of the proposed development as a result of the nearby pumping station. These impacts would be considered negative and brief in nature as they are unlikely to last for prolonged periods of time. However, it is the overall responsibility of Irish Water, the operators of the WWTP pumping station to ensure no odour nuisance impacts are occurring at any nearby sensitive receptors such as the proposed development.

3.5.6 Wind

In relation to Wind, the examination shows the Lawson comfort categories over the ground floor area around proposed Claremont Development during its operational phase. 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 really rarely are only suitable for “business walking” or “unacceptable for pedestrian comfort”.

3.5.7 Daylight Sunlight

The operational stage of the development is unlikely to precipitate any significant impacts in terms of health. As outlined in Section 6.3.8 of Chapter 6, the proposed development is unlikely to result in any undue adverse effects on daylight access within buildings in the wider surrounding area and will deliver good levels of daylight and sunlight to the proposed development.

3.5.8 Noise

Construction Phase

During the construction phase there is the potential for impacts on nearby noise sensitive properties due to noise generated by construction site activities. The implementation of the construction phase noise and vibration mitigation measures and a routine noise monitoring programme as detailed in Chapter 7 of the EIAR, will minimise the potential noise and vibration impact on the receiving environment including existing residential receptors, thereby ensuring that there will be no significant population or human health impacts associated with noise from the construction phase of the development. A programme of noise and vibration monitoring shall be implemented throughout the construction phase to assess compliance with noise and vibration limit criteria and to ensure local residents, workers, property and amenities are not adversely impacted by construction related noise and vibration.

In terms of the noise exposure of workers on site and potential hearing damage that may be caused due to exposure to high levels of noise from machinery and equipment, the *Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007)* provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The employer will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures where necessary.

Operational Phase

Once operational, the nature of on-site sources are comparable to other similar activities in the surrounding area which form part of the ambient noise environment, including DART line. The noise limits at the nearest noise sensitive locations are set in line with the best practice guidance in order to control any adverse impacts on people. In addition, operational noise limits also align with those set by the WHO *Guidelines for Community Noise (WHO 1999)* document in order to avoid any daytime annoyance or speech interference. Taking the above into consideration, operational noise levels associated with the development will be well below any level that has the capacity to cause any risk of long-term exposure to noise on human health. There are no health risks associated with operational noise resulting from the development.

3.5.6 Biodiversity

There are no considered interactions with human health.

3.5.7. Landscape and Visual Impact Assessment

Existing residents, workers and visitors to Howth will interact with this landscape on the arrival and departure from the village such that they will be aware of a change at this site. Such a transformation, whilst notable, is a zoned objective for the site and development of a notable scale has been previously approved. The landscape and visual impact associated with human beings focuses on the visual effects of the proposed development to sensitive visual receptors in the landscape. The Proposed development generates visual effects, and these are discussed within the main body of the assessment.

The design of the proposed development has considered in detail the opportunities to integrate the Proposed development with the existing village, and in particular capitalising on opportunities to provide views of the sea, public amenity that was not previously available and opportunities for recreation and social interaction.

The development would represent a high-quality positive intervention in the landscape at the gateway to the village that would enhance the sense of approach and arrival into the village for locals and visitors alike, compared to the former industrial use.

Please refer to Chapter 10 - Landscape and Visual Impact and the accompanying appendices (including photomontages) for the landscape and visual effects of the proposed development.

3.5.8 Material Assets

3.5.8.1 - Traffic

Construction

The traffic impacts, which are be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified in section 11.1.1.9.4 in Chapter 11. Increased traffic flows during construction, notwithstanding the mitigation measures outlined, have short term temporary impacts in respect of air, noise, biodiversity and human health, arising from fumes and noise from combustible engines.

Operational Phase

The development proposals include the delivery of a range of new transport infrastructure which caters for all modes of travel. Pedestrians and cyclists will benefit from this new range of transport infrastructure as these will develop connections with existing urban areas which will enhance the attractiveness, safety and convenience of active modes of travel for journeys both (i) to/from the subject development proposals and (ii) existing urban areas who will be able to benefit from the new shorter routes through the subject development site. The increase in traffic flows are considered to have a moderate, negative, long term impact on Sutton Cross.

Increased traffic flows resulting from the development, notwithstanding the mitigation measures outlined in section 11.1.1.9.5, in Chapter 11 have an impact in respect of air, noise, biodiversity and human health. These have been found to be not to have a significant impact on human health by AWN Consulting.

3.5.8.2 Water

Construction Phase

The construction phase of the proposed development may give rise to short-term impacts associated with migration of surface contaminants. Construction impacts are likely to be short term and are dealt with separately in the relevant chapters of this EIAR document and will be subject to control through a Construction and Environmental Management Plan. The construction methods employed and the hours of construction proposed will be designed to minimise potential impacts. The development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact on the construction phase will be reduced.

Operational Phase

The operational stage of the development is unlikely to precipitate any significant impacts in terms of health and safety. The design of the proposed development has been formulated to provide for a safe environment for future residents and visitors alike. The paths, roadways and public areas have all been designed in accordance with best practice and the applicable guidelines. Likewise, the proposed residential units and neighbourhood centre facilities accord with the relevant guidelines and will meet all relevant safety and building standards and regulations, ensuring a development which promotes a high standard of health and safety for all occupants and visitors.

The proposed development will not result in any significant impacts on human health and safety once completed and operational. Infrastructure will be constructed in line with the specifications of the relevant service provider. All wastewater will discharge to the municipal sewer and will be treated Ringsend Wastewater Treatment Plant prior to discharge. There is no likely significant risk to human health, due to the material assets of built services resulting from the construction or operation of the proposed development. The proposed development therefore is unlikely to result in negative impacts in relation to population and human health in this regard.

3.5.8.3 Waste Management

The potential impacts on human health in relation to the generation of waste during the construction and operational phases arise from the risk of poor management of waste giving rise to littering, odour issues and health hazards which could cause also odour nuisance and attract vermin. The design of the development in terms of waste storage areas, a planned approach to waste management and control and adherence to the CMP, CEMP and OWMP for the proposed development accompanying this planning application, will ensure appropriate management of waste and avoid any negative impacts on the local population. The effects are therefore deemed to be long-term, imperceptible and neutral.

Construction Phase

In order to establish the appropriate reuse, recovery and/or disposal route for the material to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous*. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities/landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities. Protocols for the protection of human health have been set out in Golders *Soil and Groundwater Management Plan.* It is considered that subject to implementation of best practice, the removal of construction and demolition waste will not give rise to a significant risk to human health. The potential effect of construction waste generated from the proposed development is considered to be short-term, not significant and neutral.

Operational Phase

A site-specific waste management plan has been designed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions to comply with waste reduction and recycling targets defined in *The Eastern-Midlands Region Waste Management Plan 2015-2021.*

The nature of the development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for mechanical waste recovery or energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas.

Waste contractors will be required to service the development on a biweekly basis to remove waste. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

The potential impact of operational waste generation from the development is considered to be long-term, neutral and imperceptible.

3.5.10 Risk of Major Accidents or Disasters

The risk of major accidents and disasters are not considered likely. The site is not close to any Seveso site.

Construction Phase

The risks of accidents identified include those arising from logistics and traffic movement, working form height, fire, exposure to asbestos and contaminated material, occupational health injuries, pollution and unauthorised accidents. Appropriate mitigation measures are proposed, to reduce risk. The risk assessment identifies that may be short-term nuisance to the public from noise, dust, vibration and construction traffic during the construction phase. This will be minimised and managed to industry accepted best practice standards.

The Human Health Risk Assessment (Golders Associates) has identified contaminated soils which may pose an unacceptable risk to human health. The methodology described in the Materials Management & Remedial Strategy Plan mitigates these hazards to human health, via removal of contaminated material and non-hazardous soil as a physical barrier, in addition to other management controls (See Volume 3 Chapter 4 Appendices).

Operational Phase

The development includes a pumping station, with a low-level noise output. The nearest residential units are located approximately 50 metres from the pumping station, and the background local traffic noise masks its operation, even at night.

In terms of human health, the operational impacts are likely to be not significant. During operation, there is the potential for a number of facility and traffic related emissions (e.g. NO^2, PM^{10}, $PM^{2.5}$, CO, benzene, NOx, VOCs and CO^2) to the atmosphere. These are likely to have an imperceptible impact on local air quality.

The proposed development has been designed so that it is within Flood Zone C and therefore not at risk of flooding. Overtopping by waves and a sea breach are considered very unlikely and of low consequence. In relation to the riparian strip, as with all open bodies of water there is a risk of drowning posed to the public. There is a requirement to provide appropriate safety equipment such as life buoys and relevant signage in accessible, visible areas along the riparian strip.

3.6 POTENTIAL CUMULATIVE IMPACTS

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, notably the permitted development at Balscadden of 163 residential units and retail units, ABP- 301722-18. A new permission on this site is now being sought for an increased residential component of 177 units (+14 units). See www.rennieplaceshd.ie for details.

The cumulative impacts from the permitted development is assessed where relevant.

Two permissions have also been granted for sites to the north of the current site on the west pier. These were for an extension to an existing fish processing factory (F17A/0553) and for industrial units (F18A/0267). A third permission (F18A/0074) provides for a new quay wall on the east side of the middle pier and associated berthing. These have been considered in relation to Chapters

Permission has been granted for a new Regional Wastewater Treatment Plant of 500,000 P.E in Clonsaugh, including a sludge hub centre, regional biosolids storage facility, orbital sewer and outfall pipe under ABP-301908-18 and ABP 302039-18.

The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity, will be a further increase in the population of the wider area. This will have a moderate impact on the population (human beings) in the area. This impact is likely to be long term and is considered to be positive, having regard to the zoning objective for the subject lands, and their strategic location in close proximity to public transport, and the high level of demand for new housing in the area.

With regard to human health, the cumulative impact of the proposed development in conjunction with other nearby developments will provide for the introduction of a high quality, new neighbourhood in the area with a high level of accessibility and amenity. The overall cumulative impact of the proposed development will therefore be long term and positive with regard 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.

3.7 '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.

A *'do nothing'* impact would result in the subject lands remaining in a derelict and vacant state. This would give rise to significant disamenity to neighbours and would be an underutilisation of the site from a sustainable planning and development perspective, particularly considering the location of the lands and their zoning for town and district centre use. The status of the environmental receptors described throughout this EIAR document would be likely to remain unchanged. The potential for any likely and significant adverse environmental impacts arising from both the construction and operational phases of the proposed development would not arise.

In terms of the likely evolution without implementation of the project as regards natural changes from the baseline scenario, it is considered there would be limited change from the baseline scenario in relation to population (human beings) and human health based on ongoing trends observed in the surrounding area and the national context.

However, similarly the potential for any likely and significant positive environmental impacts arising from both the construction and operational phases of the proposed development would also not arise. The site is zoned for town and district centre use purposes within the Fingal Development Plan, with an objective to protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities and the proposed use of the site is considered to be in accordance with the proper planning and sustainable development of the area.

A ‘do nothing’ scenario would involve the subject site, remaining in its current predominantly derelict state, and remaining underutilised. Asbestos and contaminants currently in place would not be removed.

The local economy would not experience the direct and indirect positive effects of the construction phase of development, including employment creation. The local construction sector and associated industries and services would be less viable than they might otherwise be.

Failure to deliver the proposed residential units would result in existing housing need and demand remaining unmet. The new pedestrian and cycle links, working, shopping and socialising space and public open spaces to be provided in the development and serving the wider area would also not be provided.

3.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

Avoidance, remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential likely and significant environmental impacts.

Construction Phase

A range of construction related remedial and mitigation measures are proposed throughout this EIAR document with reference to the various environmental topics examined and the inter-relationships between each topic. These remedial and mitigation measures are likely to result in any significant and likely adverse environmental impacts on population and human health during the construction phases being avoided. Readers are directed to Chapter 13 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIAR.

3.8.1 Mitigation Measure

In order to protect the amenities enjoyed by nearby residents, premises and employees, a Construction and Environmental Management Plan (including traffic management) should be prepared by the contractor and implemented during the construction phase.

Operational Phase

The operation phase is considered to have likely positive impacts on human beings in relation to the provision of additional residential units, neighbourhood centre facilities, and high-quality open space and pedestrian/cyclist facilities to cater for the demands of a growing population and encourage active travel modes in accordance with the principles of sustainable development and residential zoning objectives pertaining to the site.

3.9 PREDICTED 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 permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied. It should be noted that in addition to remedial and mitigation measures, impact avoidance measures have also been built into the EIA and project design processes through the assessment of alternatives described in Chapter 2 of this EIAR document.

Construction Phase

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works, which will be largely confined to the proposed development site. Notwithstanding the implementation of remedial and mitigation measures there will be some minor temporary residual impacts on population (human beings) and human health most likely with respect to nuisance caused by construction activities.

It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document any adverse likely and significant environmental impacts will be avoided. Positive impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development. As outlined above, the construction phase will have both direct and secondary positive economic impacts in this regard.

The overall predicted likely and significant impact of the construction phase will be short-term, temporary and likely to be neutral.

Operational Phase

The proposed development will result in a generally positive alteration to the existing undeveloped site in terms of the provision of residential units, shopping and socialising facilities, and a childcare facility to serve the growing population of the area and in particular the need to enhance the residential opportunities for persons working in the area, in accordance with the objectives of the Fingal Development Plan and national and regional planning policy.

Positive impacts on population and human health will include health benefits associated with the provision of a high-quality environment, a highly permeable layout which encourages walking and cycling, amenity and recreational facilities.

The implementation of the range of remedial and mitigation measures included throughout this EIAR document is likely to have the impact of limiting any adverse significant and likely environmental impacts of the operational phase of the proposed development on population and human health.

3.10 MONITORING

In relation to the impact of the development on population and human health it is considered that the monitoring measures outlined in regards to the other environmental topics such as water, air quality and climate and noise etc. address monitoring requirements.

Generally, measures to avoid negative impacts on Population and Human Health are integrated into the design and layout of the proposed development. These are subject to compliance conditions of any permitted development. Monitoring will be undertaken by the Building Regulations certification process Monitoring of compliance with Health & Safety requirements will be undertaken by the Project Supervisor for the Construction Process. Monitoring of Fire Safety will be part of the Fire Safety Certification Process.

3.11 REINSTATEMENT

While not applicable to every aspect of the environment considered within the EIAR, certain measures may be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.

There are no reinstatement works proposed specifically with respect to population and human health.

3.12 RESIDUAL IMPACTS

It is anticipated that the proposed development will realise significant positive long term overall economic and social benefits for the local community and the wider Howth area. The proposed development will increase the population in Howth. This is considered a positive impact. It will redress the population decline that Howth has experienced from a population high of 9,369 persons in 1996. It will provide additional services, such as a creche and convenience store large enough to provide for a weekly shop for the citizens of Howth. This will reduce the need to travel by car to Sutton Cross. There will be a negative moderate long term impact on traffic congestion at Sutton Cross.

The additional parks and civic space, walkway and cycleways provided by the proposed development will improve the recreational opportunities in Howth and enhance public health by providing more opportunities for exercise.

Strict adherence to the mitigation measures recommended in this EIAR will ensure that there will be no negative residual impacts or effects on Population and Human Health from the construction and operation of the proposed scheme. Indeed, the delivery of housing, retail and additional open space will realise a significant positive long term impact for the local area.

3.13 INTERACTIONS

The specific interactions between chapters have being documented above. As noted above, there are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to human health. This chapter of the EIAR has been instructed by updated guidance documents reflecting the changes within the 2014 EIA Directive. These documents include *the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (2018) and the *Draft Guidelines on the information to be contained in environmental impact assessment reports*, published by the EPA in August 2017. Therefore, in line with the guidance documents referred to, this chapter of the EIAR focuses primarily on the potential likely and significant impact on Population and Human Health in relation to health effects/issues and environmental hazards from the other environmental factors and interactions that potentially may occur.

Where there are identified associated and inter-related potential likely and significant impacts which are more comprehensively addressed elsewhere in this EIAR document, these are referred to. However, the reader is directed to the relevant environmental topic chapter of this EIAR document for a more detailed assessment.

3.14 DIFFICULTIES ENCOUNTERED IN COMPILING

No significant difficulties were experienced in compiling this chapter of the EIAR document.

3.15 REFERENCES

Directive 2014/52/Eu Of The European Parliament And Of The Council
European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018
Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, DHPLG 2018
Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, 2017
Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (2017) – European Commission
Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment Guidelines for Regional Authorities and Planning Authorities 2004 DOELG
Regional Planning Guidelines for the Greater Dublin Area 2010-2022
Draft Regional Spatial and Economic Strategy for the EMRA, 2018
Fingal Development Plan 2013-2019
2019 Labour Force Survey Q2 – www.cso.ie
2019 Labour Force Survey Q1 – www.cso.ie
2018 Labour Force Survey Q4 – www.cso.ie
ESRI Quarterly Economic Commentary, Winter 2018
ESRI Quarterly Economic Commentary, Spring 2019
ESRI Quarterly Economic Commentary, Summer 2019
ESRI Quarterly Economic Commentary, Autumn 2019
Central Statistics Office www.cso.ie
Pobal.ie

Chapter 4
Land, Soil, and Geology

4.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the land, soil and geology within and immediately surrounding the Site of the Proposed Development and an assessment of the potential impacts of the Proposed Development on land, soils and geology and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Land, soil, geological and groundwater characteristics of the Site;
- Potential impacts that the Proposed Development may have on land, soils, geology and hydrogeology (water quality), including geological heritage and contaminated land/groundwater assessments including worst case scenario assessment;
- Potential constraints that these features may place on the Proposed Development;
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development; and
- Evaluate the significance of any residual impacts.

4.1.1 QUALITY ASSURANCE AND COMPETENCE

This chapter of the EIAR was written by Gareth Carroll BAI, Senior Environmental Consultant with Enviroguide Consulting (Enviroguide) with 8 years' experience of environmental assessment of brownfield and greenfield sites. The chapter was reviewed by Claire Clifford BSc., MSc., PGeo., EurGeol who is Technical Director of the Contaminated Land and Hydrogeology Division of Enviroguide and is a Professional Geologist with the Institute of Geologists of Ireland and has extensive experience in preparing environmental assessments for a range of project types and geological and hydrogeological site settings.

4.1.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The Proposed Development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The Proposed Development will include the demolition of all structures on site (c.8,162m2 GFA) and excavation of a basement. The Proposed Development comprises of the provision of a mixed use development of residential, retail/non retail uses and a childcare facility in 4 no. blocks (A to D), over part basement. Blocks A, B, and C range in height from part three and a half storeys with further floors setback of up to seven storeys in 'U' shaped blocks. Block D is part single storey and part six storey. The residential component will consist of 512No. residential units. The Proposed Development will consist of;

Provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at ground floor, to provide for a total of 439 no. spaces. 1,335 no. bicycle parking spaces shall be provided, including 49 no. bicycle spaces to cater for the retail units and creche. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and the main vehicular entrance at Block C;

A public walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be opened up and incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 944m2. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum of seven storeys, will provide for 234 units, a gym, residents' lounge, residents' support office, and 2 no. multi-purpose rooms. Own door access will be provided to ground floor units. Block B, with a maximum of seven storeys, shall provide for 154 no. units, residents' lounge, multi-purpose room, and creche of 236m2 with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum of seven storeys will provide for 83 no. residential units in two wings over retail units and Block D, with a maximum of 6 storeys, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637m2 gross floor area. In Block C it consists of 1,705m2anchor unit at ground floor. In Block D it consists of a restaurant (243m2) and retail unit (603m2), and café (86m2) at first floor;

The Proposed Development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the Proposed Development is 48,252m2 on a site of 2.68 hectares (Ha).

4.1.3 Characteristics of Proposed Development Relevant to this Chapter

The construction phase of the Proposed Development will likely have impacts on the receiving environment that are specifically relevant to the land, soil, geological and hydrogeological characteristics of the Site.

The land-use at the site of the Proposed Development will be changed from industrial and commercial land use to a mixed-use development of residential, retail/commercial uses and a childcare facility.

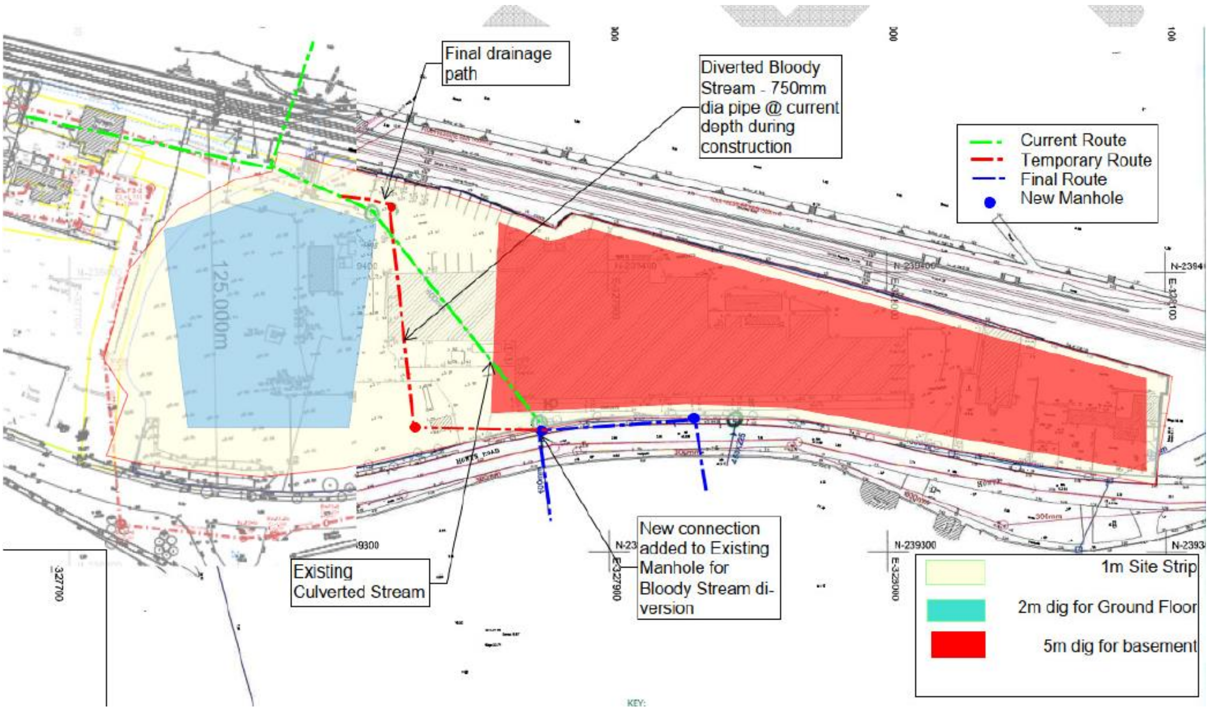
The Proposed Development will include the following:

- Demolition of existing buildings including the existing Techrete factory, Teeling's Garage and the Garden Centre (8,162 sqm) together with and above and below infrastructure;
- Basement construction including bulk excavation over an area of 6,308m2 to a depth of 2.2 meters below ground level (mBGL) (1.8mOD) in the west beneath Block A and over an area of 9,933m2 to a depth of 5.2mBGL (-1.2mOD) beneath Blocks B, C and D in the mid and eastern portions of the site. The basement locations are shown on Figure 4.1 below;
- Groundwater dewatering will be required for the excavation and construction of the basement level underneath Blocks A, B, C and D and there will be no direct discharges to surface water. All groundwater will be discharged under temporary license.
- Opening up of the Bloody Stream and developing a riparian strip across the site that will include the construction of an open impermeable concrete channel spanning the breadth of the site with underground drainage connections at either ends, a settlement chamber and landscaped banks on either side of the channel (levels range from 2.371mOD in the southern portion of the

strip (S5) to 2.238mOD in the northern portion of the strip (S6)). Results from site investigations (Golder, 2019a) show the water table to be approximately 2.0mOD and therefore it is anticipated that the proposed riparian strip will be constructed above the water table. During development works it is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe as per Irish Water (IW) guidelines;

- Storm water from the Proposed Development will be managed in accordance with principles of Sustainable Drainage Systems (SuDS). It is noted that the full implementation of SuDS measures is not deemed necessary for the Proposed Development because of the proximity to the sea and the fact that the surface water sewer discharges directly to the sea.
- It is proposed that a combination of intensive and extensive green roof will drain into the Bloody Stream throughout the Proposed Development. Water collected in the lower ground car park will be collected for outfall into the foul drainage. Water collected in the basement will drain into a sump and pumped to lower ground floor and outfall into the foul sewer. Further detail on storm water management is included in Chapter 5 of this EIAR;
- Disposal of rainfall on permeable paving will be designed to replicate the green field infiltration rate and will therefore not be included in the surface water drainage system. Permeable paving / green areas will be within the western park and limited areas along the southern boundary and riparian strip area of the site. Further detail on the permeable paving design is included in Chapter 5 of this EIAR;
- The majority of the site will be hard covered with buildings and impermeable pavement on completion of the Proposed Development.

Figure 4.1. Bulk Excavation Works



The amount of excavation and infilling to be undertaken during the construction phase of the development is estimated below:

Table Error! No text of specified style in document.**.1. Cut/Fill Balance for Excavation Area (BMCE, 2019)**

Cut Balance	**Area (m^2)**	**Volume (m^3)**
Earth	6,308	15,770
Block A	9,933	39,732
Basement	690	1,380
Block B		
Riparian Strip	1,632	3,264
Pile Arisings		3,940
West Block 970No. 600dia x 12.0m (plus 25%)		1,015
East Block 450dia secant wall x 4.0m)		
		65,101
Total Earth		
Landscaping 1.75m above	4,000	-7,000
Cut/Fill Balance		**58,101**
Rock		
Basement (	9,933	11,920
East Block Pile Arising		510
Total Rock		12,450
Total Approximate Quantity of Excavated Materials		**70,551**
Hazardous Soil for Verification (estimate for disposal off-site)		**2,600**
Pile Arisings (non-hazardous for disposal)		**5,200**
In-situ Soils (inert / non-hazardous waste less fill requirement)		**50,301**
Rock		**12,450**
Total Volume Removed Off-site		**70,551**

The cut and fill balance at the site is estimated to be 70,551m3. The basement excavation will extend to 5.2mBGL. Excavated material will be disposed off-site to a licensed facility for land reclamation. It is anticipated that approximately 7,000m3 of soil will be retained on site for landscaping areas and berming. It is also anticipated that approximately 1,500m3 of topsoil cover will be imported on-site. Additional aggregates may also require importing to site if it is considered that rubble from demolition of buildings is not suitable.

4.1.4 Description of other Relevant Developments

1. 301722-18

Granted Permission on 14/09/2018

Development Description:

A Strategic Housing Development has been permitted at a site at Balscadden in Howth. This development consists of 163 no. residential units including 1, 2, and 3-bedroom apartments and duplex units. 757m2 of commercial space, including two no. retail units and a café, is also included. The development provides for 120 no. car parking spaces located at street level and basement level.

2. F18A/0267

Granted Permission on 06/11/2018

Development Description:

Planning permission is being sought by the Department of Agriculture, Food and Marine for construction of 2 no. ground level industrial buildings (5 no. units each) consisted of a total of ten industrial units. The maximum height of buildings at ridge level is 6.25m. The use of the building will consist of light industrial activities such as repair and maintenance of maritime and fishing equipment and ancillary storage.

3. F17A/0553

Granted Permission on 05/12/2017

Development Description:

Permission sought by Oceanpath Ltd. for development at existing food processing facility at sites 37-03 and 37-05, Claremont Industrial Estate, West Pier, Howth, County Dublin. The proposed development will consist of the scheme previously approved under F17A/0313 with the following alterations:

- Reduction in size of the proposed extension by 133m2 so that it will consist of: The construction of 1,258m2 (approximately) two storey extension (8.135m high approximately) to west side of existing 1,130m2 (approximately) two storey building (8.135m high approximately). The main use of the existing building is for the processing of food (primarily fish) and it storage and distribution. The main uses of the proposed extension will be for the processing of food (primarily fish) and its storage and distribution but will also include an 11.0m (approximately) factory retail outlet primarily for the sale to the public of seafood products produced on-site.
- The omission of the proposed construction of 3.8m2 (approximately) single storey (3.505metre high approximately) compactor enclosure to northwest corner of the site.
- The relocation of the existing fence on the west side of the site 37-05 to be against the legal site boundary.
- Associated works.

4. F18/0074

Granted Permission on 01/10/2019

Development Description:

Permission granted for the provision of 130m long quay wall; associated deck area, road access, hard standing; localised dredging to facilitate works, dredging to -4m Chart Datum along the front of new quay wall to provide berthing depth and land reclamation of approximate 0.30 Ha on the east side of Middle Pier of Howth FHC.

5. ABP-301908-18 AND ABP-302039-18

Granted Permission on 13/11/2019

Development Description:

Development of a new wastewater treatment plant, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids storage facility. The project will be located in County Fingal and with a 60-metre section of pipeline in Dublin City and is 25 kilometres long. The development may be described in more detail as:

- Regional WwTP of 500,000 PE on 29.8 ha site in Clonshaugh to be constructed in a single phase.
- Wastewater treatment plant comprising a regional wastewater treatment plant to be located on a 29.8-hectare site in the townland of Clonshagh (Clonshaugh) in Fingal.
- Abbotstown pumping station comprising a pumping station to be located on a 0.4-hectare site in the grounds of the National Sports Campus (NSC) at Abbotstown.
- Orbital sewer route comprising an underground orbital sewer, the route of which will intercept the existing sewer at Blanchardstown and divert it from this point to the wastewater treatment plant at Clonshagh.
- Diversion of the North Fringe Sewer (NFS) which will be constructed from the junction of the access road to the wastewater treatment plant with the R139 Road (Dublin City Council administrative area).
- Outfall pipeline route (land-based section) to be constructed from the northern boundary of the wastewater treatment plant to the R106 Coast Road at Maynetown (townland).
- Outfall pipeline route (marine section) to be constructed from the R106 Coast Road (at Maynetown) and will terminate at a discharge location approximately one kilometre north-east of Ireland's Eye (island).
- Regional biosolids storage facility (RBSF) located on an 11-hectare site at Newtown, Dublin.

4.2 METHODOLOGY

4.2.1 REGULATIONS AND GUIDANCE

The methodology adopted for the assessment takes cognisance of the relevant guidelines in particular the following:

- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment including amendment directive 2014/52/EU of the European Parliament and of the Council of 16th April 2014.;
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (Groundwater Protection Schemes, 1999).
- Environmental Protection Agency, August 2017. Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017);
- Environmental Protection Agency, September 2015. Draft Advice Notes for preparing Environmental Impact Statements (EPA, 2015);
- Environmental Protection Agency, 2002. Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002);
- Environmental Protection Agency, 2003. Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);

- Institute of Geologists of Ireland Guidelines, 2002. Geology in Environmental Impact Statements, A Guide (IGI, 2002);
- Institute of Geologists of Ireland Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013);
- National Roads Authority, 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009);
- Transport Infrastructure Ireland Publications, June 2015. Road Drainage and the Water Environment (including Amendment No. 1 dated June 2015). (TII, 2015);
- Transport Infrastructure Ireland Publications, December 2017. The management of Waste from National Road Construction Projects. (TII, 2017);
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy with amendments 2455/2001/EC, 2008/32/EC and 2008/105/EC;
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and amendment S.I. No.366/2016;
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019; and
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

4.2.2 PHASED APPROACH

A phased approach was adopted for this Environmental Impact Assessment (EIA) in accordance with EPA and IGI guidelines as set out above and is described in the following sections.

Element 1: An Initial Assessment and Impact Determination stage was carried out by Enviroguide (Claire Clifford) to establish the project location, type and scale of the development, the baseline conditions, and the type of land, soil, geological and hydrogeological environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and impact determination.

This stage of the assessment included a desk top study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for the soils and geology chapter of the EIAR, extends beyond the site boundaries and includes potential receptors within a 2km radius of the Site. The extent of the wider study area was based on the IGI, 2013 Guidelines which recommend a minimum distance of 2km.

This stage of the assessment was completed by Enviroguide and included the review of the following sources of information:

Environmental Protection Agency (EPA) webmapping 2019;

GSI Datasets Public Viewer and Groundwater webmapping;

Ordnance Survey Ireland (OSI) webmapping 2019; and

Water Framework Directive Ireland (WFD) webmapping, 2019.

Liaison with the design team was integral to determining the overall potential impacts associated with the Proposed Development. The design team members and relevant reports, documents and drawings reviewed and evaluated are set out below:

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Construction Management Plan Report (CMP (BCME, 2019a));

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Civil Infrastructure Report (IR (BCME, 2019b));

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Flood Risk Assessment Report (FRA (BCME, 2019c));

Barrett Mahony Consulting Engineers Civil and Structural, November 2019. Construction and Demolition Waste Management Plan Report (CDWMP, 2019d);

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Basement Foul and SW Drainage. Drawing No. PPT-BMD-XX-ZZ-DR-C-1001;

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Ground Floor Foul and SW Drainage. Drawing No. PPT-BMD-XX-ZZ-DR-C-1002;

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Outline Sections 1 & 2. Drawing No. PPT-BMD-XX-ZZ-DR-S-2100;

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Watermain Layout. Drawing No. PPT-BMD-XX-ZZ-DR-C-1005;

Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Riparian Strip Plan & Sections. Drawing No. PPT-BMD-XX-ZZ-DR-C-1010;

Enviroguide Consulting, November 2019. Outline Construction Environmental Management Plan (OCEMP (Enviroguide, 2019a));

Henry J Lyons, October 2019. Claremont Project. Block B – Basement Plan. Drawing No. CLR-HJL-02-B01-DR-A-1008;

Henry J Lyons, October 2019. Claremont Project. Block C & D – Basement Plan. Drawing No. CLR-HJL-03-B01-DR-A-1008CD;

Henry J Lyons, October 2019. Claremont Project. Block A – Lower Ground Floor Plan. Drawing No. CLR-HJL-01-L00-DR-A-1009A;

Henry J Lyons, October 2019. Claremont Project. Block B – Lower Ground Floor Plan. Drawing No. CLR-HJL-02-L00-DR-A-1009B;

Henry J Lyons, October 2019. Claremont Project. Parking Plan – B01 – Lower Ground Level, B02 – Basement Plan. Drawing No. CLR-HJL-A-1121.

Minerex Environmental Ltd., November 2019. Planning stage dewatering plan, risk assessment and mitigation measures (Minerex, 2019).

OHSS Safety Consultants, October 2019. Asbestos Demolition Survey Report (OHSS Safety Consultants, 2019a); and

OHSS Safety Consultants, October 2019. Risk Assessment for Mechanical Handling of Soils/Stones Containing Asbestos (OHSS Safety Consultants, 2019b).

Element 2: Direct and Indirect Site Investigation and Studies stage was carried out to refine the conceptual site model and undertake a detailed assessment and impact determination. The scope of work included: site walkovers and interview with site personnel regarding the historic operations at the Site completed by Enviroguide on the 7th and 14th January 2019 and desk-based review of site investigation and environmental assessment reports completed by Golder Associates Ireland Limited (Golder).

The reports and documents reviewed and evaluated for Element 2 of this assessment included the following:

Golder Associates Ireland Limited, November 2019. Interpretative Ground Investigation Report Claremont Development Site, Howth (Golder, 2019a);

Golder Associates Ireland Limited, November 2019. Controlled Waters Risk Assessment Claremont Development Site, Howth (CWRA (Golder, 2019b));

Golder Associates Ireland Limited, November 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth (MMRP (Golder, 2019c)) – note this report incorporates previous site investigation report by IGSL Ltd. (IGSL);

Golder Associates Ireland Limited, November 2019. Human Health Risk Assessment Claremont Development Site, Howth (HHRA (Golder, 2019d));

Note that these four reports are included in Appendix A.

The regime that governs the assessment of potential and actual pollutants with the ability to cause harm in Ireland follows that of the UK contaminated land regulatory regime (which includes legislation such as the Environmental Protection Agency Act 1992, Environmental Risk Assessment for Unregulated Waste Disposal Sites, 2007 and Groundwater Directive 2006) that provide a regime by which brownfield land can be risk assessed in a phased manner broadly described as Tier 1 (Preliminary Risk Assessment), Tier 2 (Generic Quantitative Risk Assessment) and Tier 3 (Detailed Quantitative Risk Assessment) levels. The specific scope of assessment of each of the Tier 1, Tier 2 and Tier3 are set out relevant reports produced by Golder for the Site as set out in the Table **4.2**.

Table 4.2. Key Assessment Context (Golder, 2019c)

Report Reference	Key Assessment Context
Golder Associates Ireland Limited, October 2019. Interpretative Ground Investigation Report Claremont Development Site, Howth (Golder, 2019a)	Contaminated Land – Tier 1 Risk Assessment
Golder Associates Ireland Limited, October 2019. Human Health Risk Assessment Claremont Development Site, Howth (Golder, 2019d)	Contaminated Land – Tier2/3 Risk Assessment
Golder Associates Ireland Limited, October 2019. Controlled Waters Risk Assessment Claremont Development Site, Howth (Golder, 2019b)	
Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth (Golder, 2019c)	Waste Characterisation (includes Remedial requirements identified from Tier 2/3 Risk Assessment)

Element 3: Mitigation Measures, Residual Impacts and Final Impact Assessment were based on the outcome of the information gathered in Element 1 and Element 2 of the assessment. Mitigation measures to address all identified adverse impacts that were identified in Element 1 and 2 of the assessment were considered in relation to the operational and construction phase of the development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Element 4: Completion of the Soils, Geology & Hydrogeology Section of the EIA was completed in this EIAR chapter and includes all the associated figures and documents.

4.2.3 CONSULTATIONS

The following relevant bodies were consulted regarding the Proposed Development:

- Fingal County Council (FCC);
- Department Application Unit - National Parks and Wildlife Service (NPWS);
- Irish Water (IW);
- Iarnród Éireann; and,
- Irish Aviation Authority (IAA).

The specific items raised by the relevant consultees relating to land, soil and geology have been assessed in this EIAR Chapter and in particular those of the NPWS relating to:

- Concerns regarding the basement excavation
- Hydrogeological and hydrological impacts of the dewatering which is required for the basement construction.

Any potential impacts associated with these specific items and potential impacts have been assessed and the findings presented in Section 4.4.

4.2.4 Description and Assessment of Potential Impact

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this chapter is described in Table 4.3 below:

Table 4.3. Assessment of Potential Impacts Terminology and Methodology

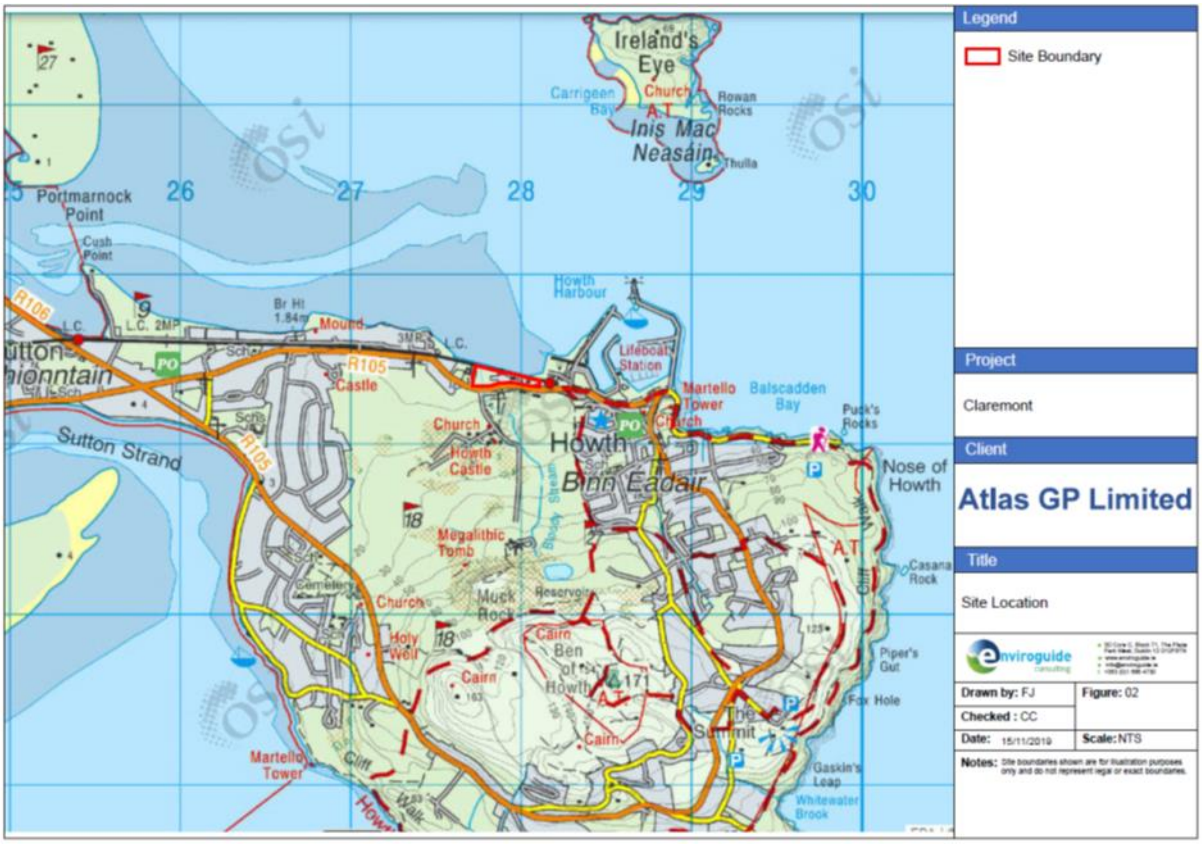
Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**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 a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	**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

4.3 BASELINE CONDITIONS FOR THE RECEIVING ENVIRONMENT

4.3.1 SITE LOCATION AND ADJOINING LAND USE

The Proposed Development is located at the western side of Howth, Co. Dublin, approximately 400m west of Howth Harbour. The Site is bordered to the south by Howth Road (R105) serving the Howth Peninsula and to the north by the DART railway line. Claremont Strand is located on the northern side of the railway line. A FCC water pumping station and associated lands lie to the west of the Site and there are residential and commercial properties adjoining the eastern Site boundary. The Site is located approximately one mile from Howth town centre. A Site location plan depicting the current layout of the Site prior to development and in the context of the surrounding environment is presented in Figure ***4.2***.

Figure 4.2. Site Location



4.3.2 CURRENT AND HISTORIC LAND USE

The Site is zoned as ‘Objective TC – Town and District Centre’. The objective of this zoning is to ‘Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities’. It is noted that residential development is permitted in principle under this zoning objective.

The Site is approximately 2.68 hectares (Ha) and generally level. Howth Road (R105) provides direct access to the Site.

The brownfield site consists of three formerly separate properties. The former Techcrete factory (historically operated by Parsons) area makes up the largest portion of the Site occupying the central and western portion of the Site. The Techrete site was historically operated as a sheet metal engineering works by Parsons prior to the property being taken over by Techrete who manufactured concrete pre-+products at the Site until 2008. The buildings to the west continued to be used as an engineering works during this time. This area of the Site comprises redundant offices, manufacturing and storage facilities located within two-to-three storey industrial sheds with corrugated steel roof, steel framework and masonry walls. The remaining area of the Site was formerly used for storage of manufacturing equipment/material and storage of finished products e.g. concrete panels.

The property to the east of the Techrete factory is occupied by the former Beshoff Motors and historically operated by Teeling Motors garage site. The Beshoff Motors site was in use as a car dealership until 2018 and is no longer in operation. This area is occupied by a former steel frame show room, separate garage and car park.

A former garden centre and dog grooming facility lie east of the Beshoff motors area. This area is occupied by a vacant single storey masonry building with a corrugated roof and concrete yard. Anecdotal evidence identified that the Site of the former garden was previously occupied by a service station and mechanics garage with underground storage tanks.

The undeveloped lands to the west of the Site, are understood to have historically been used by the local authority and that screenings from the wastewater screening plant to the west of the Site were placed on these lands.

Decommissioning of the on-site building infrastructure across the Site had not been undertaken at the time of writing this report. The existing site infrastructure occupies a large portion of the central and eastern portions of the Site, while the remaining lands are comprised of hard cover of bitumen or concrete in the lands surrounding the existing infrastructure, and with vegetation cover in the western portion of the Site.

There is a private dwelling 'Ashbury' located adjoining the eastern site boundary and the Former Stationmaster's House and Howth Railway Station are located to the east of the Site.

The lands adjoining the west of the Site are owned by FCC. The current discharge of wastewater on-site is into a 300mm sewer that outfalls into the local authority screen house and pumping station located to the west of the Site. This then carries the wastewater to a pumping station in Sutton by means of a 500mm diameter pressure main located to the north of the railway line running along the northern Site boundary. It is noted that this pressure main cuts across a small portion of the northwest corner of the Site. The wastewater is then pumped across Dublin Bay and treated at Ringsend Wastewater Treatment Plant (WwTP) before its release into the Irish Sea. There is no wastewater disposal into Baldoyle Bay.

4.3.3 Geological Heritage

There are six geological heritage sites located within a 2km radius of the Site which are summarised in Table 4.4.

Table 4.4. Geological Heritage Sites

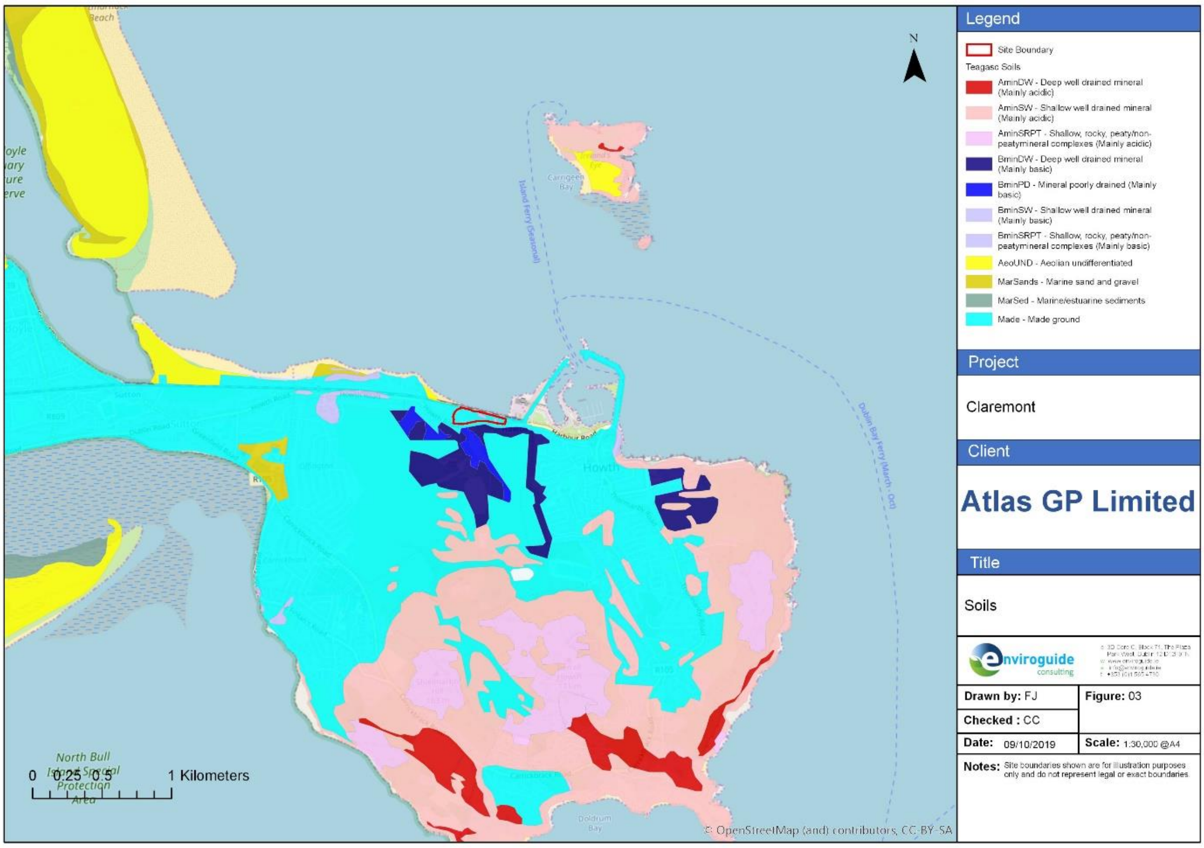
Feature	Total Number of Sites	Name	Site Code	Distance (km)	Location
Geological Heritage Site	6	Claremont Strand	DF014	0.025	North
		Balscadden Bay	DF013	0.7	East
		Ireland's Eye	DF011	1.68	North-east
		Hill of Howth	DF010	0.9	South
		Bottle Quay	DF009	1.97	South
		North Bull Island	DC007	1.36	South-west

4.3.4 Soils and Quaternary Deposits

The GSI database (GSI, 2019) has mapped the majority of the soil beneath the Site as being made ground, derived from made/built land.

A very small portion of the soil on-site, mainly on the eastern side of the Site, is mapped by the GSI as being Lithosols and Rezinas within the category shallow well drained mineral (mainly acidic) (BminSW), derived from mainly calcareous parent materials. A figure depicting the soils mapped beneath the Site is presented in Figure 4.3.

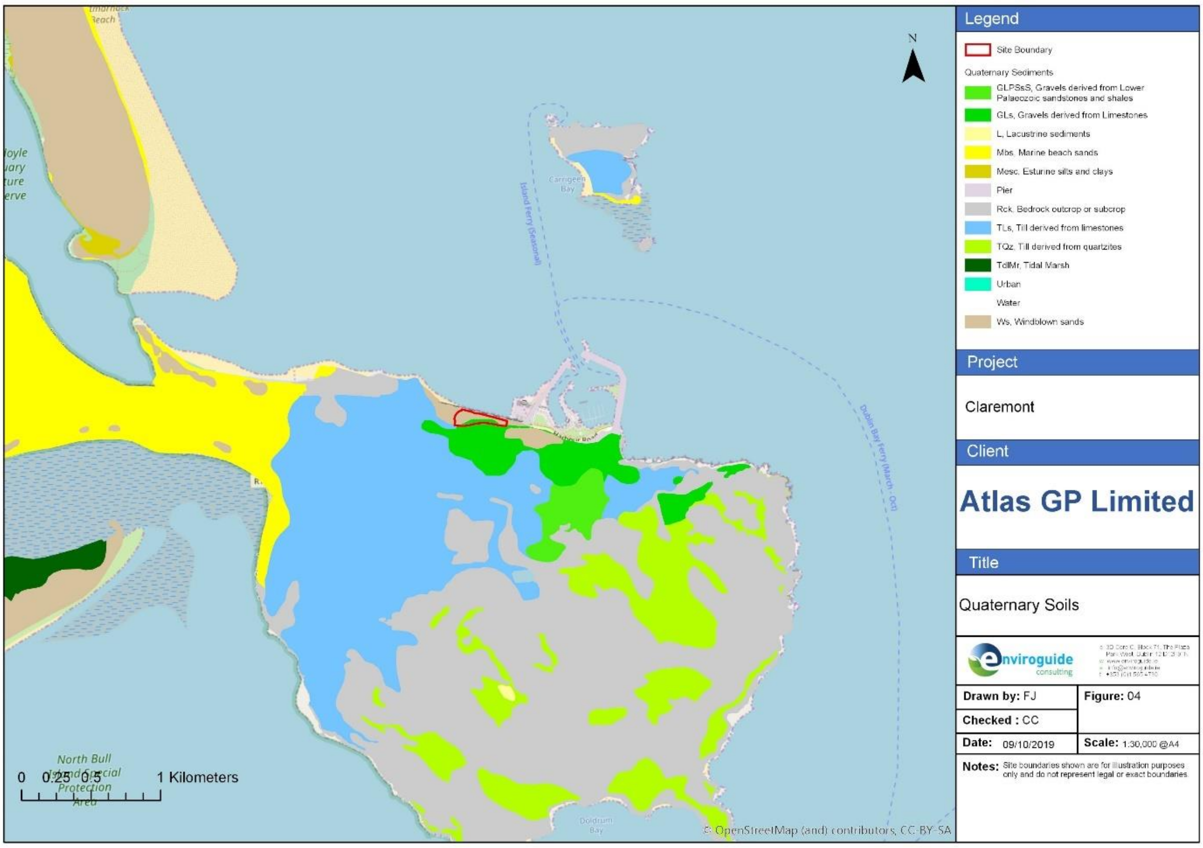
Figure 4.3. Soil Classification



The GSI database (GSI, 2019) has mapped the majority of the quaternary soils beneath this Site as being windblown sands with a portion of the south side of the Site to be gravels derived from Limestones (GLs). The are no recorded glacial meltwater channels near the Site, with the nearest ones located 4.7km from the site, that trend broadly southeast. The quaternary soils mapped beneath the Site are presented in

Figure .

Figure 4.4: Quaternary Geology



The soils underlying the Site are described in the borehole logs as documented in the Golder, 2019a report.

A hard cover of bitumen or concrete was identified across the majority of the Site with vegetation cover occupying the western portion of the Site. Made ground was encountered beneath the hard cover and vegetated cover.

The made ground soils underlying is commonly described as dark brown/black, slightly silty, gravelly, sandy CLAY with various inclusions of concrete, brick, textiles, plastics and glass.

The total depth of made ground in the eastern portion of the Site ranged from 0.3mBGL (BH05 - IGSL) in the south to 1.5mBGL (BH06 - IGSL) in the north. The depth of made ground encountered in the central portion of the Site ranged from 1.0mbGL (BH09 – Golder) in the south to 3.5mBGL (BH03 – Golder) in the north. Inclusions of ash and clinker in addition to increased deposits of ceramic, glass, concrete, steel, timber, and cinders was observed within the made ground across the central portion of the Site. The depth of made ground encountered in the western portion of the Site ranged from 1.6mBGL (TP108 – IGSL) in the south to 5.1mBGL (BH22 – IGSL) in the north. As detailed in the site investigation logs included in the Golder, 2019a report, some increased inclusions of brick, concrete, steel, and timber were observed within the made ground across the western portion of the Site.

As detailed in the site investigation logs included in the Golder, 2019a report, the surficial (native) geology of the Site can be split into three main lithologies:

Grey/yellow gravelly, silty, SAND was observed to underlie the made ground primarily in the eastern and central portions of the Site from 0.3mBGL (BH05 – IGSL) to a maximum depth of 4.1mBGL (BH04 – IGSL).

Dark grey, gravelly slightly sandy SILT with occasional shell fragments was observed to underlie the gravelly, silty, SAND primarily in the eastern and central portions of the Site to a maximum depth of 5.1mBGL (BH03 – Golder).

Basal deposits of glacial till comprising brown, slightly gravelly CLAY were observed underlying the made ground primarily in the western portion of the Site to a maximum depth of 5.7mBGL (BH22 – IGSL).

The NRA criteria for estimation of the importance of geological features at the Site during the EIA stage, as documented in the IGI Guidelines (IGI, 2013), are summarised in Table **4.5**.

Table 4.5. Criteria for Rating Site Importance of Geological Features

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource.
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on-site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale.	Contaminated soil on-site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit.

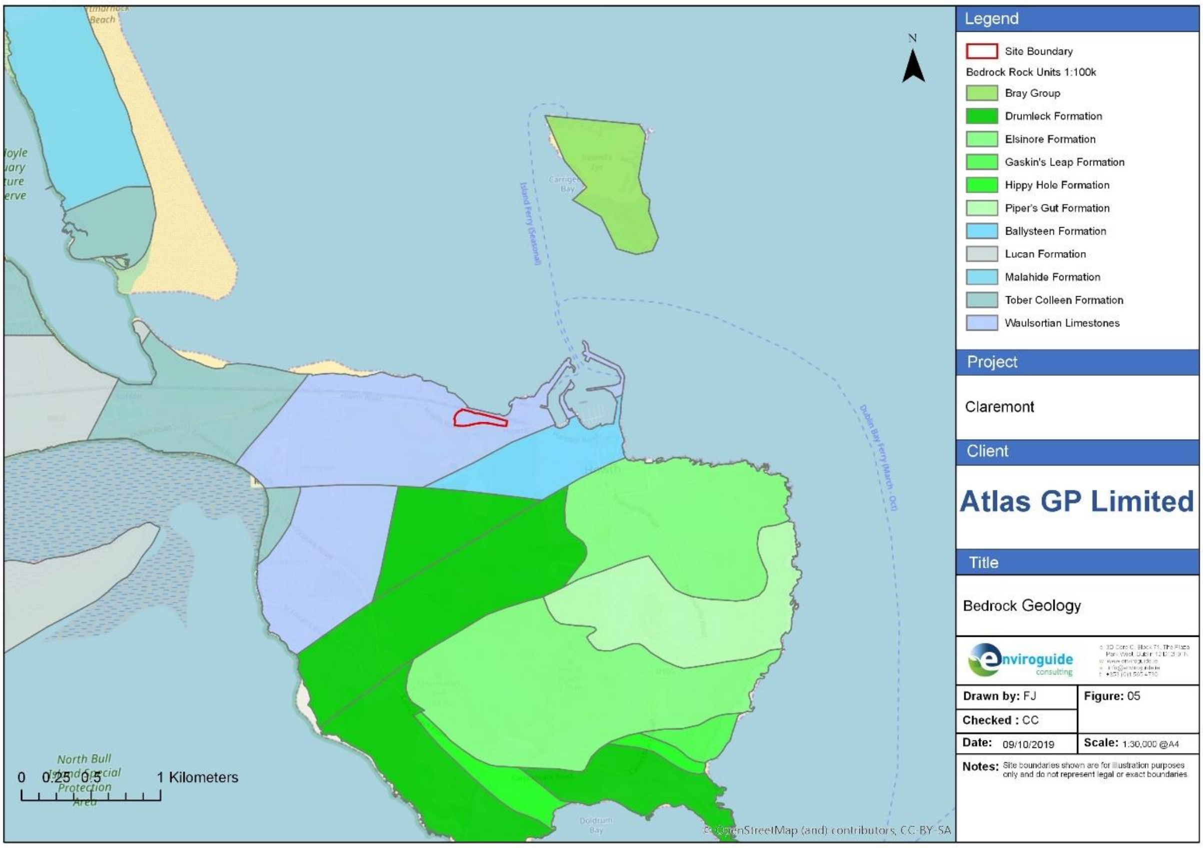
Importance	Criteria	Typical Example
	Volume of peat and/or soft organic soil underlying route is moderate on a local scale.	Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

It is noted that, in accordance with the NRA Guidance as documented in by IGI (IGI, 2013) and as outlined in Table **4.5** the soils underlying the Site would be rated as an attribute of 'medium to high' importance, due to the moderate degree of contamination on a local scale and the presence of contaminated soil on-site with previous heavy industrial usage. It is noted that this attribute of importance is assigned due to its potential for adverse environmental impacts and not on the basis of importance in the context of geological heritage or resource potential. It is noted that there are no extractable minerals or areas of geological heritage in the vicinity of the Proposed Development.

4.3.5 BEDROCK GEOLOGY

The GSI database (GSI, 2019) has mapped the bedrock beneath the Site as Waulsortian Limestone Formation. The Waulsortian Limestones comprise massive, unbedded lime-mudstones. They are predominantly grey massive limestones from the Carboniferous era, typically 300m to 500m thick. The bedrock structures in the area trend west/southeast. The bedrock geology is presented in Figure .

Figure 4.5: Bedrock Geology



The bedrock profile underlying the Site is described in the borehole logs as documented in the Golder, 2019a Report.

The bedrock underlying the Site is described as fractured (becoming less fractured with depth) limestone with a honeycomb weathered structure in its upper layer becoming dolomitised (recalcified and veins) with depth. Site investigation data shows that the depth to bedrock in the eastern portion of the Site ranges from 3.0mBGL (BH07 – IGSL) to 10.2mBGL (BH04 – IGSL). The depth to bedrock in the central portion of the Site ranges from 2.3mBGL (BH10 - IGSL) in the south to 9.2mBGL (BH14 – IGSL) in the north. And, the depth to bedrock in the western portion of the Site ranges from 4.7mBGL (BH31 – IGSL) in the south to 16.2mBGL (BH26 – IGSL) in the west. The overall observations for the depth to bedrock across the entire Site indicates a trend of increasing depth to the west and north of the Site.

It is noted that, in accordance with the NRA Guidance as documented by IGI (IGI, 2013) and as outlined in Table 4.5 above the bedrock at the Site would be rated as an attribute of 'low' importance, due to it being of significance or value on a local scale only and being an uneconomically extractable mineral source.

4.3.6 RADON

The Site is mapped by the EPA (EPA, 2019) to be in an area where less than 1% of the homes in a 10km grid square are estimated to be above the Reference Level. A High Radon Area is any area where it is predicted that 10% or more of homes will exceed the Reference Level of 200 Becquerel per cubic metre (Bq/m3). Therefore, the Site is not considered to be within a High Radon Area. It is noted that a high radon level can be found in any home, in any part of the country, but these homes are more likely to be located in High Radon Areas.

4.3.7 HYDROLOGY

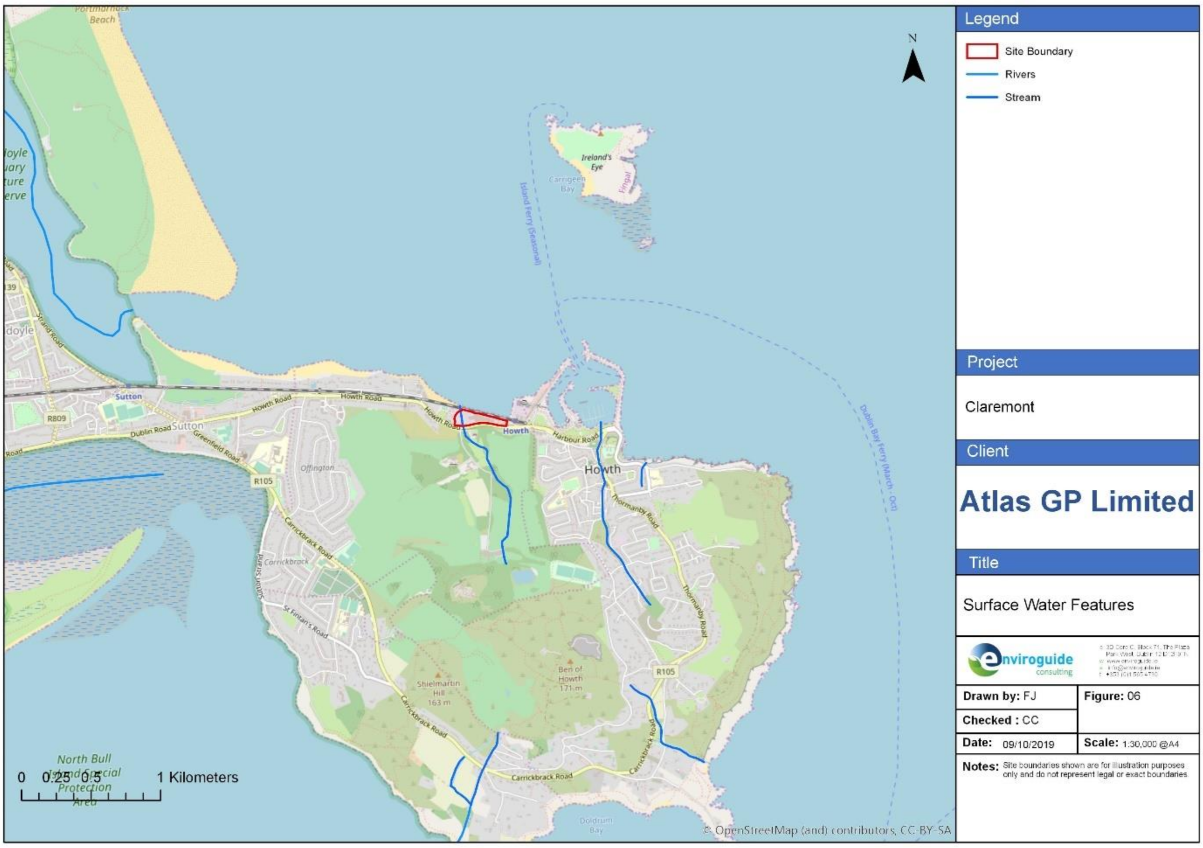
It is noted that for the purposes of this report hydrology is mentioned in the context of water quality within the receiving environment only and hydrology in the vicinity of the Site will be further addressed in Chapter 5 of the EIAR.

The nearest water feature is named locally and recorded on the GSI database (GSI, 2019) as the Howth_09 stream, named locally as the Bloody Stream (Segment Code 09-2176, EPA Code 09H23) which rises approximately 1km south of the Site and flows in a northerly direction. The Bloody Stream is culverted beneath Howth Road (R105) via a 600mm diameter pipe, where it flows through the Site and under the DART railway line before discharging to the Irish Sea Dublin (HA 09) at Claremont Strand (which forms part of the Baldoyle Bay Special Area of Conservation (SAC)) approximately 0.02km north of the Site.

Two other unnamed streams have been identified within a 2km radius of the Site on the GSI (GSI, 2019) and EPA (EPA, 2019) databases. The first unnamed stream (Segment code 09-410) is located approximately 0.9km to the east of the Site and discharges to Howth Harbour. The second unnamed stream (Segment Code 09-2196) is located approximately 1.2km to the east of the Site and discharge to Balscadden Bay which forms part of the Howth Head SAC.

Local surface water features are presented in Figure .

Figure 4.6: Surface Water Features



4.3.8 Designated and Protected Areas

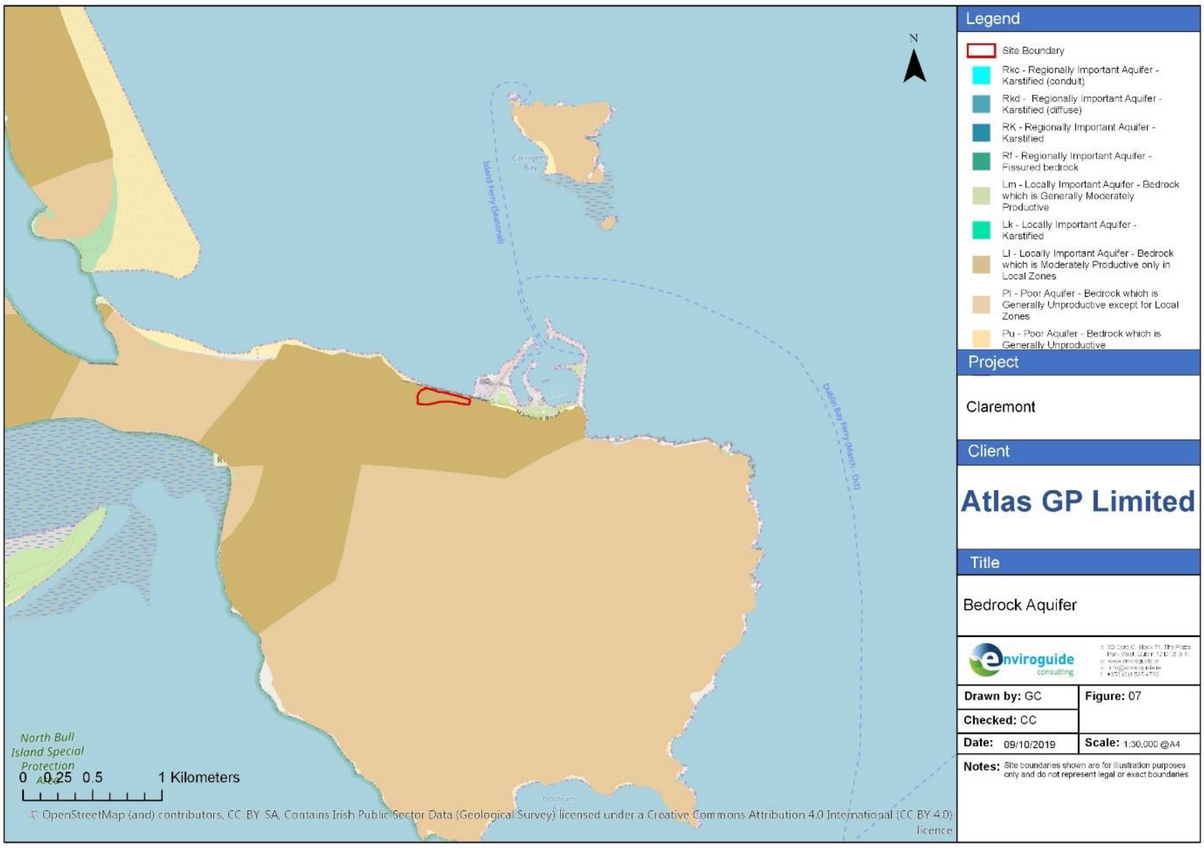
There are five (5No.) sites located within a 2km radius of the Site that are identified as SACs, four (4No.) sites located within a 2km radius of the Site that are identified as Special Protection Areas (SPA) and four (4No.) sites that are identified as proposed National Heritage Areas (pNHA). It is noted that the Baldoyle Bay SAC is located 0.02km north of the Site. It is also noted that there are a number of additional SAC, SPA and NHA sites located within the greater Dublin Bay area.

The designated and protected areas in the vicinity of the Site are presented in the biodiversity section of this report included in Chapter 8 of this EIAR.

4.3.9 Aquifer Classification and Vulnerability Rating

The GSI (GSI, 2019) has classified the bedrock of the Waulsortian Limestone Formation beneath the Site and surrounding area as a locally important aquifer (LI) (i.e. bedrock which is moderately productive only in local zones). It is noted that there are no gravel aquifers mapped within 2km of the Site. The Bedrock Aquifer Map is presented in Figure Error! No text of specified style in document.**4.4**.

Figure Error! No text of specified style in document.**4.4: Bedrock Aquifer**



The NRA criteria for estimation of the importance of hydrogeological features at the Site during the EIA stage are summarised in Table 4.Error! No text of specified style in document.**6**.

Table 4. Error! No text of specified style in document.**6. Criteria for Rating Site Importance of Hydrogeological Features**

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers.

Importance	Criteria	Typical Example
		Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

It is noted that, in accordance with the NRA Guidance as documented by IGI (IGI, 2013), the bedrock aquifer beneath the Site is rated as an attribute of 'medium' importance, due to it being of significance or value on a local scale only. There are also no referenced potable water supplies or groundwater outer source protection areas within a 2.0km radius of the Site (GSI, 2019).

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes, 1999 publication. The guidelines state that 'as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area:

- the subsoils that overlie the groundwater;
- the type of recharge - whether point or diffuse; and
- the thickness of the unsaturated zone through which the contaminant moves.'

Table 4.7. Vulnerability Mapping Criteria (Groundwater Protection Schemes, 1999)

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability & Type				
	High permeability (sand & gravel)	Moderate permeability (sandy subsoil)	Low permeability (clayey subsoil, clay, peat)	(Swallow holes, losing streams)	(sand & gravel aquifers only)
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High

Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.

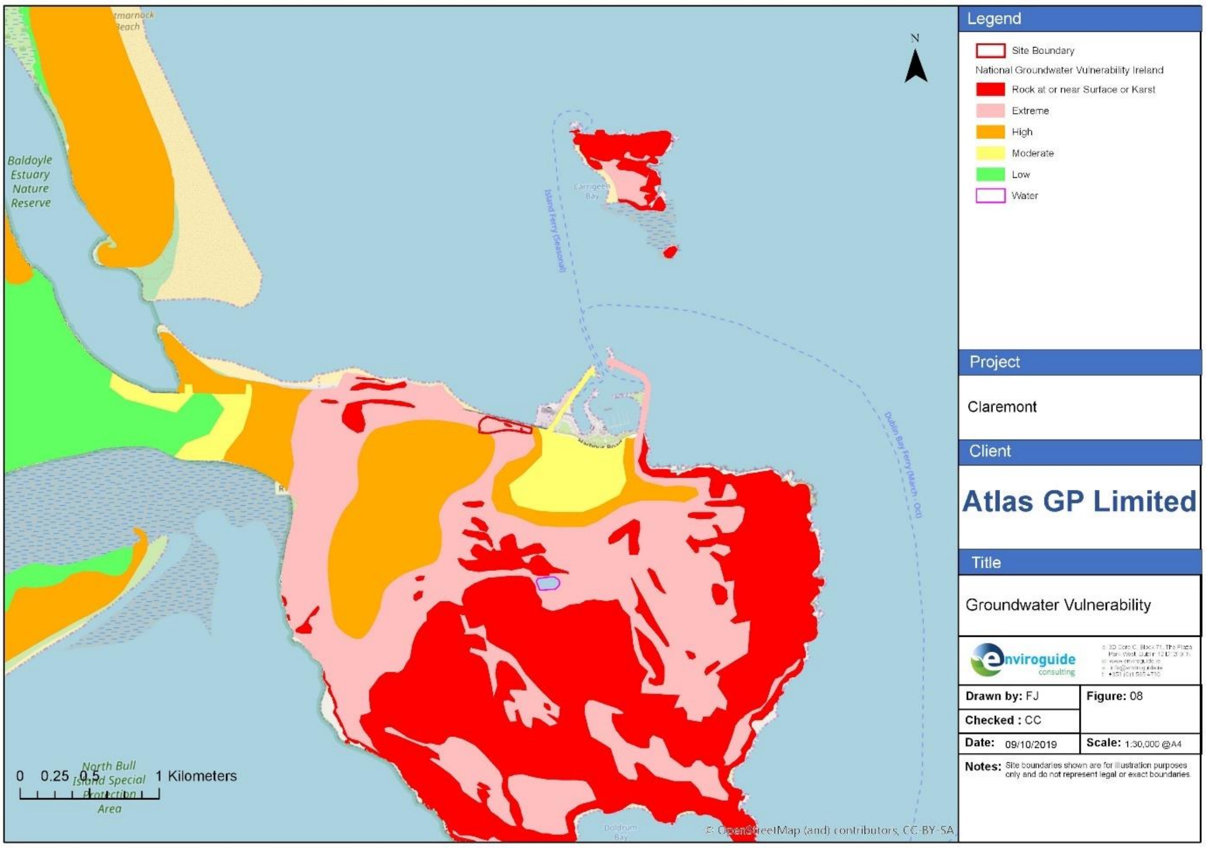
In accordance with the criteria outlined in Table 4.7, the groundwater vulnerability rating assigned to groundwater in the bedrock aquifer beneath the majority of the Site is Extreme (E) (GSI, 2019) with an

Extreme (X) rating where outcrops have been identified at the surface. This implies a very thin overburden depth or highly permeable strata such as gravels.

Based on the groundwater vulnerability rating for the Site (GSI, 2019), it is considered that the groundwater body underlying the Site would be at a high risk from potential contamination at surface.

The GSI Groundwater Vulnerability Map is presented in Table 4.8.

Figure 4.5: Groundwater Vulnerability Map



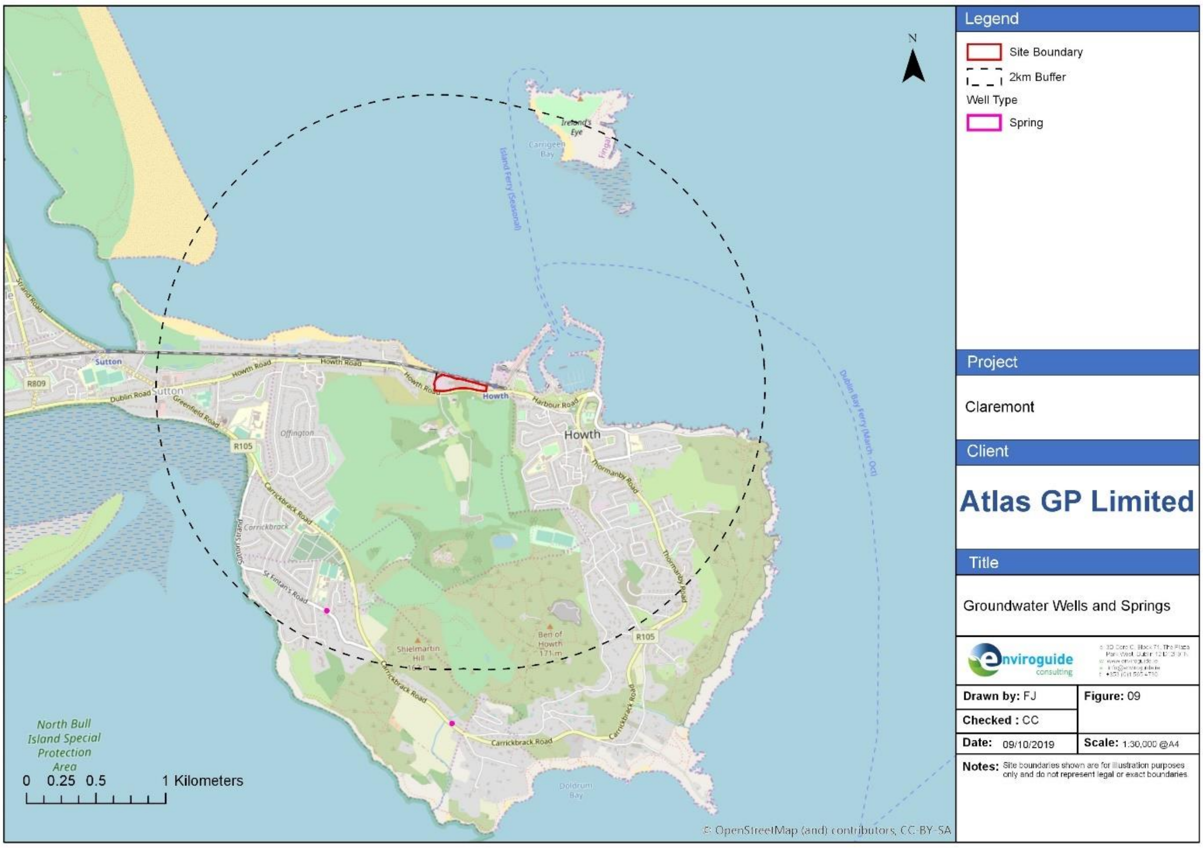
4.3.10 GROUNDWATER USE AND SOURCE PROTECTION

A search of the GSI groundwater well database was conducted to identify registered wells and groundwater sources. There is one groundwater source recorded within a 2.0km radius of the Proposed Development (GSI, 2019) located approximately 1.73km southwest of the Site and is identified as a 'Spring' (St. Fintan's Well). A second source is mapped on Howth Head, located approximately 2.4km south of the Proposed Development that is also identified as a 'Spring' (Balsaggart Well). It is noted that there are no referenced potable water supplies with a 2.0km radius of the Site (GSI, 2019).

The Site is located within an area serviced by mains water supply and it is proposed that the development will be connected to the IW mains water supply.

There are no Groundwater Source Protection Areas (Groundwater SPAs) within 2km of the Site. The closest Groundwater SPA is the Dunboyne Public Water Supply SPA (SI), located 26.4km west of the Site (GSI, 2019).

Figure 4.6: Groundwater Wells and Springs within 2km radius of the Site



4.3.11 RECHARGE

The groundwater recharge map provides an estimate of the average amount of rainwater that percolates down through the subsoils to the water table over a year. The map accounts for rainfall that percolates diffusely through soils and subsoils but does not take into account water that enters aquifers at points (e.g. at sinkholes) or along linear features (e.g. along sinking streams/rivers). Groundwater recharge amounts are estimated by considering soil drainage, subsoil permeability, thickness and type, the ability of the aquifer to accept the recharge, and Met Éireann's 30year average rainfall and actual evapotranspiration for the period 1971-2000.

The GSI (GSI, 2019) have calculated an effective rainfall value of 304mm/yr and a recharge coefficient of 20% however the recharge cap of 200mm/yr has been applied for the area in the vicinity of the Site.

The majority of surface cover at the Site is currently hard paving, as will be the case for the Proposed Development, therefore an infiltration rate of 10mm/yr is considered appropriate for the Site as documented in the CWRA (Golder, 2019b).

4.3.12 GROUNDWATER FLOW REGIMES

The bedrock aquifer beneath the Site is within the Dublin Groundwater Body (Dublin GWB) (EU Code: IE_EA_G_008).

Regionally, groundwater within Dublin GWB will discharge directly to the Irish Sea along the coast (Claremont Strand/Baldoyle Bay). It is reported by the GSI (Dublin GWB Report) that there will also be discharge to the overlying rivers, however the Bloody Stream has been culverted through the Site via a 600mm diameter pipe and therefore discharge to this watercourse will be constrained.

The GSI (Dublin GWB Report) identifies that the majority of groundwater flow will be a rapid flow into the upper weathered zone. It is noted that deeper flow in conduits is commonly recorded at depths of 30mbGL to 50mbGL. The aquifer is not considered to have any primary porosity and flow will be through fractures, some of which will have been enlarged by karstification and dolomitisation. Evidence of these processes was identified in the borehole logs for the ground investigation at the Site (Golder, 2019a).

Groundwater elevations recorded by Golder ranged from 1.05maOD (BH05) to 1.7maOD (BH09) on the 13th of September 2019 and from 1.13maOD (BH06) to 1.97maOD (BH01) on the 18th of September 2019 and that groundwater beneath the Site flows down-gradient to the north to Baldoyle Bay.

As documented in the Golder, 2019a report, groundwater beneath the Site is tidally influenced and a greater tidal influence was recorded in the borehole closer to the coast (BH05). Golder also conclude that there is strong indication there is vertical hydraulic continuity between bedrock, superficial deposits and made ground groundwater (where encountered) which is to be expected based on the stratigraphy encountered at the Site in the site investigation locations (hydraulic continuity from approximately 2.0mBGL to 3.0mBGL and into the bedrock, and there is no evident perched (separate) groundwater body).

4.3.13 GROUNDWATER BODY AND STATUS

According to the WFD, groundwater beneath the general vicinity of the Site is part of the Dublin GWB (EU Code: IE_EA_G_008). This Dublin GWB is classified by the WFD as having an overall good water quality status (for the period 2010-2015). The risk status assigned to the Dublin GWB is identified as ‘Not At Risk’ (EPA, 2019).

4.3.14 SURFACE WATER CATCHMENT MANAGEMENT UNIT AND STATUS

It is noted that for the purposes of this report hydrology is mentioned in the context of water quality within the receiving environment only. Hydrology in the vicinity of the Site will be further addressed in Chapter 5 of the EIAR.

The Site is within the Eastern River Basin District management unit. The Site is mapped by the EPA (EPA, 2019) as within the WFD Catchment of Liffey and Dublin Bay (09), Hydrometric Area (HA09), the Mayne Sub-catchment (SC_10, Sub-catchment code 09_17) and the Howth WFD River Sub Basin (IE_SE_09H230880).

There are no EPA water quality monitoring stations on the Bloody Stream. The Bloody Stream is classified as having an ‘At Risk’ status.

The closest river runs through the Site from the south, which is named locally and recorded on the GSI database as the Bloody Stream (IE_EA_09H230880) and flows north into the Irish Sea Dublin (HA09) at Claremont Strand. This has been given a River Water Body Status of ‘Unassigned’ for the period 2010-2015 (EPA, 2019) and has a risk status of ‘Review’.

4.3.15 Contaminated Land and Hydrogeology

Sources of Contamination

Following a review of the desk top study, a number of potential sources of contamination were identified at the Site and are summarised in Table 4.8.

Table 4.8. Site Operations and Potential Sources of Contamination.

Area	Location	Description
On-site	Existing on-site building occupying most of the central portion of the Site (Techrete).	Area beneath the building (steel assembly and associated assembly tanks, heavy engine and steel works, historical boilers, possible fuel storage, chemical storage, drainage).
	Area north of the existing on-site building (Techrete).	Former paint shop, boiler house, washdown sump, compressors, oil stores, degreasing area etc.
	Former Techrete Steel storage area and later Beshoff motors	Steel storage area, possible vehicle maintenance, oil / chemical storage areas potential drainage / interceptors.
	Former Teeling’s service station in the eastern portion of the Site.	Service station infrastructure. Fuel/oil storage and use, drainage/ interceptors etc., underground storage tanks (USTs).
	Area in southwest portion of the Site.	ESB substation, former infilled pond/hollow.
	Area in the western portion of the Site.	The undeveloped lands in the western portion of the Site, were understood to have historically been used by the local authority and that screenings from the screening plant to the west of the Site were placed on these lands.
Off-Site	Area north of northern Site boundary.	Railway line located along the northern Site boundary.
	Area west of the Site, adjoining the northern and southern boundaries.	Local Authority screen house and pumping station and associated foul sewers.

The Golder, 2019a report indicates that the previous site uses are largely industrial with brownfield soils across the entirety of the Site largely due to land reclamation of the Site footprint prior to industrial development of the Site (circa 1872 to 1913). The made ground soils underlying the Site are commonly described as dark brown/black, slightly silty, gravelly, sandy CLAY with various inclusions of concrete, brick, textiles, plastics and glass. The made ground soils range in depth across the Site with the average depth of brownfield soils approximately 2.5mBGL.

SOIL QUALITY

Following a review of the soil analytical results as documented in the Golder, 2019a and the HHRA (Golder, 2019d) reports, a number of small parcels of contaminated soil hotspots were identified.

- Total Petroleum Hydrocarbon (TPH) hotspot in the area of TP16 at a depth of around 1m and deeper, which is likely attributed to the historical fuel UST (underground storage tanks);
- There is a potential TPH hotspot in the area of TP109 at 0.6mBGL; and
- There are benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(ah)anthracene and lead hotspots identified in the Made Ground soils across the Site.
- Asbestos as fibre bundles (mostly chrysotile, and three reports of amosite) was identified at 24No. sample locations, at concentrations of <0.001% w/w with the exception of one sample at <0.1% w/w and one sample at 0.003% w/w. It is noted that there are no specific quantitative generic environmental assessment guidelines for asbestos in soil other than whether asbestos is present or absent.

The contaminated soil hotspots are identified in Drawings 02 through 08 included in the Golder, 2019d report.

WASTE CLASSIFICATION

The waste classification assessment results for a total of 97No. samples, as documented in the Golder, 2019c report, indicate that the in-situ material across the Site is classified as: inert, non-hazardous and hazardous with asbestos identified in specified samples. The key findings of the waste classification assessment as documented in the MMRP (Golder, 2019c) are summarised in Table ***Error! No text of specified style in document.**.9*.

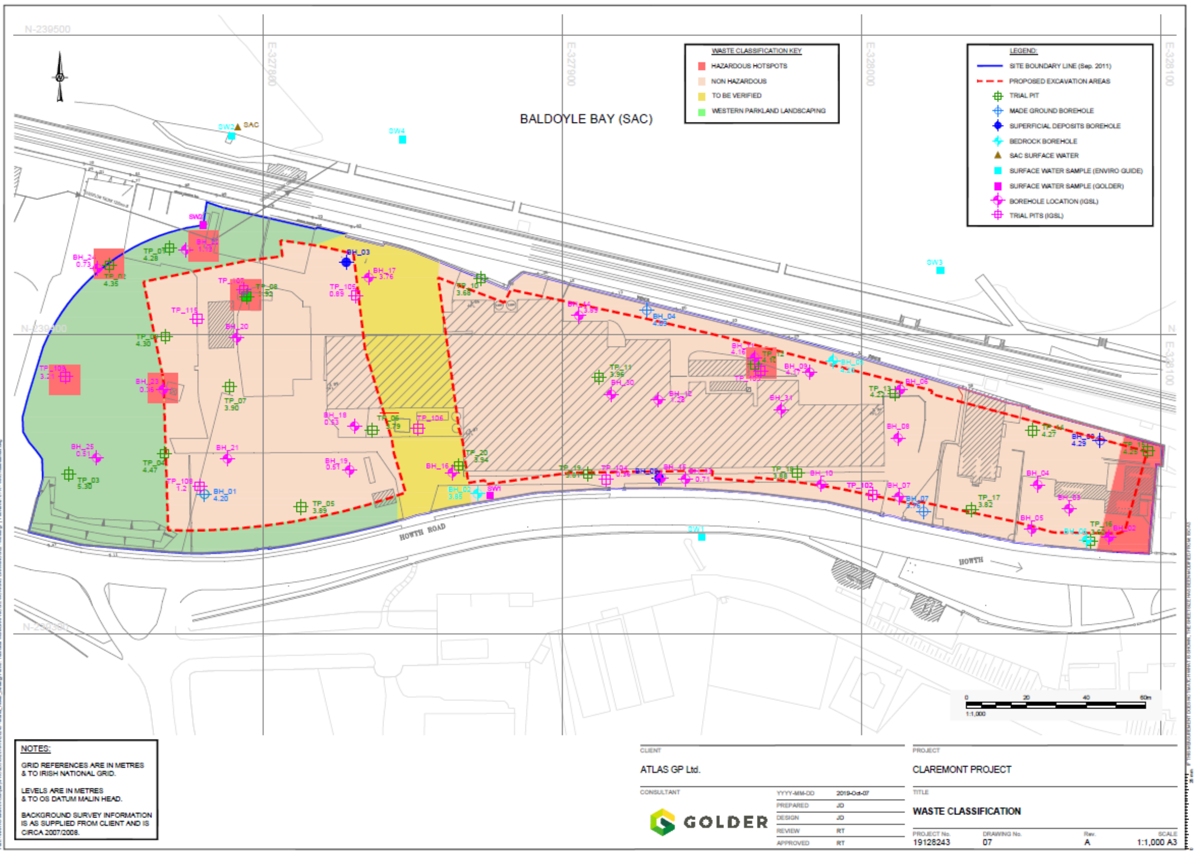
Table Error! No text of specified style in document..9. **Waste Classification Summary**

Waste Classification	No. Sample Locations
Category B1 (inert).	30
Category B2 (inert IMS).	19
Category C (non-hazardous).	25
Category C1 (non-hazardous) with asbestos fibre content <0.001% w/w.	12
Category C2 (non-hazardous) with asbestos fibre concentration <0.01%.	1
Category C3 (non-hazardous) with asbestos fibre concentration <0.1%.	1
Category D (hazardous for export).	9

As indicated in the MMRP (Golder, 2019c) it is noted that a number of hazardous soil hotspots were identified on-site. A small parcel of hazardous soil was found on the former service station area of the Site (TP15 and TP16). Hazardous hotspots were also identified at TP12, TP107, TP109, BH12, BH22, BH23 and BH24. The hazardous hotspots are presented in

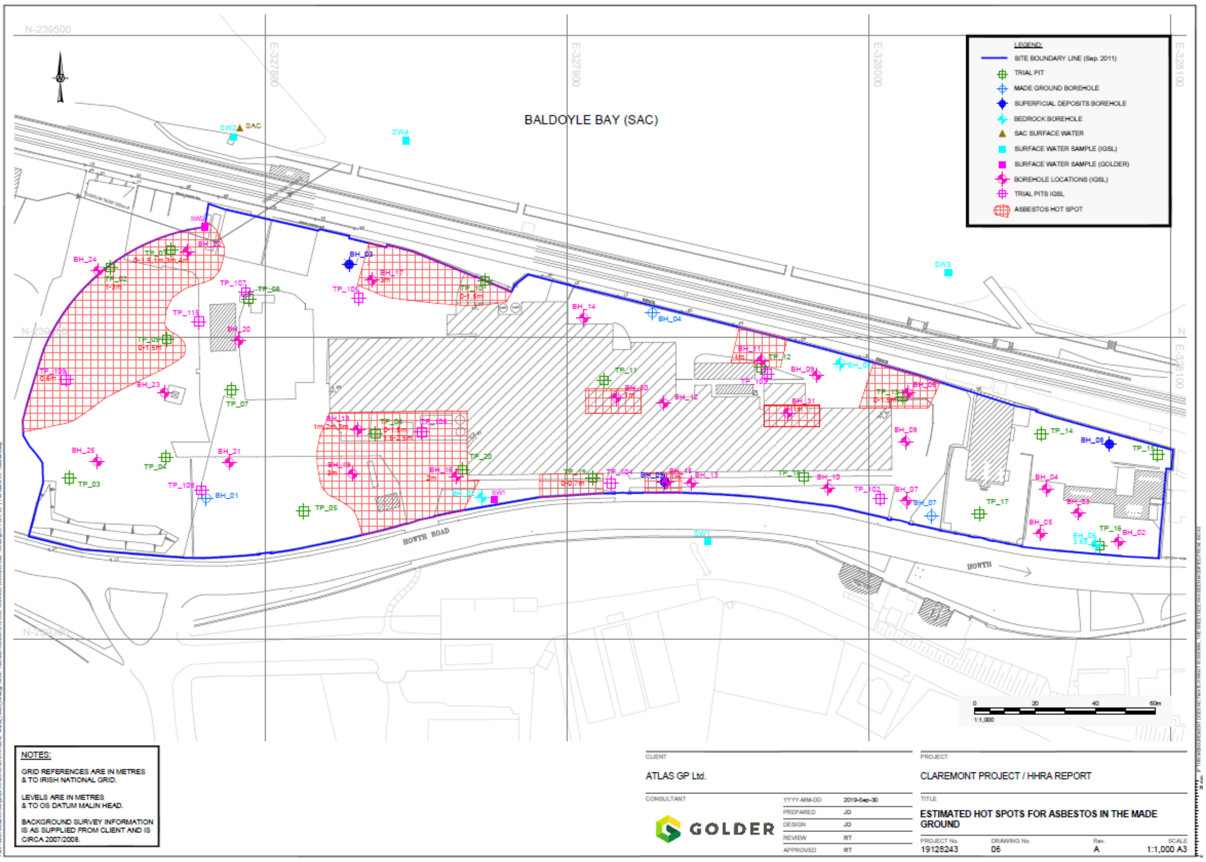
Figure 4.7 below.

Figure 4.7. Hazardous Soil Hotspots



Asbestos hotspots were also identified during site investigations (MMRP (Golder, 2019c)). These soils are largely classified as non - hazardous in nature and fall largely within the excavation areas that are to be removed off-site for disposal to an appropriately licenced landfill. The asbestos hotspots are presented in Figure 4.8 below.

Figure 4.8. Asbestos Hotspots



GROUNDWATER QUALITY

A total of 27No. groundwater samples were collected from groundwater monitoring wells installed across the Site (BH2, BH3, BH4, BH5, BH6, BH8, BH9, BH11, BH15, BH16, BH17 and BH22) during site investigation works (Golder, 2019a). Groundwater samples were taken from each sample point and analysed for varying suites of metals, volatile organic compounds (VOCs), benzene, toluene, ethylbenzene, xylenes (BTEX), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons criteria working group (TPHCWG).

Following a review of the groundwater analytical results (Golder, 2019a) a number of contaminants were observed to exceed the relevant groundwater guideline threshold values (GTVs) as detailed below:

- Concentrations of salinity were observed to be greater than 800 uS/cm at 1No. location and several in the region of 600 to 700 uS/cm suggesting saline influenced conditions.
- Concentrations of metals (arsenic and nickel), total PAHs, TPHs, sulphate, nitrite and ammoniacal nitrogen were also observed to exceed the applicable groundwater GTVs.

SURFACE WATER QUALITY

It is noted that the surface water attribute is addressed in Chapter 5 of this EIAR, however given the direct environmental linkages between surface water and land soil, geology and hydrogeology, the surface water quality is considered relevant in the context of the overall assessment presented in this Chapter. As documented in the Golder, 2019a Report, surface water samples were collected from locations SW1 and SW2 on the Bloody Stream located upstream and downstream of the Site respectively, at SW3 and SW4 collected from coastal locations at Claremont Strand and at SAC collected from Baldoyle Bay SAC during site investigation works completed for the Site. Samples were collected from each sample point and analysed for varying suites of metals, VOCs, BTEX, SVOCs, PAHs and TPHCWG.

Following a review of the surface water analytical results, as documented in the Golder, 2019a report, a number of contaminants were observed to exceed the relevant surface water environmental quality standards (EQS) as detailed below:

A total of 13No. surface water samples results were reported in the Golder, 2019a report. Concentrations of total PAHs at 1No. location (SW1 - upstream) and ammoniacal nitrogen at 6No. locations (SW2 – downstream (on four occasions), SW3 – Baldoyle Bay SAC/Claremont Strand (on one occasion) and SW4 – Baldoyle Bay SAC/Claremont Strand (on one occasion)) were observed to exceed the applicable surface water EQS standards. It is noted that based on the findings as detailed in the CWRA (Golder, 2019b), the elevated ammoniacal nitrogen in the samples collected from Baldoyle Bay SAC/Claremont Strand are not attributable to a pollutant linkage from the Site and could be due to biogenic sources not untypical of marine environments.

4.3.16 Environmental Risk Assessment

Based on the findings of the MMRP (Golder, 2019c) report, Tier 1, Tier 2 and Tier 3 risk assessment of soils and controlled water data generated from the recent and historic site investigations has indicated the presence of elevated concentrations of several contaminants on the Site primarily within made ground deposits. A summary of the contaminants of concern are provided in Table 4.1010 below.

Table 4.10. Contaminants of Concern

Contaminants of Concern – Human Health	Contaminants of Concern – Controlled Waters
Lead	Arsenic
Benzo(a)pyrene	Chromium
Benzo(b)fluoranthene	Lead
Dibenzo(ah)anthracene	Mercury
Asbestos	Sulphate
Speciated and Total Petroleum Hydrocarbons (TPHs)	Total Polycyclic Aromatic Hydrocarbons (PAHs)
	Ammoniacal Nitrogen

These contaminants of concern have been identified following Tier 1, Tier 2 and Tier 3 risk assessment as documented in the CWRA (Golder, 2019b) and the HHRA (Golder, 2019d) where they have failed to meet threshold criteria protective of the receptor.

In relation to the risk posed to Controlled Waters, the source, pathway and receptor model at the Site is detailed in Figure 4.9 and Table Error! No text of specified style in document.**.11**.

Figure 4.9: Schematic Conceptual Site Model (MMRP (Golder, 2019c))

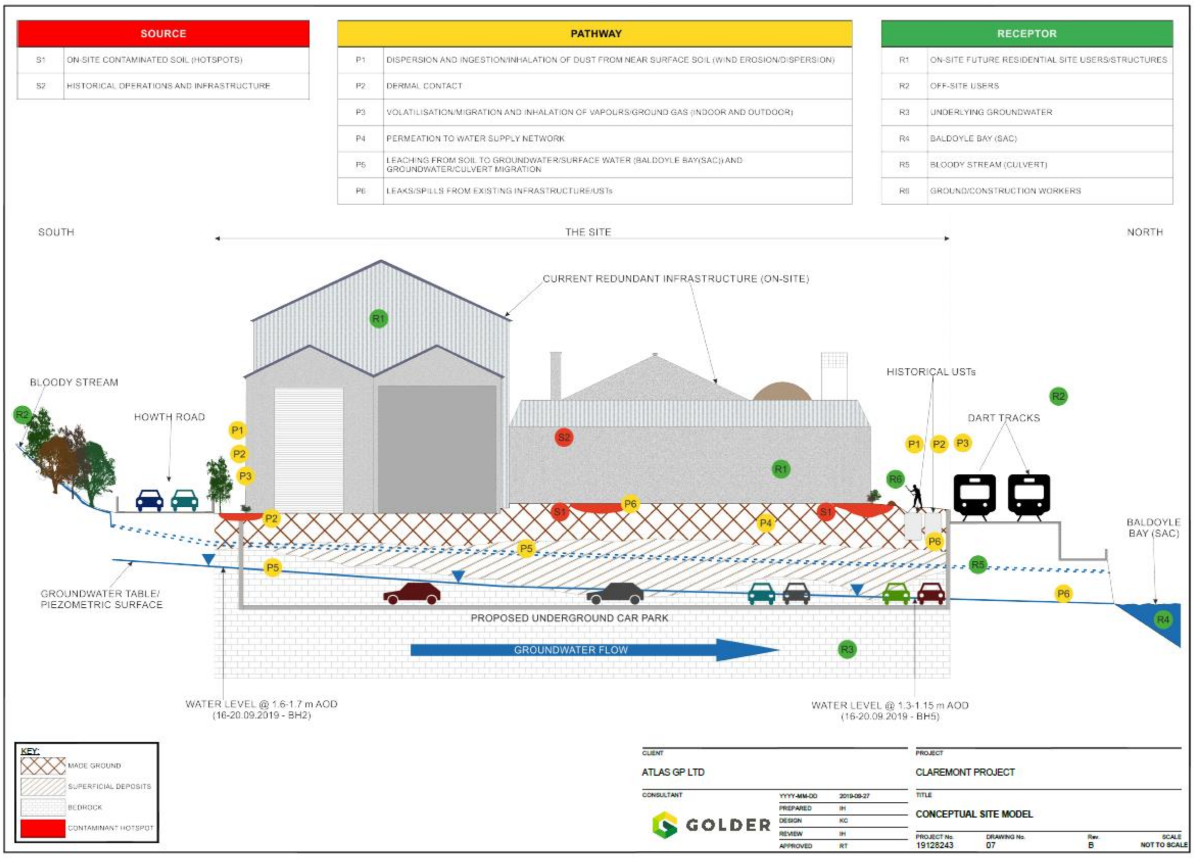


Table Error! No text of specified style in document.**.11. Source Pathway Receptor**

Risk	Source	Pathway	Receptor
Risk to Waters	Contaminants of Concern (CoCs)	• Downward vertical migration of dissolved contaminants through the unsaturated zone to limestone groundwater by rainfall and leaching. • Mixing of dissolved contaminants with groundwater and lateral migration through the saturated limestone / superficial deposits to the Irish Sea (Baldoyle Bay SAC)	• Groundwater beneath the Site. • Surface water of the Baldoyle Bay SAC (groundwater receptor)
Risk to Humans	On-site contaminant hotspots. Historical Operations and Infrastructure	• Dispersion and ingestion/inhalation of dust from near surface soils through wind erosion or dispersion. • Dermal contact. • Ingestion • Volatilisation of vapours / ground gas (indoor and outdoor) • Leaks and spills from existing structures / USTs	• On-site future residential. • Off-site users.

4.3.17 SUMMARY OF THE BASELINE ENVIRONMENT

The generic type of geological/hydrogeological environment of the Proposed Development can be determined based on the IGI guidelines. The generic types of geological/hydrogeological environments include:

Type A – Passive geological / hydrogeological environments e.g. areas of thick low permeability subsoil, areas underlain by poor aquifers, recharge areas, historically stable geological environments;

Type B – Naturally dynamic hydrogeological environments e.g. groundwater discharge areas, areas underlain by regionally important aquifers, nearby spring rises, areas underlain by permeable subsoils;

Type C – Man-Made dynamic hydrogeological environments e.g. nearby groundwater abstractions, nearby quarrying or mining activities below the water table, nearby wastewater discharges to ground, nearby geothermal systems;

Type D – Sensitive geological / hydrogeological environments e.g. potentially unstable geological environments, groundwater source protection zones, karst;

Type E – Groundwater dependent eco systems e.g. wetlands, nearby rivers with a high groundwater component of base flow.

Therefore, the Site is considered to be Type B as it is a naturally dynamic hydrogeological environment which is attributed to the tidal influence on groundwater beneath the Site and hydraulic connection to Baldoyle Bay SAC.

The Site is a brownfield site with a historical industrial land use.

Soil and geology at the Site includes made ground underlain by sand and silts and basal glacial till deposits (CLAY) primarily in the western portion for the Site. Bedrock comprised of fractured Waulsortian limestone and top of bedrock is irregular at depths ranging from 2.3mBGL in the east to 16.2mBGL in the west.

Soils at the Site have been impacted with contaminants associated with historical site activities. Contaminants hotspots include asbestos, polycyclic aromatic hydrocarbons, petroleum hydrocarbons and heavy metals which are primarily associated with made ground in the upper 1mBGL to 2mBGL.

The groundwater at the Site discharges to the north to Baldoyle Bay (SAC) at Claremont Stand. Groundwater is hydraulically connected between overburden and made ground and is tidally influenced.

Groundwater has been impacted with contaminants including polycyclic aromatic hydrocarbons, petroleum hydrocarbons, heavy metals and ammonia. The source is identified as impacted soil/ made ground on-site which is above the groundwater saturated zone and within the extent of the bulk excavation for the basement of the Proposed Development. The significantly reduced contaminant mass at the site will reduce any potential risk on the SAC associated with the Site.

4.4 IMPACT OF PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

The procedure for determination of potential impacts on the receiving soil and geological environment is to identify potential receptors within the Site boundary and surrounding environment and use the information gathered during the desk study and site walkover to assess the degree to which these receptors will be impacted upon. Impacts are described in terms of quality, significance, duration and type as detailed in Table 4.3.

4.4.1 DIRECT

SOIL AND GEOLOGY

The land-use at the Proposed Development Site will be changed from industrial and commercial land use to a mixed-use development of residential, retail/commercial uses and a childcare facility. It is noted that the residential development is permitted in principle under its current zoning objective and that the land cover across the majority of the Site remain relatively unchanged. It is considered that the change of land use will result in a ‘positive’, ‘moderate’ and ‘permanent’ impact on the Site.

It is noted that, in accordance with the NRA Guidance, as documented in the IGI Guidelines (IGI, 2013), the soils underlying the Site would be considered to be ‘medium to high’ importance based on the moderate degree of local-scale soil contamination associated with previous heavy industrial usage of the Site. Excavation of contaminated soils and permanent removal off-site is a design requirement of the Proposed Development for the construction of the lower ground floor level (to a depth of 1.8mOD in the west beneath Block A) and basement (depth of -1.2mOD beneath Blocks B, C and D), opening up of the Bloody Stream and developing a riparian strip across the Site and in the preparation of a suitable sub-formation for road construction, trenching for foul drainage and water infrastructure and other services. The excavation of contaminated soils will result in the removal of source contaminant loading through the removal of impacted soils from the Site. Therefore, it is considered that there will be a ‘positive’, ‘significant’ and ‘permanent’ impact on existing soils underlying the Site.

Excavation of bedrock will also be required for the construction of the basement level. In accordance with the NRA Guidance, as documented by IGI (IGI, 2013), the bedrock at the Site would be rated as an attribute of ‘low’ importance, due to it being of significance or value on a local scale only and being an uneconomically extractable mineral source. Therefore, it is considered that there will be an unavoidable, ‘negative’, ‘slight’ and ‘permanent’ impact on bedrock.

Taking account of the Site history and the extensive site investigation completed at the Site, there remains a potential to encounter as yet unidentified contaminant sources (‘hotspots’) during groundworks of the construction phase or uncontrolled release of contaminant sources to the geological environment. As the Site is a contaminated brownfield site, it is considered that the potential impact of such a scenario on soil and geology would be a ‘negative’, ‘slight to moderate’ and ‘long term’.

Fill material will be required during the construction of the Proposed Development which will include imported topsoil and aggregates from licenced sources. In the unlikely event that fill materials are sourced from unlicensed or unauthorised sources, it may result in the importation of contaminated materials, uncertified or material not suitable for use at the Proposed Development. In the unlikely event of the importation of contaminated materials on-site, there would be a ‘negative’, ‘moderate to significant’ and ‘long term’ impact on the Proposed Development.

In the absence of mitigation, there is a potential risk associated with the cementitious materials during piling and construction of the basement and other in-ground works of impacting on the underlying soil bedrock at the Site. It is considered that this may result in a ‘negative’, ‘slight’ and ‘medium term’ impact on existing soil quality underlying the Site.

The potential accidental release of hazardous material including fuels and materials being used on-site, through the failure of secondary containment or a materials handling accident on the Site is considered to potentially result in a ‘negative’, ‘moderate to significant’, ‘long-term’ impact on the receiving geological environment depending on the nature of the incident.

WATER QUALITY

The potential impacts on surface water are addressed in Chapter 4. This Chapter addresses the potential water quality impacts related to groundwater beneath the Site and potential impacts on the adjoining Baldoyle Bay SAC.

Excavation of the basement will result in the permanent removal of the contaminant source within the soil at the Proposed Development. The excavation of contaminated soils including identified hotspots that present an unacceptable risk to waters as identified in the CWRA (Golder, 2019b) will result in the removal of a significant contaminant mass from the site. Therefore, it is considered that there will be an overall ‘positive’, ‘significant’ and ‘permanent’ impact on existing groundwater underlying the Site and on the adjacent Baldoyle Bay SAC.

Groundwater dewatering will be required during the bulk excavation for the basement construction. As there will be no direct discharge of groundwater to the Baldoyle Bay SAC associated with the construction phase, the temporary groundwater dewatering will not impact on the water quality of the Baldoyle Bay SAC. Similarly, surface runoff will be managed during construction and there will be no discharges to ground. However, there is a potential risk of accidental release of untreated water or other runoff to the underlying groundwater during dewatering (e.g. a breakdown of the temporary treatment system). The potential risk of the release of untreated water may present a ‘negative’, moderate’ and ‘medium’ impact on the receiving hydrogeology environment.

There is a potential risk for the mobilisation of contaminants during piling works whereby a preferential conduit for contaminants (e.g. hotspots, unidentified underground storage tanks) at shallower levels to migrate downwards to groundwater albeit over a very short duration could be introduced. It is considered that there will be a ‘negative’, ‘moderate’ and ‘short - medium term’ impact on the existing water quality underlying the Site as a result of piling.

There is a potential risk associated with the cementitious materials used during piling and construction of the basement and other in-ground works of impacting on the underlying groundwater at the Site which may result in a ‘negative’, ‘moderate’ and ‘medium term’ impact.

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 as the hardstanding and subsoil is removed from the Site. However, such discharge will temporary as the pavement and fill materials will reinstate the protection of the aquifer. Such impacts are considered to be ‘negative’, ‘slight’ and ‘short-term’.

As mentioned above, there remains a potential to encounter as yet unidentified contaminant sources (‘hotspots’) during groundworks of the construction phase. While the baseline condition of the Site including any unknown contaminant sources may not present any potential impact on the receiving environment, during the construction phase there would be a potential for uncontrolled release any such contaminant sources to the groundwater environment. Therefore, it is considered that, in the event of such an uncontrolled release, there would be a ‘negative’, ‘slight to moderate’ and ‘medium-term’ impact on existing groundwater underlying the Site taking account of the hydrogeological site setting and natural attenuation.

If the accidental release of hazardous material including fuels, chemicals and materials being used on-site, through the failure of secondary containment or a materials handling accident on the Site, were to occur over open ground then these materials could infiltrate through the soil contaminating the underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. In the event of such a scenario it is considered that this could result in a 'negative', 'moderate to significant', 'long term' impact on the receiving hydrogeological environment depending on the nature of the incident.

HYDROGEOLOGICAL REGIME

A secant pile wall will be constructed around the basement perimeter as part of the sequencing of the bulk excavation and basement construction. Temporary dewatering from within the secant pile wall will be required to enable 'dry excavation' to facilitate the bulk excavation of soil including contaminated soil and any underground storage tanks (e.g. at the former fuel/service station). It is considered that there will be a local impact on the groundwater levels and flow regime associated with the works that will be 'negative', 'slight' and 'short term'.

4.4.2 INDIRECT

SOIL AND GEOLOGY

It is anticipated that approximately 70,551m3 (see Table 4.1 above) of surplus soil and rock will require removal off-site. A waste classification assessment was undertaken to assess the general nature of the infilled materials in the context of the waste characterisation for off-site disposal in compliance with waste management legislation (Golder, 2019c). The majority of soils were classified as non-hazardous. A small number of hazardous hotspots, including asbestos contaminated material, identified at the Site will be removed in accordance with the requirements and recommendations outlined in the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BMCE, 2019a), the CDWMP (BCME, 2019d), the Asbestos Demolition Survey Report (OHSS Safety Consultants, 2019a) and the Risk Assessment for Mechanical Handling of Soils/Stones Containing Asbestos (OHSS Safety Consultants, 2019b) and managed in accordance with all statutory obligations. It is noted that all waste material to be removed off-site will be sent to appropriately licensed/permitted receiving waste facilities and potential impacts have therefore been adequately assessed and mitigated. Accordingly, it is considered that offsite removal and recovery and/or disposal will have a 'neutral', 'imperceptible' 'long-term' impact on the receiving waste facility.

It is noted that the specific types and quantities of waste are detailed in Chapter 11 – Material Assets Waste of this EIAR.

In the unlikely event that waste soil and bedrock are directed to an unauthorised disposal site, there is potential to impact on the receiving land, soil, geology and hydrogeology at that location. In the event of such a scenario it is considered that this would result in a 'negative', 'significant' and 'long-term' impact on the land, soil, geology and hydrogeology at any receiving unauthorised landfill.

Fill material will be required during the construction of the Proposed Development, which will include imported topsoil and aggregates. Contract and procurement procedures will ensure that all aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with the necessary statutory consents. The potential impacts may include loss of attribute and changes in the hydrogeological/ geological regime at the source site. It is anticipated that the soil materials identified for importation on-site will have an 'neutral', 'imperceptible' and 'long term' impact on the source site taking account of the fact that the statutory consent process would have required the necessary environmental impacts to be assessed and mitigated as appropriate.

WATER QUALITY

As mentioned above, there will be no direct discharge to Baldoyle Bay SAC. However, there is a potential risk of accidental release of untreated water during dewatering to the underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. (e.g. a breakdown of the temporary treatment system). It is considered that the potential risk of the release of untreated water may present a ‘negative’, moderate’ and ‘long term’ impact on the receiving Baldoyle Bay SAC.

HYDROGEOLOGICAL REGIME

A temporary drawdown on the local groundwater levels will result from the required dewatering during the bulk excavation for the basement construction. Taking account of the identified hydrogeological regime at the Site and the findings of the CWRA (Golder, 2019b) it is considered that the temporary dewatering will not impact on the adjacent Baldoyle Bay SAC.

4.4.3 SECONDARY

The importation of aggregates or topsoil for use in fill, landscaping at the Site will be subject to control procedures which shall include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use from an engineering and environmental perspective. Only material sourced from authorised borrow sites, quarries and suppliers that meet the engineering specification and criteria set out in the MMRP (Golder, 2019c) to ensure that all necessary consents in place and appropriate quality control procedures to enable verification of suitability for use will be considered for importation of soil to the Site. Overall it is considered that any impacts associated with importation of soil, replacing the removed contaminated soil will be ‘positive’, ‘slight’ and ‘long-term’.

4.4.4 CUMULATIVE

Excavated soils and the movement of the materials from the Site could potentially be directed to the same receiving waste facilities for recovery, re-use or disposal as excavated materials from the permitted development at Balscadden, Howth (301722-18). All surplus materials from the Site will be managed in compliance with relevant waste management legislation and directed to appropriately licensed waste facilities operated in compliance with the relevant statutory consents for the facility. Accordingly, it is considered that any cumulative impact on the land, soils, geology and hydrogeology associated with the Proposed Development and the permitted development at Balscadden, Howth (301722-18) would be ‘neutral’, ‘imperceptible’ and ‘permanent’.

There are no other cumulative impacts associated with the operational phase of the Proposed Development including taking account of other relevant developments (refer to 4.1.4).

4.5 Impact of Proposed Development – Operational Phase

During the operational phase of the Proposed Development there is limited to no potential for any direct adverse impact on the receiving soil, geological and hydrogeological environment at the Site taking account of the design measures for the Proposed Development.

There will be no risk of unidentified residual contamination being uncovered during the operational phase as the public open spaces of the development include paved finishes, while landscaped areas will be reinstated with soils suitable for use. Any contamination at the site including as yet unidentified hotspots will be addressed in accordance with the materials management plan for the Proposed Development as detailed in the MMRP (Golder 2019c) report.

During the operational phase the permanent watertight basement structure will be in place at the Proposed Development. However, taking account of the hydrogeological setting at the Site, and findings of the CWRA (Golder 2019d) report it is considered that any impact associated with the basement structure on the hydrogeological regime will be 'neutral', 'imperceptible', 'long-term' significance. It is noted that further detail on potential impacts on the hydrogeological regime are provided in Chapter 5 – Water of this EIAR.

The Bloody Stream riparian zone will be constructed with a concrete lined channel designed and constructed in manner that will be fully impermeable. This design measure will prevent any potential ingress of residual soil or groundwater contaminants albeit at concentrations below the identified Remedial Target Values as set out in the CWRA (Golder, 2019b) report, into the Bloody Stream and potential discharge to the Baldoyle Bay SAC.

There will be no petroleum hydrocarbon-based fuels used during the operational phase and the main operating system for heating will be gas based. Using such a system removes any potential contaminant sources associated with fuels.

The only runoff from the Site directed to ground is rainfall directly onto the permeable paving. Clean rainwater from the building roofs will be managed as part of the SuDS design via green roofs and discharge to the Bloody Stream, thereby eliminating any potential discharge to soil, geology and groundwater.

All below (below ground) drainage infrastructure will be constructed in accordance with current IW requirements.

4.5.1 Direct

There will be no direct impacts associated with the operational phase of the Proposed Development.

4.5.2 Indirect

There will be no indirect impacts associated with the operational phase of the Proposed Development.

4.5.3 Secondary

There are no secondary impacts associated with the operational phase of the Proposed Development.

4.5.4 CUMULATIVE

There are no cumulative impacts associated with the operational phase of the Proposed Development.

4.6 'DO NOTHING' IMPACT

In the 'Do Nothing' scenario the potential impact on the receiving land soil, geology and hydrogeology environment if the Proposed Development did not proceed is considered.

It is considered that there would be no change or resulting impact on the brownfield nature of the Site which would remain as a dis-used commercial / industrial site and there would be no impact or change to the land, soil, geology and hydrogeology and the Site.

The potential positive impact on the receiving water quality including at Baldoyle Bay SAC associated with the Proposed Development would not occur and the ongoing potential risks to water quality associated the existing site condition would remain.

4.7 MITIGATION MEASURES

4.7.1 CONSTRUCTION PHASE

The following mitigation measures have been developed in consultation with relevant Design Team members including Enviroguide and BCME. These mitigation measures have been developed in conjunction with the measures set out in the various management plans for the Proposed Development including: MMRP (Golder, 2019c), OCEMP (Enviroguide, 2019a); CMP (BMCE, 2019a); CDWMP (BCME, 2019d); Asbestos Demolition Survey Report (OHSS Safety Consultants, 2019a) and Risk Assessment for Mechanical Handling of Soils/Stones Containing Asbestos (OHSS Safety Consultants, 2019b) which have been submitted with this application.

Mitigation measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include:

- Management and control of soil and bedrock during bulk excavation and export from the Proposed Development;
- Management and control of water during construction including dewater of groundwater for the construction of the basement
- Management and control of imported soil and aggregates from off-site sources;
- Fuel and Chemical handling, transport and storage;
- Accidental release of contaminants – notify relevant statutory authorities

CONTROL AND MANAGEMENT OF SOIL AND BEDROCK

<u>Managing Contaminated Soil and Excavation of Contamination Hot Spots</u>

Prior to excavation, a detailed review of the final cut and fill model will be carried out to confirm cut and fill volumes. Detailed quantities of material to be excavated will be verified through accurate survey techniques by the groundworks contractor at the construction phase. Confirmation of final hotspot volumes will be provided and incorporated into an excavation plan.

The specific types and quantities of waste are detailed in Chapter 11 – Material Assets Waste of this EIAR.

As set out in Section 4.3.15, a number of contaminated soil and hazardous soil hotspots on-site that are required to be excavated for off-site for disposal. It is noted that a large portion of the Site requires some form of excavation works. Many of the hotspots that require remediation fall within the excavation areas and these will be removed off-site for appropriate disposal at suitably licensed waste facilities. The main areas for hotspot removal relate to asbestos and TPH. The asbestos and TPH hotspots are indicated in the MMRP (Golder, 2019c) report and identified in plans provided in Appendix E.

It is noted that the delineation of hazardous hot spots as identified for excavation reports will need to be completed once buildings and the Site infrastructure are removed. The extent of the hazardous hotspots will be determined through additional testing to refine the volume of hazardous materials to be exported off-site for disposal.

The Contractor will undertake their works such that all potentially contaminated hotspots can be removed without any risk of environmental impact. An excavation plan will be established by the contractor prior to the commencement of any excavation. The plan shall take into account the findings of the Site Investigation Reports produced by Golder (refer to Appendix A).

It is intended that the basement bulk excavation will be a ‘dry excavation’ through a robust methodology for installation of the secant pile wall and dewatering methodologies that will be developed by the contractor in accordance with the recommendations of the Dewatering Design (Minerex, 2019) report (refer to Appendix C).

Where appropriate, suitable batters or retained vertical walls will need to be maintained on excavation faces to ensure the stability of adjacent ground, structures and services. During excavation adjacent to existing/nearby structures, roadways, services etc., the construction of temporary support may be required, or ground may need to be excavated then backfilled in stages to ensure that contamination is removed without affecting the stability of structures etc. (i.e. panel excavation).

A sampling and analysis plan will be provided by the Environmental Consultant appointed by the Contractor which will address all required sampling and analysis following the removal of the buildings and infrastructure on the Site. Excavation of these areas will not take place until the Site has been investigated and the soil has been classified.

Verification sampling will be carried out to confirm the findings in the Golder, 2019a site investigation report and to verify the removal of the contaminated material. This shall be carried out in accordance with the sampling and analysis plan for the development. The removal of contaminated soil will be supervised by a competent and qualified consultant.

Records will be maintained according to the waste records procedures and including photographs of the removal of contaminated material. A log of all contaminated material removed will be maintained on-site.

All contaminated soil from excavations will be handled in accordance with the procures outlined in the Waste Management and Management of Stockpile sections of the OCEMP (Enviroguide, 2019a) and must have due regard to the procedures for stockpile management outlined in the MMRP (Golder 2019c) report in order to protect ground and surface water and minimise airborne dust.

Asbestos Waste Management

An asbestos survey has been completed which identified asbestos-containing materials (ACMs) on-site; in the buildings and in the made ground. All works will be carried out by a suitably qualified specialist contractor. The asbestos removal contractor/Demolition contractor will prepare an asbestos removal plan of work in accordance the Safety Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.

Asbestos contaminated soil hotspots are largely classified as non - hazardous in nature and also fall largely within the excavation areas that are to be removed off-site for disposal to an appropriately licenced landfill.

It is noted that Site design has incorporated that some hotspots will remain on-site in accordance with the findings MMRP (Golder, 2019c) report through engineering barriers such as maintenance of a clean soil barrier >1m below finished level or construction of an impermeable barrier such as paved finishes, this relates to human health related hotspots only.

Waste asbestos will be removed by an authorised and licenced contractor who is competent and experienced in the area of asbestos removal. Asbestos containing waste will only be removed from the Site by a haulier permitted to transport this waste and shall be delivered to an appropriately licenced hazardous waste management facility.

The normal measures required to prevent airborne dust emissions and associated nuisance arising from site work will be in place including measures to prevent uncovered soil drying out leading to wind pick up of dust and mud being spread onto the local road network. This will require additional wetting at the point of dust release, dampening down of uncovered soil during dry weather and wheel cleaning for any vehicles leaving the Site.

Vehicles transporting material with potential for dust emissions to an off-site location shall be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

Excavation of Bedrock

Monitoring will be undertaken to ensure that there are no impacts on geological structure associated with rock breaking. It is noted that the quantity of bedrock removal will be localised.

Importation of Soil and Aggregates

Contract and procurement procedures will ensure that all aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations.

The importation of aggregates or topsoil for use in fill, landscaping etc. shall be subject to management and control procedures which shall include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development. Therefore, any unsuitable material will be identified prior to unloading / placement on-site.

Exportation of Soil and Aggregates

All waste will be removed off-site in accordance with the requirements outlined in the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BCME, 2019a) (refer to Appendix B) and the CDWMP (BCME, 2019d) and will be managed in accordance with all legal obligations. It will be the contractor's responsibility to either; gain a waste collection permit or, to engage specialist waste service contractors who will possess the requisite authorizations, for the collection and movement of waste off-site. Material will be brought to a facility which currently holds an appropriate waste facility permit or licence for the specified waste types.

Waste Permitting, Licences & Documentation under the Waste Management (Collection Permit) Regulations 2007, as amended, a collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO), must be held by each waste collection contractor.

Any other relevant waste permits required for any proposed processing of materials shall be obtained prior to construction at the Site if required.

All waste will be documented prior to leaving the Site. All information will be entered into a waste management system kept on the Site.

Vehicles transporting material with potential for dust emissions to an off-site location shall be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

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 deployed to ensure that public roads are kept free of debris.

The wheels of all Lorries will be washed / cleaned prior to leaving the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

Piling Methodology

The proposed piling methodology as detailed in the CMP (BCME, 2019a) report (refer to Appendix B) and the OCEMP (Enviroguide, 2019a) will minimise the potential for introduction of any temporary conduit between contaminated materials and underlying groundwater. Piles that require rock sockets will be drilled under bentonite or cased to rock head level, to ensure stability of the bore through the water bearing sands. CFA piles will be carefully monitored to ensure positive pressure in the concrete below the auger head as it is retracted.

The combined development is 90% hardstanding, with a significant amount concrete slabbed. The slab will be broken out using a rock breakers and materials either sent off-site or used for the piling matt depending on the quality and quantity. Dust dampeners will be used to control dust. It is anticipated that additional hardcore will have to be brought to the Site to form the piling mat. The piling mat for the basement will be formed first, this will then be recycled and used to form the piling mat under Block A. The estimated quantity of hardcore equates to 3000m2 by 600mm deep, giving a volume of 1,800m3 of hardcore. When piling is complete, this will be removed off-site in accordance with all legal obligations and sent to appropriately licensed/permitted receiving waste facilities.

Management of Stockpiles

Segregation and storage of wastes generated during works will be segregated and temporarily stored on-site (pending removal or for re-use on-site) in accordance with the CMP (BCME, 2019a) report (refer to Appendix B), the CDWMP (BCME, 2019d) and the CEMP (Enviroguide, 2019a).

While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows:

- A suitable temporary storage area shall be identified and designated;
- All stockpiles shall be assigned a stockpile number;
- Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings;
- Erroneous pieces of concrete shall be screened from the stockpiled soils and segregated separately;
- Non-hazardous and hazardous soil (if required to be stockpiled) shall be stockpiled only on hard-standing or high-grade polythene sheeting to prevent cross-contamination of the soil below;
- Soil stockpiles shall be covered with high-grade polythene sheeting to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust;

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to disposal. An excavation/stockpile register shall be maintained on-site showing at least the following information:

- Stockpile number;
- Origin (i.e. location and depth of excavation);

- Approximate volume of stockpile;
- Date of creation;
- Description and Classification of material;
- Date sampled;
- Date removed from the Site;
- Disposal/recovery destination; and
- Photograph;

Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery; and
- Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

Handling of Chemicals, Waste Materials and Fuel

Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable).

Fuel, oils and chemicals used during the construction stage are classified as hazardous. If fuel is stored on-site for machinery and construction vehicles, then areas around fuel tanks and draw off points will be bunded and clearly marked. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Oils and chemicals used and stored on-site will also be will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage into the local surface water network or groundwater. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

Portable generators or similar fuel containing equipment will also be placed on suitable drip trays.

Emergency procedures will be developed, and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures for in the event of accidental fuel spillages.

Concrete Works

The cementitious grout used during the construction of the basement and the riparian strip will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

All ready-mixed concrete shall be delivered to the Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be removed offsite. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

CONTROL AND MANAGEMENT OF GROUNDWATER

Groundwater will be encountered during the construction works in particular the basement excavation. All excavations will be encompassed by secant pile wall around the basement excavation to allow dewatering and dry excavation. Where water must be pumped from the excavations, water will be managed in an in accordance with best practice standards (i.e. CIRIA – C750) and regulatory consents. Water will not be discharged to open water courses (e.g. the Bloody Stream or shore) and will be disposed to foul sewer.

Groundwater in the excavation will be controlled based on the methodology outlined in the Dewatering Design (Minerex, 2019) report (refer to Appendix C). The treatment system will be installed on-site for the duration of the project to meet the requirements of the discharge licence but will typically include a number of stages of settlement and filtration to remove sludge, suspended solids, free-phase hydrocarbons (oils) and dissolved phase hydrocarbons to ensure the conditions of the temporary discharge consent are met.

The groundwater removed will be discharged into the public sewer in accordance with the necessary consent/licence issued under Section 16 of the Local Government (Water Pollution) Acts and Regulations and must be obtained from IW. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements. All dewatering will be undertaken in strict compliance with the conditions of the discharge licence for the construction phase of the Proposed Development.

A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer. The monitoring programme shall be designed by the Environmental Consultant assigned to the project and shall include analysis of samples by an accredited laboratory for all parameters detailed in the monitoring programme. The specific analytical suite and compliance values and points for groundwater will be determined in accordance the recommendations of the MMRP (Golder, 2019c).

Water is anticipated to be treated and pumped to a holding area where it will be sampled and tested by the Contractor prior to discharge. Upon receipt of analysis results and screening against required consent limits, the Contractor will arrange the appropriate disposal, with the groundwater treated and discharged to foul sewer in accordance with temporary discharge consent.

If free product is identified during works, in the case of an accidental release appropriate remediation measures would be required depending on the nature and extent of any contamination caused under such a scenario. The contamination would be assessed in accordance with the recommendations of the MMRP (Golder, 2019c). If it is identified that remediation is required to mitigate any identified potential risk associated with the incident remedial measures would include excavation and removal of contaminated soil, removal of any free-phase materials or liquids via vac tanker or in-situ remediation methods to address soil and groundwater this will be pumped, and removed off-site via tanker to a licensed waste disposal facility. In the event of such a scenario, the dewatering operation will be immediately stopped and investigated, and the relevant authorities notified.

The full details of the dewatering works can be found in the CMP (BCME, 2019a) report (refer to Appendix B) and OCEMP (Enviroguide, 2019a) accompanying this planning application.

CONTROL AND MANAGEMENT OF SURFACE WATER RUNOFF

There may be a temporary increase in the exposure of the underlying groundwater during earthworks due to the temporary removal of hardstanding areas. Silt laden and contaminated runoff associated with exposed soils and stockpiling of excavated soils across the Site may also migrate into the underlying groundwater. Accordingly, pollution prevention controls/ mitigation measures as detailed in the CMP (BCME, 2019a) report (refer to Appendix B) and the OCEMP (Enviroguide, 2019a) will be implemented during the construction of the Proposed Development to prevent off-site impacts to surface waters and groundwater.

The Contractor is to ensure that no contaminated water/liquids leave the Site (as surface water run-off or otherwise), enter the local storm drainage system or direct discharge to the Baldoyle Bay SAC.

INSPECTION AND MONITORING

The inspection and monitoring stage of the construction activities increase the effectiveness of environmental mitigation, as this addresses any environmental problems that may be occurring and assists in intervention and response at an early stage.

Sentinel wells will be installed for the purposes of sampling gas and groundwater in order to monitor the impacts of the works and identify trends arising which may indicate appropriate measures to be undertaken.

In addition, the area of made ground in the south west corner of the basement excavation will continue to be monitored via the installed well until such time as the earthworks are complete.

Gas, groundwater and surface water monitoring and sampling/testing rounds will be undertaken, before, during and after the earthworks works; this will comprise:

- Pre-earthworks - 3no. weekly visits over a two-month period;
- During earthworks – 1no. per month for duration of earthworks; and
- Post-earthworks – 3no. visits monthly post completion of earthworks.
- Results from the monitoring rounds will be provided in monthly reports to be completed and assessed against Tier 1 screening values and will comprise previous monitoring round (cumulative) datasets undertaken and allowing information to be graphically displayed for identification and review of trends.

All gas, ground and surface water monitoring including monitoring of Baldoyle Bay will be carried out in line with the recommendations in MMRP (Golder, 2019c) and the detailed dewatering plant that will be developed for the construction phase.

Waste Auditing and Site Inspection

Inspection of the waste compound will be undertaken on a daily basis by the Environmental Officer. A full site walkover shall also be undertaken to check for any detectable nuisances such as odour, vermin, noise, dust or other such nuisance.

Waste audits will be carried out at regular intervals to monitor waste management practices, record keeping, traceability of all waste arising and removed from the Site and evidence of acceptance at the end destination.

4.7.2 Operational Phase

There is no requirement for mitigation measures for the operational stage of the Proposed Development.

4.8 Residual Impacts

There will be no significant adverse residual impacts on, or associated with the land, soils, geology, hydrogeology associated with the Proposed Development.

It is considered that the Proposed Development will have an overall ‘positive’, ‘slight to moderate’ and ‘long-term’ impact the receiving land, soil, geology and hydrogeology environment in particular water quality including the adjoining Baldoyle Bay SAC.

The predicted impacts of the construction phase are described in Table 4.12 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.

Table 4.12. Summary of Residual Impacts

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Construction of Proposed Scheme.	Land-use	The land-use will be changed from industrial to residential however, the majority of the site cover will remain as impermeable	Positive	Moderate	Permanent	Direct	The Proposed Development is permitted in principle under this zoning objective. Note that the change of land use, amenity etc. are addressed under relevant sections of this EIAR.	Moderate
Bulk Excavation of Soil and Stones (including Basement, Riparian Strip and Lower Ground Level Block A).	Soil, Groundwater and Baldoyle Bay SAC	Excavation for the basement will result in the removal of contaminant source within the soil. This will ultimately result in an improvement to soil and receiving water quality of the underlying groundwater and associated Baldoyle Bay SAC	Positive	Significant	Permanent	Direct	Removal of source of contaminant loading through removal impacted soils from the Site.	Positive
Bulk Excavation of Bedrock (Basement).	Bedrock	Removal of bedrock for the construction of the basement is an unavoidable impact of the Proposed Development.	Negative	Slight	Permanent	Direct	The potential impacts on bedrock are unavoidable and there is no mitigation. Monitoring will be undertaken to ensure that there are no impacts on geological structure associated with rock breaking. The quantity of bedrock removal will be localised.	Slight

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Encountering any as yet unidentified contaminant sources (‘hotspots’) during groundworks of the construction phase.	Soil, Bedrock, Groundwater	Potential for uncontrolled release of unidentified contaminant sources to the geological and water environment	Negative	Slight to moderate	Medium term	Direct	As detailed in the MMRP, OCEMP, CDWMP and CMP, appropriate mitigations will be put in place for the excavation of contaminated soils.	Imperceptible
Import of topsoil and aggregates on-site.	Land, Soil, Geology and Groundwater	In an unlikely event, there exists the possibility of unauthorised importation of unsuitable materials including: a) contaminated material; or b) uncertified materials/soils/aggregates from an unauthorised borrow site. Potential impacts may include contamination of soil, geology and groundwater at the Proposed Development.	Negative	Moderate to Significant	Long term	Direct	Contract and procurement procedures will ensure that all aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations. Quality control procedures will be in place to check and verify all materials being imported to the Site. Therefore, any unsuitable material will be identified prior to	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
							unloading / placement on Site	
Use of cementitious material	Soil and Bedrock	Potential release of cementitious material during construction works including piling, pavement and other structures.	Negative	Slight	Medium term	Direct	The proposed piling methodology will prevent any risk of dispersion of ground from the piling bore including the use of bentonite grout. The cementitious grout used during the construction of the basement and the riparian strip will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.	Imperceptible
Use of cementitious material	Groundwater	Potential release of cementitious material during construction works including piling, pavement and other structures	Negative	Moderate	Medium term	Direct	The proposed piling methodology will prevent any risk of dispersion of ground from the piling bore including the use of bentonite grout. The cementitious grout used during the construction of the basement and the riparian strip will avoid any contamination of	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
							groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.	
Accidental release of hazardous material including fuel, chemicals and hazardous materials.	Soil, Bedrock and Groundwater	Potential for uncontrolled release of unidentified contaminant sources to the geological and water environment	Negative	Moderate/Significan t	Long term	Direct	Mitigation measures as detailed in the MMRP, OCEMP, CDWMP and CMP will be implemented across the Site. If fuel is stored on-site for machinery and construction vehicles, then areas around fuel tanks and draw off points will be bunded and clearly marked. Oils and chemicals used and stored on-site will also be will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas. Portable generators or similar fuel containing equipment will also be placed on suitable drip trays. Emergency procedures will be developed, and	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
							spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures for in the event of accidental fuel spillages.	
Dewatering (management of contaminated water).	Groundwater and Baldoyle Bay SAC	There will be no direct discharge to Baldoyle Bay SAC. However, there is a potential risk of accidental release of untreated water during dewatering with possible impacts on the receiving land soil, geology and hydrogeology environment	Negative	Moderate	Long term	Indirect/Direct	Management of shallow groundwater encountered during construction stage through robust dewatering methodologies and water treatment and management measures will ensure that there is minimal risk that mitigates against the mixing of dissolved contaminants in groundwater. There is no direct discharge of impacted groundwater or surface water from the Site during construction to the receiving Land, soil, geology hydrogeology environment. Groundwater encountered during	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
							construction works is to be managed through licensable discharge to public sewer prior to final discharge to surface waters.	
Piling.	Groundwater	Potential introduction of preferential pathway from contaminated material (e.g. identified hotspots unidentified contaminant source) to bedrock and groundwater	Negative	Moderate	Short to medium term	Direct	The proposed piling methodology will minimise the potential for introduction of any temporary conduit between contaminated materials and underlying groundwater.	Imperceptible
Bulk Excavation of Soil and Stones (including Basement, Riparian Strip and Lower Ground Level Block A).	Groundwater	Potential contaminated run-off percolating to ground and the underlying groundwater environment.	Negative	Slight	Short term	Direct	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 as the subsoil is removed from the 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

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Dewatering.	Groundwater	Temporary drawdown of local groundwater levels during dewatering required for bulk excavation and basement construction. Dewatering will be carried out following construction of the secant pile walls. However, the extent of the impact is considered to be localised to the immediate area surrounding the basement	Negative	Slight	Short term	Direct	The requirement to dewater will be managed through robust dewatering methodologies that will minimise the potential impact on the local groundwater regime.	Imperceptible
Export of Soil and Stone Waste.	Land, Soil, Geology and Hydrogeology at Receiving Site	Soil and stone waste arising from the Site has been classified for off-site disposal as inert, non-hazardous and hazardous as well as asbestos contaminated soil.	Neutral	Imperceptible	Long term	Indirect	All waste soil and bedrock waste materials be removed off-site in accordance with the requirements outlined in the MMRP, CEMP, CDWMP and CMP and will be managed in accordance with Planning and Waste Management Statutory Requirements and obligations and sent to appropriately licensed/permitted receiving waste facilities.	Imperceptible
Export of Soil and Stone Waste.	Land, Soil, Geology and Hydrogeology at Receiving Site	In an unlikely event, soil and stone waste from the Site could be directed to an unauthorised disposal site with potential to impact on	Negative	Significant	Long term	Indirect	All waste will be removed off-site in accordance with the requirements outlined in the MMRP, OCEMP, CDWMP and	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
		the receiving land, soil geology and hydrogeology at that location.					CMP and will be managed in accordance with all legal obligations and sent to appropriately licensed/permitted receiving waste facilities	
Import of topsoil and aggregates from off-site sources.	Off-site (source site) - Land, Soil, Geology and Hydrogeology	Potential loss of attribute at the source site. Materials will only be sourced from borrow sites operating in accordance with necessary statutory consents and therefore ensuring any potential impacts are adequately mitigated and addressed.	Neutral	Imperceptible	Long term	Indirect	Management Procedures will ensure that all topsoil, aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations.	Imperceptible
Import of topsoil and aggregates.	Land (on-site), Soil, Geology, Hydrogeology	The importation of fill, will be subject to control procedures which to ensure suitability for use from engineering and environmental perspective and absence of contaminants, invasive species and other anthropogenic inclusions. All material sourced from borrow sites, quarries etc. with the necessary consents in place.	Positive	Slight	Long term	Secondary	Management Procedures and appropriate quality control procedures to enable verification of suitability for use will be implemented for importation of soil and aggregates to the Site.	Positive

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Excavation of soil and materials.	Receiving Waste Facility	Excavated soils and the movement of the materials from the Site could potentially be directed to the same receiving waste facilities for recovery, re-use or disposal as excavated materials from the permitted development at Balscadden, Howth (301722-18).	Neutral	Imperceptible	Permanent	Cumulative	All surplus materials from the Site will be managed in compliance with relevant waste management legislation and directed to appropriately licensed waste facilities operated in compliance with the relevant statutory consents for the facility.	Imperceptible

4.9 INTERACTIONS

4.9.1 PUBLIC HEALTH

No general public health issues associated with the land, soil, geology and hydrogeology conditions at the Site have been identified for the construction phase of the Proposed Development in regard to management of contaminants.

Procedures for dealing with potentially contaminated material during bulk excavations and the movement of materials including asbestos contaminated soils and asbestos containing materials (ACMs) on-site that will prevent any potential public health issues are outlined in the MMRP (Golder, 2019c) and proven, robust, site specific procedures will be implemented for the works by the Contractor taking account of the recommendations set out in the OCEMP (Enviroguide, 2019a), the CMP (BCME, 2019a) report (refer to Appendix B), the CDWMP (BCME, 2019d), the Asbestos Demolition Survey Report (OHSS safety Consultants, 2019a) and the Risk Assessment for Mechanical Handling of Soils/Stones Containing Asbestos (OHSS Safety Consultants, 2019b) for the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

With regards to contaminated soils containing asbestos the following specific mitigation measures, in addition to those as outlined in Section 4.7.1., will be implemented across the Site to ensure the protection of site workers and the general public.

- Measures will be in place to prevent workers transferring mud from the Site to their cars and/or homes including appropriate personal protective equipment, welfare and changing facilities, separation of work wear from non-work wear and washing of boots before leaving the Site.
- Workers will also receive awareness training in relation to the possibility that ACMs may be present in soil in order that they know what to look out for and what to do, if they encounter any suspect materials and also in order that they appreciate the importance of implementing the required hygiene measures.

The design of the Proposed Development includes remedial measures to adequately address any potential human health issues associated with the baseline land, soil, geology and hydrogeology site condition as outlined in the MMRP (Golder, 2019c). The design of the Proposed Development will ensure that the Site will be suitable for use for the operational phase as a residential and mixed-use commercial / retail development of the proposed end-use of the development.

It is noted that specific issues relating to Public Heath associated with the Proposed Development are set out in Chapter 3 of this EIAR.

4.9.2 WATER

Enviroguide have carried out an assessment of the potential impact of the Proposed Development on the water environment. Namely; surface water, foul water and water supply as outlined in Chapter 5 Water. Groundwater dewatering at the Site will be required during bulk excavation works to allow construction of the basement levels at the Site. It is proposed that treated groundwater will be discharge to the public foul sewer network only under a temporary discharge consent from IW and there will be not discharges to groundwater.

4.9.3 BIODIVERSITY

Enviroguide have carried out an assessment of the potential impacts of the Proposed Development on the Biodiversity of the Site, with emphasis on habitats, flora and fauna which may be impacted a result of construction activities, including exaction works and groundwater dewatering, at the Proposed

Development. It also 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 are set out in Chapter 8 Biodiversity.

4.9.4 Material Assets - Waste

Enviroguide have carried out an assessment of the potential impacts associated with the waste that will be generated during the construction stage as set out in Chapter 11 Material Assets - Waste. There will be a requirement for the handling and storage of waste in addition to the removal of waste for off-site disposal during the construction phase of the Proposed Development.

4.9.5 Other Interactions

Land, soils, geology and hydrogeology interact with other environmental attributes such as air quality (Chapter 6), noise (Chapter 7) and traffic (Chapter 10) and are examined in relevant chapters of this EIAR.

4.10 Difficulties Encountered in Compiling Required Information

There were no difficulties encountered in compiling this land, soil, geology and hydrogeology assessment.

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Chapter 5

Water,

Hydrology and Hydrogeology

5.0 WATER (HYDROLOGY AND HYDROGEOLOGY)

5.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the hydrology, water and hydrogeology environments within and immediately surrounding the Site of the Proposed Development and an assessment of the potential impacts of the Proposed Development on hydrology, water and hydrogeology and sets out any required mitigation measures where required.

The principal objectives of this chapter are to identify:

- Water (hydrology and hydrogeology) characteristics of receiving environment at the Site;
- Potential impacts that the Proposed Development may have on the receiving water environment;
- Potential constraints that the environmental attributes may place on the Proposed Develop ment;
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development; and
- Evaluate the significance of any residual impacts.

Please note that the EIAR has addressed S8.2.7 of the Planning Authority's Opinion and An Bord Pleanala Opinion Item no. 7.

5.1.1 Quality Assurance and Competence

This Chapter of the EIAR was written by Gareth Carroll BAI, Senior Environmental Consultant with Enviroguide Consulting (Enviroguide) with 8 years experience of environmental assessment of brownfield and greenfield sites. The Chapter was reviewed by Claire Clifford BSc., MSc., PGeo, EurGeol,. who is Technical Director of the Contaminated Land and Hydrogeology Division of Enviroguide and is a Professional Geologist with the Institute of Geologists of Ireland and has over 18 years of experience in preparing environmental and hydrogeological assessments for a range of projects types.

5.1.2 Description of the Proposed Development

The Proposed Development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The Site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

5.1.3 Characteristics of Proposed Development Relevant to this Chapter

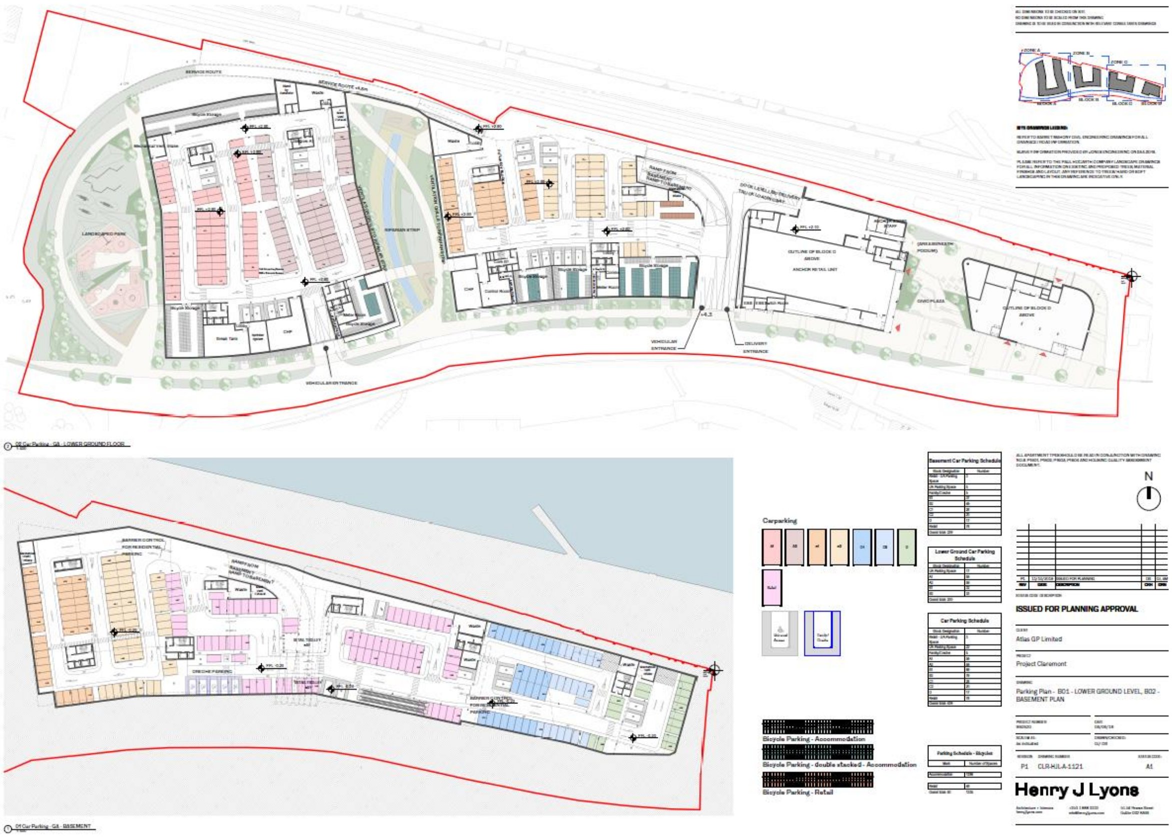
The construction phase of the proposed development will likely have impacts on the receiving environment that are specifically relevant to the water (hydrological and hydrogeological) characteristics of the site.

The land-use at the site of the proposed development will be changed from industrial and commercial land use to a mixed-use development of residential, retail/café/restaurant uses and a creche.

The Proposed Development will include the following:

- Demolition of existing buildings including the existing Techrete factory, Teelings Garage and the Garden Centre together with and above and below infrastructure;
- Basement construction including bulk excavation over an area of 6,308m2 to a depth of 2.5 meters below ground level (mBGL) (2.3 meters above ordinance datum (mOD)) in the west beneath Block A and over an area of 9,933m2 to a depth of 5.2mBGL (-0.4 mOD) beneath Blocks B, C and D in the mid and eastern portions of the Site. The basement locations are shown on *Figure 5-1.*

Figure 5-1. Basement and Subsurface Carpark

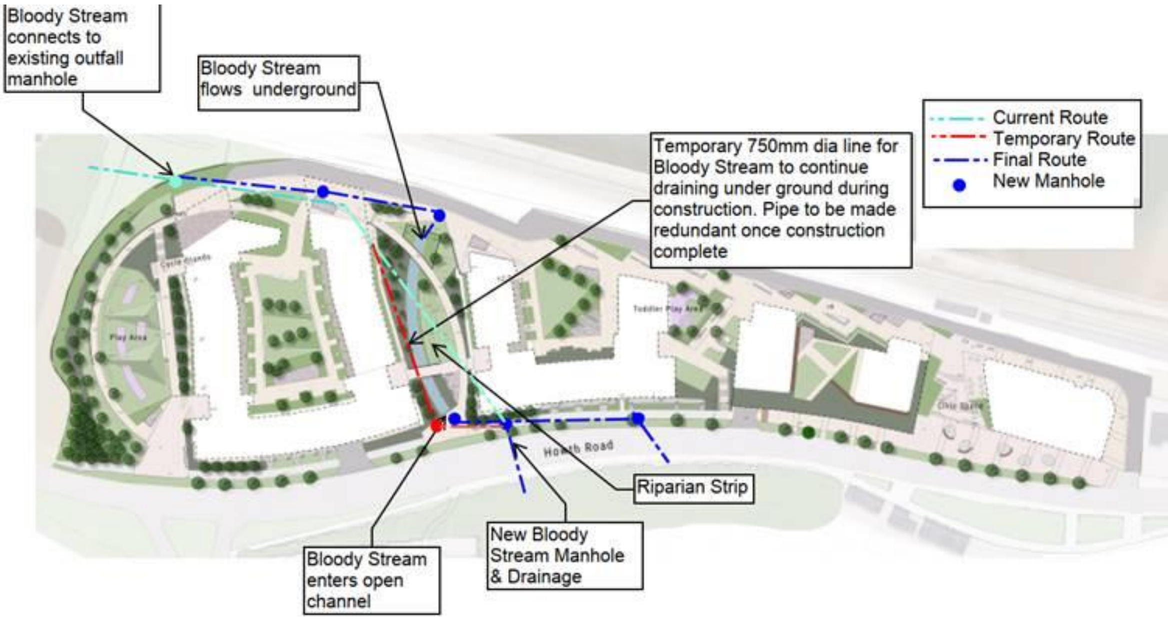


- Groundwater dewatering will be required for the excavation and construction of the basement level underneath Blocks A, B, C and D and there will be no direct discharges to surface water. All groundwater will be discharged under temporary license to Irish Water (IW) foul sewer.
- Opening up of the Bloody Stream and developing a riparian strip across the Site that will include the construction of an open impermeable concrete channel spanning the breadth of the Site with underground drainage connections at either end, a settlement chamber and landscaped banks on either side of the channel. The proposed design of the riparian strip is detailed in Drawing 18386 in Appendix B and presented in Figure 5-2 of the EIAR.

During the Construction Phase the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete culvert/pipe. To ensure the integrity of the pipe for example due to heavy plant traversing the pipe, it will be encased in 150mm concrete. This is in accordance with FCC Guidelines and Greater Dublin Regional Code of Practice for Drainage Works.

Connection of the Bloody Stream into the riparian strip will be carried out via a temporarily pumping water from the existing manhole to a safe location in the new channel while the new connection is formed. Once complete pumping will be stopped, and the Bloody Stream will flow into the riparian strip.

Figure 5-2. Bloody Stream Temporary Diversion Riparian Strip Plan and Sections



- Storm water from the Proposed Development will be managed in accordance with principles of Sustainable Drainage Systems (SuDS). It is noted that the full implementation of SuDS measures is not deemed necessary for the Proposed Development because of the proximity to the sea and the fact that the surface water drainage will discharge directly (via the Bob Davis Culvert) to the sea. Regardless of this, the drainage design takes cognisance of the principles of SuDS design. The design for the storm water management strategy will improve water quality and reduce the quantity of water discharged to the Bloody Stream including the following features:
    - Use of a combination of intensive and extensive green roof will provide interception storage of 555.7m^3
    - Provision of full retention fuel interceptors for water collected from carpark areas and Howth Road that will be discharged to the foul sewer.
    - Rainfall on permeable paving has been be designed to replicate the green field infiltration to ground.
- The existing Site is covered by buildings and hard standing areas that make up 70% (BMCE, 2019a) of the total Site area. Similarly, the majority of the Site will be hard covered with buildings and impermeable pavement on completion of the Proposed Development.

5.1.4 Description of other Relevant Developments

1. 301722-18

Granted Permission on 14/09/2018

Development Description:

A Strategic Housing Development has been permitted at a site at Balscadden in Howth. This development consists of 163 no. residential units including 1, 2, and 3-bedroom apartments and duplex units. 757m^2 of commercial space, including two no. retail units and a café, is also included. The development provides for 120 no. car parking spaces located at street level and basement level.

2. F18A/0267

Granted Permission on 06/11/2018

Development Description:

Planning permission is being sought by the Department of Agriculture, Food and Marine for construction of 2 no. ground level industrial buildings (5 no. units each) consisted of a total of ten industrial units. The maximum height of buildings at ridge level is 6.25m. The use of the building will consist of light industrial activities such as repair and maintenance of maritime and fishing equipment and ancillary storage.

3. F17A/0553

Granted Permission on 05/12/2017

Development Description:

Permission sought by Oceanpath Ltd. for development at existing food processing facility at sites 37-03 and 37-05, Claremont Industrial Estate, West Pier, Howth, County Dublin. The proposed development will consist of the scheme previously approved under F17A/0313 with the following alterations:

- Reduction in size of the proposed extension by 133m^2 so that it will consist of: The construction of 1,258m^2 (approximately) two storey extension (8.135m high approximately) to west side of existing 1,130m^2 (approximately) two storey building (8.135m high approximately). The main use of the existing building is for the processing of food (primarily fish) and it storage and distribution. The main uses of the proposed extension will be for the processing of food (primarily fish) and its storage and distribution but will also include an 11.0m (approximately) factory retail outlet primarily for the sale to the public of seafood products produced on-site.
- The omission of the proposed construction of 3.8m^2 (approximately) single storey (3.505metre high approximately) compactor enclosure to northwest corner of the site.
- The relocation of the existing fence on the west side of the site 37-05 to be against the legal site boundary.
- Associated works.

4. F18/0074

Granted Permission on 01/10/2019

Development Description:

Permission granted for the provision of 130m long quay wall; associated deck area, road access, hard standing; localised dredging to facilitate works, dredging to -4m Chart Datum along the front of new quay wall to provide berthing depth and land reclamation of approximate 0.30 Ha on the east side of Middle Pier of Howth FHC.

5. ABP-301908-18 and ABP-302039-18

Granted Permission on 13/11/2019

Development Description:

Development of a new wastewater treatment plant, sludge hub centre, orbital sewer, outfall pipeline and regional biosolids storage facility. The project will be located in County Fingal and with a 60-metre section of pipeline in Dublin City and is 25 kilometres long. The development may be described in more detail as:

- Regional WwTP of 500,000 PE on 29.8 ha site in Clonshaugh to be constructed in a single phase.
- Wastewater treatment plant comprising a regional wastewater treatment plant to be located on a 29.8-hectare site in the townland of Clonshagh (Clonshaugh) in Fingal.
- Abbotstown pumping station comprising a pumping station to be located on a 0.4-hectare site in the grounds of the National Sports Campus (NSC) at Abbotstown.
- Orbital sewer route comprising an underground orbital sewer, the route of which will intercept the existing sewer at Blanchardstown and divert it from this point to the wastewater treatment plant at Clonshagh.
- Diversion of the North Fringe Sewer (NFS) which will be constructed from the junction of the access road to the wastewater treatment plant with the R139 Road (Dublin City Council administrative area).
- Outfall pipeline route (land-based section) to be constructed from the northern boundary of the wastewater treatment plant to the R106 Coast Road at Maynetown (townland).
- Outfall pipeline route (marine section) to be constructed from the R106 Coast Road (at Maynetown) and will terminate at a discharge location approximately one kilometre north-east of Ireland's Eye (island).
- Regional *biosolids storage facility (RBSF) located on an 11-hectare site at Newtown, Dublin*.

5.2 METHODOLOGY

5.2.1 Regulations and Guidance

The methodology adopted for this assessment takes cognisance of the relevant guidelines in particular the following:

- Construction Industry Research and Information Association (CIRIA), 2016. Groundwater control: design and practice (second edition) (CIRIA - C750).
- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment including amendment directive 2014/52/EU of the European Parliament and of the Council of 16th April 2014 (EIA Directive).;
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (Groundwater Protection Schemes, 1999).
- Environmental Protection Agency, August 2017. Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017);
- Environmental Protection Agency, September 2015. Draft Advice Notes for preparing Environmental Impact Statements (EPA, 2015);
- Environmental Protection Agency, 2002. Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002);
- Environmental Protection Agency, 2003. Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council, 2012.The Greater Dublin Regional Code of Practice for Drainage Works. Version Draft 6.0.
- Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council, 2012. Addendum to Greater Dublin Regional Code of Practice for Drainage Works. Version Draft 6.0.

- Institute of Geologists of Ireland Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013);
- Dublin City Council, April 2005. Greater Dublin Strategic Drainage Study (GDSDS);
- DEHLG. (2009). Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. Department of Environment, Heritage and Local Government;
- National Roads Authority, 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009);
- Transport Infrastructure Ireland Publications, June 2015. Road Drainage and the Water Environment (including Amendment No. 1 dated June 2015). (TII, 2015);
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy with amendments 2455/2001/EC, 2008/32/EC and 2008/105/EC;
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and amendment S.I. No.366/2016;
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019;
- Office of Public Works (OPW), November 2009. The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009; and
- Dublin City Council, September 2019. Basement Development Guidance Document Version 1.0.

5.2.2 Phased Approach

A phased approach was adopted for this EIAR in accordance with Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines as set out above and is described in the following sections.

Element 1: An initial Assessment and Impact Determination stage was carried out to establish the project location, type and scale of the development, the baseline conditions, and the type of hydrological and hydrogeological environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and impact determination.

This stage of the assessment included a desk top study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for the Water (Hydrology and Hydrogeology) chapter of the EIAR, extends beyond the Site boundaries and includes potential receptors within a 2km radius of the Site. The extent of the wider study area was based on the IGI, 2013 Guidelines which recommend a minimum distance of 2km radius from the site. This distance was reviewed during the desk based studies and revised to 15km to identify potentially sensitive habitats which is a distance set out in AA/ NIS methodologies (DEHLG, 2009). The purpose of this increased search radius was to ensure that any potential hydrogeological / hydrological connections to sensitive habitats were identified.

This stage of the assessment was completed by Enviroguide and included the review of the following sources of information:

- EPA webmapping 2019;
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping;
- Ordnance Survey Ireland (OSI) webmapping 2019;
- Water Framework Directive Ireland (WFD) webmapping, 2019;
- Office of Public Works (OPW) database on historic flooding and the Catchment Flood Risk Assessment and Management (CFRAM) maps;
- Irish Coastal Protection Strategy Study – Phase 3 – North East Coast; and

- Fingal County Council, 2017. Strategic Flood Risk Assessment for the Fingal Development Plan 2017-2023.

Liaison with the design team was integral to determining the overall potential impacts associated with the Proposed Development. The design team members and relevant reports, documents and drawings reviewed and evaluated are set out below:

- Barrett Mahony Consulting Engineers Civil and Structural, November 2019. Construction Management Plan Report (CMP (BCME, 2019a));
- Barrett Mahony Consulting Engineers Civil and Structural, November 2019. Civil Infrastructure Report (IR (BCME, 2019b));
- Barrett Mahony Consulting Engineers Civil and Structural, November 2019. Flood Risk Assessment Report (FRA (BCME, 2019c));
- Barrett Mahony Consulting Engineers Civil and Structural, November 2019. Construction and Demolition Waste Management Plan Report (CDWMP, 2019d);
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Basement Foul and SW Drainage. Drawing No. PPT-BMD-XX-ZZ-DR-C-1001;
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Ground Floor Foul and SW Drainage. Drawing No. PPT-BMD-XX-ZZ-DR-C-1002;
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Outline Sections 1 & 2. Drawing No. PPT-BMD-XX-ZZ-DR-S-2100;
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Watermain Layout. Drawing No. PPT-BMD-XX-ZZ-DR-C-1005;
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Claremont Project. Riparian Strip Plan & Sections. Drawing No. PPT-BMD-XX-ZZ-DR-C-1010;
- Enviroguide Consulting, October 2019. Outline Construction Environmental Management Plan (OCEMP (Enviroguide, 2019a));
- Henry J Lyons, October 2019. Claremont Project. Block B – Basement Plan. Drawing No. CLR-HJL-02-B01-DR-A-1008;
- Henry J Lyons, October 2019. Claremont Project. Block C & D – Basement Plan. Drawing No. CLR-HJL-03-B01-DR-A-1008CD;
- Henry J Lyons, October 2019. Claremont Project. Block A – Lower Ground Floor Plan. Drawing No. CLR-HJL-01-L00-DR-A-1009A;
- Henry J Lyons, October 2019. Claremont Project. Block B – Lower Ground Floor Plan. Drawing No. CLR-HJL-02-L00-DR-A-1009B;
- Henry J Lyons, October 2019. Claremont Project. Parking Plan – B01 – Lower Ground Level, B02 – Basement Plan. Drawing No. CLR-HJL-A-1121.
- Minerex Environmental Ltd., October 2019. Planning stage dewatering plan, risk assessment and mitigation measures (Minerex, 2019).

Save for the Henry J Lyons drawings, these reports can be found in Chapter 4 of Volume 3 of this EIAR

Element 2: Direct and Indirect Site Investigation and Studies stage was carried out to refine the conceptual site model and undertake a detailed assessment and impact determination. The scope of work included: site walkovers and interview with site personnel regarding the historic operations at the Site completed by Enviroguide on the 7th and 14th January 2019 and desk-based review of site investigation and environmental assessment reports completed by Golder Associates Ireland Limited (Golder).

The reports and documents reviewed and evaluated for Element 2 of this assessment included the following:

- Golder Associates Ireland Limited, November 2019. Interpretative Ground Investigation Report Claremont Development Site, Howth (Golder, 2019a);

- Golder Associates Ireland Limited, October 2019. Controlled Waters Risk Assessment Claremont Development Site, Howth (CWRA (Golder, 2019b));
- Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth (MMRP (Golder, 2019c)) – note this report incorporates previous site investigation report by IGSL Ltd. (IGSL);
- Golder Associates Ireland Limited, October 2019. Human Health Risk Assessment Claremont Development Site, Howth (HHRA (Golder, 2019d));

The regime that governs the assessment of potential and actual pollutants with the ability to cause harm in Ireland follows that of the UK contaminated land regulatory regime (which includes legislation such as the EPA Act 1992, Environmental Risk Assessment for Unregulated Waste Disposal Sites, 2007 and Groundwater Directive, 2006) that provide a regime by which brownfield land can be evaluated in the context or environmental risk assessment in a phased manner broadly as described as Tier 1 (Preliminary Risk Assessment), Tier 2 (Generic Quantitative Risk Assessment) and Tier 3 (Detailed Quantitative Risk Assessment) levels, The specific scope of assessment of each of the Tier 1, Tier 2 and Tier3 are set out relevant reports produced by Golder for the Site as set out in *Table 5-1*.

Table 5-1. Key Assessment Context (Golder, 2019c).

Report Reference	Key Assessment Context
Golder Associates Ireland Limited, October 2019. Interpretative Ground Investigation Report Claremont Development Site, Howth (Golder, 2019a)	Contaminated Land – Tier 1 Risk Assessment
Golder Associates Ireland Limited, October 2019. Human Health Risk Assessment Claremont Development Site, Howth (Golder, 2019d)	Contaminated Land – Tier2/3 Risk Assessment
Golder Associates Ireland Limited, October 2019. Controlled Waters Risk Assessment Claremont Development Site, Howth (Golder, 2019b)	
Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth (Golder, 2019c)	Waste Characterisation (includes Remedial requirements identified from Tier 2/3 Risk Assessment)

It is noted that the CSM, as detailed in the Golder environmental assessment reports, was updated and refined for the purposes of this chapter of the EIAR to incorporate the assessment of the receiving water environment. The outcome of this refinement is presented in this chapter of the EIAR.

Element 3: Mitigation Measures, Residual Impacts and Final Impact Assessment were based on the outcome of the information gathered in Element 1 and Element 2 of the assessment. Mitigation measures to address all identified adverse impacts that were identified in Element 1 and 2 of the assessment were considered in relation to the Operational and Construction Phase of the development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Element 4: Completion of the Water (Hydrology and Hydrogeology) sections of the EIAR was completed in this Chapter and includes all the associated figures and documents.

5.2.3 Consultations

The following relevant bodies were consulted regarding the Proposed Development:

- Fingal County Council (FCC);
- Department Application Unit - National Parks and Wildlife Service (NPWS);
- Irish Water (IW); and,
- Iarnród Éireann.

The key items relevant to this hydrological and hydrogeological assessment were raised by the NPWS in correspondence dated 20th September 2019 (Department of Culture, Heritage and Gaeltacht Correspondence Reference G Pre00221/2019) are summarised as follows:

- Potential construction phase impacts associated with dewatering;
- Potential construction phase impacts on water quality of the bloody stream and other drainage; and,
- Potential operational phase impacts associated with the connection between the Bloody Stream and Baldoyle Bay.

These issues have been considered in the hydrological and hydrogeological assessment and the potential impacts and assessment findings are outlined in Section 5.41 and 5.5.1

Items regarding the storm drainage were agreed with FCC and are presented in Section 5.5.

5.2.4 Description and Assessment of Potential Impact

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this chapter is described in Table 5-2 below:

Table 5-2. Assessment of Potential Impacts Terminology and Methodology

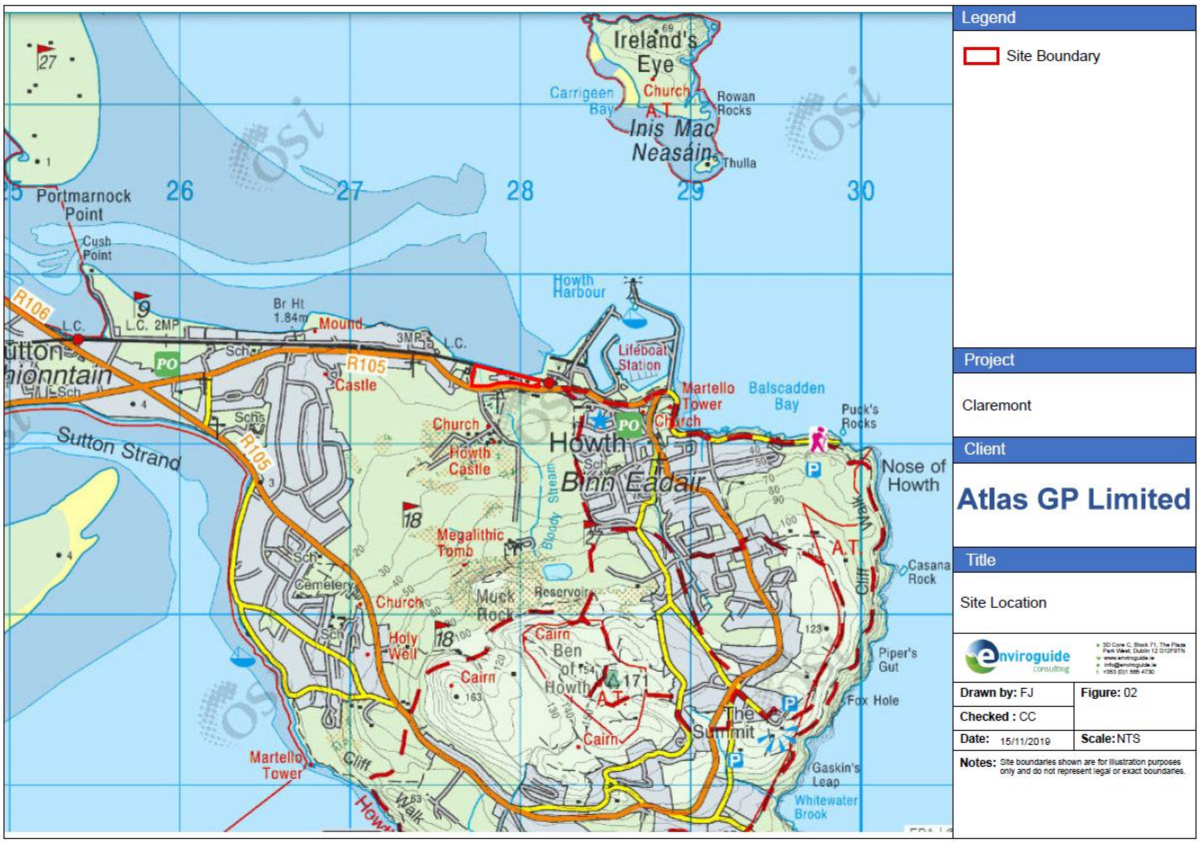
Quality of Effects / Impacts	**Definition**
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**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 a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	**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

5.3 BASELINE CONDITIONS FOR THE RECEIVING ENVIRONMENT

5.3.1 Site Location and Adjoining Land Use

The Proposed Development is located at the western side of Howth, Co. Dublin, approximately 400m west of Howth Harbour. The Site is bordered to the south by Howth Road (R105) serving the Howth Peninsula and to the north by the DART railway line. Claremont Strand is located on the northern side of the railway line. A FCC water pumping station and associated lands lie to the west of the Site and there are residential and commercial properties adjoining the eastern Site boundary. The Site is located approximately one mile from Howth town centre. A Site location plan depicting the current layout of the Site prior to development and in the context of the surrounding environment is presented in Figure ***5-3***.

Figure 5-3. Site Location



5.3.2 Current and Historic Land Use

The Site is zoned as 'Objective TC – Town and District Centre'. The objective of this zoning is to 'Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities'. It is noted that residential development is permitted in principle under this zoning objective.

The Site is approximately 2.68 hectares (Ha) and generally level. Howth Road (R105) provides direct access to the Site.

The brownfield Site consists of three formerly separate properties. The former Techcrete factory (historically operated by Parsons) area makes up the largest portion of the Site occupying the central and western portion of the Site. The Techrete site was historically operated as a sheet metal engineering works by Parsons prior to the property being taken over by Techrete who manufactured concrete pre-cast products at the Site until 2008. The buildings to the west continued to be used as an engineering works during this time. This area of the Site comprises redundant offices, manufacturing and storage facilities located within two-to-three storey industrial sheds with corrugated steel roof, steel framework and masonry walls. The remaining area of the Site was formerly used for storage of manufacturing equipment/material and storage of finished products e.g. concrete panels.

The property to the east of the Techrete factory is occupied by the former Beshoff Motors and historically operated by Teeling Motors garage site. The Beshoff Motors site was in use as a car dealership until 2018 and is no longer in operation. This area is occupied by a former steel frame show room, separate garage and car park.

A former garden centre and dog grooming facility are located to the east of the Beshoff motors area. This area is occupied by a vacant single storey masonry building with a corrugated roof and concrete yard. Anecdotal evidence identified that the Site of the former garden was previously occupied by a service station and mechanics garage with underground storage tanks.

The undeveloped lands to the west of the Site, are understood to have historically been used by the local authority and that screenings from the wastewater screening plant to the west of the Site were placed on these lands.

Decommissioning of the on-site building infrastructure across the Site has not been undertaken at the time of writing this report. The existing Site infrastructure occupies a large portion of the central and eastern portions of the Site, while the remaining lands are comprised of hard cover of bitumen or concrete in the lands surrounding the existing infrastructure, and with vegetation cover in the western portion of the Site.

There is a private dwelling ‘Ashbury’ located adjoining the eastern Site boundary and the Former Stationmaster’s House and Howth Railway Station are located to the east of the Site.

The lands adjoining the west of the Site are owned by FCC. The current discharge of wastewater on-site is into a 300mm sewer that outfalls into the local authority screen house and pumping station located to the west of the Site. This then carries the wastewater to a pumping station in Sutton by means of a 500mm diameter pressure main located to the north of the railway line running along the northern Site boundary. It is noted that this pressure main cuts across a small portion of the northwest corner of the Site. The wastewater is then pumped across Dublin Bay and treated at Ringsend Wastewater Treatment Plant (WwTP) before its release into the Irish Sea. There is no wastewater disposal proposed into Baldoyle Bay.

5.3.3 Topography

Originally an island, Howth Head is connected to the mainland via a narrow strip of land, or tombolo, and forms the northerly bound of the great crescent of Dublin Bay, roughly corresponding to Dalkey Hill and Killiney Hill in the south. Most of the headland is hilly, with peaks such as the Black Linn (171m), by the Ben of Howth, on a side road beyond the Green Hill Quarries at the Loughereen Hills, Shielmartin Hill (163m) overlooking Carrickbrack Road and Carrickbrack and Dun Hill. There are also craggy areas such as Muck Rock (Carrickmore), and Kilrock. Howth has an extensive and varied coastline, and there are steep sea cliffs around parts, especially on the north coast.

The existing Site is relatively flat ranging from a level of 4.5mOD to 4.0mOD generally with the slight fall to the east in line with the fall in the Howth Road itself toward Howth village/harbour. A detailed topographical survey has been carried out for the Site and has informed this EIAR Chapter.

5.3.4 Rainfall

Monthly gridded rainfall data was sourced from Met Éireann (Walsh, 2012) and is presented in Table 5-3.

Table 5-3. Long term mean monthly rainfall data (mm) (Walsh, 2012)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
60	47	52	51	57	58	53	66	61	76	72	68	721

The closest the synoptic meteorological station to the Site is at Dublin Airport located approximately 11.0km west of the Site. The mean average potential evapotranspiration (PE) from Dublin Airport is presented in Table 5-4.

Table 5-4. Mean Average Potential Evapotranspiration

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
16.1	22.9	35.3	52.9	71.6	82.3	82.5	69.0	48.2	28.5	16.1	13.2	538.6

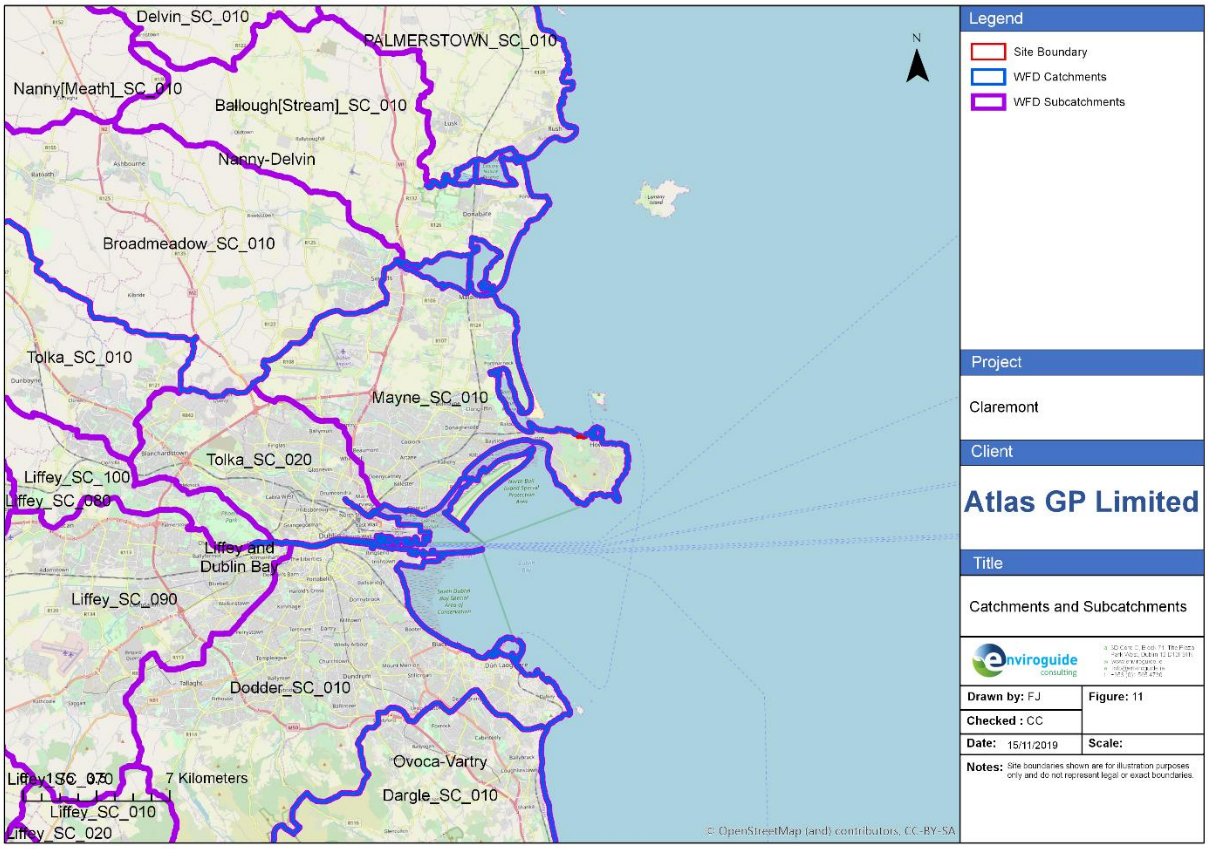
The GSI (GSI, 2019) have calculated an effective rainfall value of 304mm/year for the Site.

5.3.5 Hydrology

The Site is mapped by the EPA (EPA, 2019) as within the Liffey and Dublin Bay hydrometric area (HA09), the WFD Catchment of Liffey and Dublin Bay (Catchment I.D 09) and the Mayne_SC_010 Sub-catchment (Sub-catchment I.D. 09_17), the river catchments are described below. The catchment units are presented in

Figure *5-4*.

Figure 5-4. Catchment Units



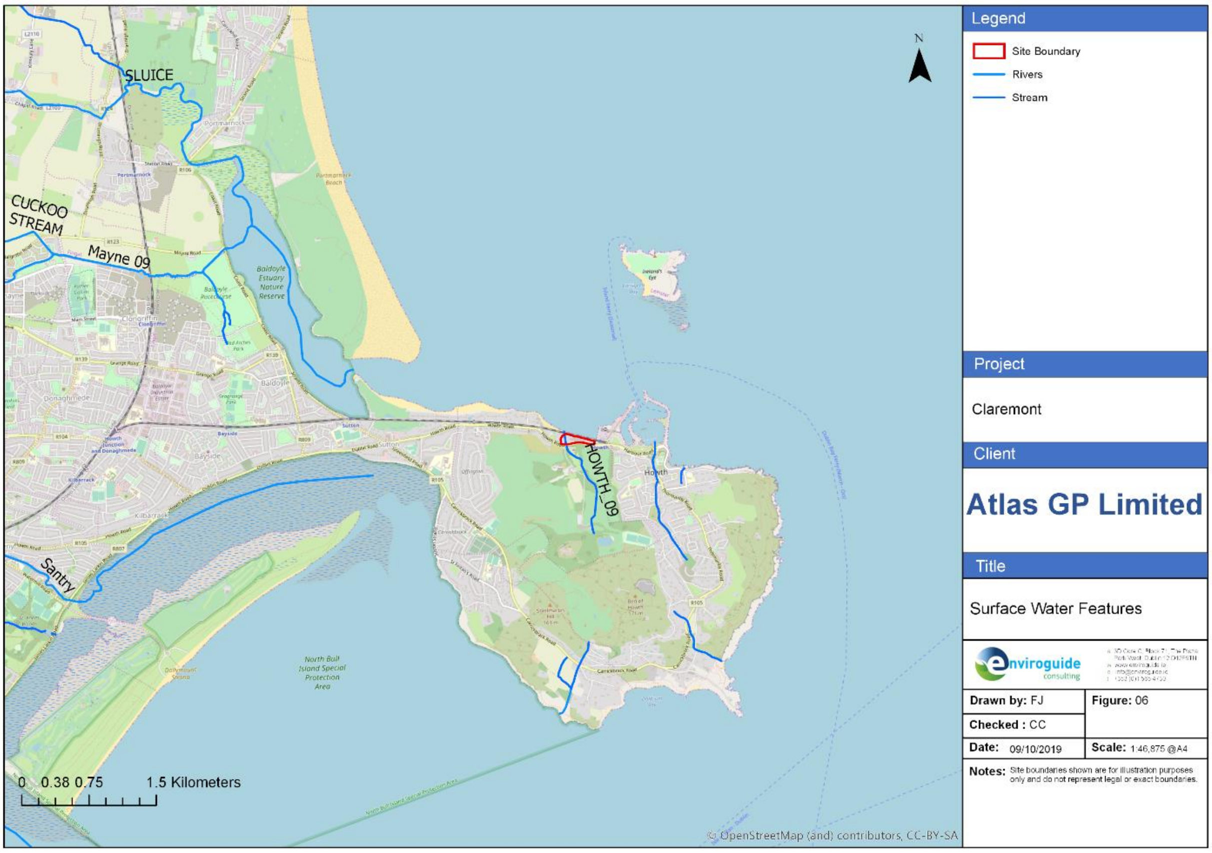
Surface water bodies that are relevant to the Proposed Development are discussed below.

The Mayne River (IE_EA_09M030500) is located approximately 4.3km north west and the Sluice River (IE_EA_09S071100) is located approximately 4.9km north west of the Site. The Mayne River and the Sluice River both discharge into the Baldoyle Estuary Nature Reserve (the Mayne Estuary) which forms part of the Baldoyle Bay SAC and Special Protection Area (SPA).

The closest surface water feature to the Site is recorded on the GSI database (GSI, 2019) as the Howth_09 Stream (Segment Code 09_2176 and EPA Code 09H23) the Bloody Stream on the EPA database (EPA, 2019). This watercourse is mapped as rising within the grounds of the Deer Park Hotel approximately 1.0km south of the Site and discharging to the sea at Claremont Strand (which forms part of the Baldoyle Bay Special Area of Conservation (SAC)) having passed through the Site. The Bloody Stream is culverted beneath Howth Road (R105) and the Site via a 600mm diameter pipe and discharges into the Bob Davis Culvert under the DART railway line before discharging to the sea approximately 0.02km north of the Site.

A total of four additional unnamed streams have been identified within the Howth Head Peninsula, two of which have been mapped by the GSI (GSI, 2019) to be within a 2km radius of the Site. The first unnamed stream (Segment code 09_410) is located approximately 0.9km to the east of the Site and discharges to Howth Harbour. The second unnamed stream (Segment Code 09_2196) is located approximately 1.2km to the east of the Site and discharges to Balscadden Bay which forms part of the Howth Head SAC. The additional two unnamed streams (Segment Code 09_516 and 09_2190) are located on the Howth Peninsula approximately 2.2km and 2.1km south and south east of the Site respectively. These surface water features are presented in Figure 5-5.

Figure 5-5. Surface Water Features



5.3.6 Existing Surface Water Drainage On-Site

The Site is currently occupied with 8,162m^2 of industrial type buildings and associated yards and hardstanding areas approximately 8,878m^2. The total area of the Site is 2.64Ha.

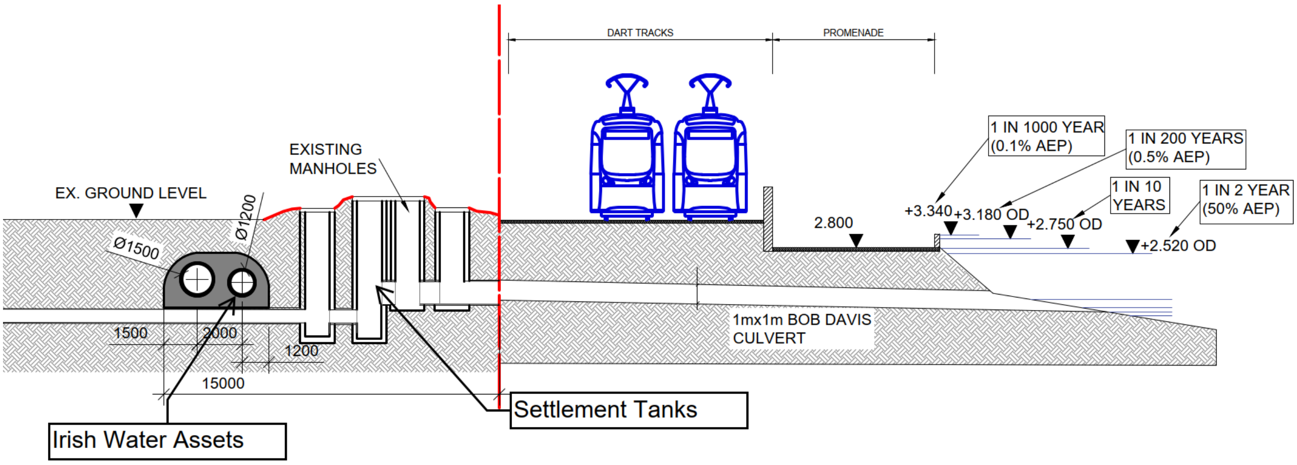
Currently all surface water is collected without attenuation storage and is discharged into the culverted Bloody Stream and discharges through a series of settlement tanks and outfalls into the Bob Davis Culvert which flows under the DART line and discharges to Claremont Strand.

These settlement tanks are located on the northwest area of the Site were necessary because of the existence of two IW assets, 1500mm and the 1200mm concrete sewers, and which necessitated the Bloody Stream to flow effectively under these.

A survey was carried out to establish the exact location of these pipes and this survey was overseen by Fingal Co. Co. (FCC) and BMCE. The survey involved a series of excavations to determine the exact route of the pipes. The excavation found that the pipes were laid together and encased in concrete, forming a 3.0m to 4.7m wide mound at 2.360mOD, at a gradient of 1:150 towards the DART line. A CCTV survey was also carried out to establish the current underground drainage system around these settlement tanks. The effectiveness of the existing configuration results in a very poor hydraulic gradient for flows out falling through the Bob Davis Culvert.

Figure 5-6 shows the existing outfall configuration. The Bloody Stream goes below the IW Assets and as a result is below the outfall levels in the Bob Davis Culvert. This means that in the current configuration, for water to discharge, a certain amount of surcharge has to occur in the existing surface water network. This results in sediment build up with associated ongoing maintenance issues.

Figure 5-6. Existing Outfall Configuration



As detailed in the FRA (BCME, 2019c), the flow in the existing Bloody Stream has been estimated as follows:

- Qbar (~50% AEP) = 1.12m^3/s
- Q100 (1% AEP) = 2.20 m^3/s
- Q200 (0.5% AEP) = 3.27 m^3/s
- Q1000 (0.1% AEP) = 3.93 m^3/s

The existing surface water runoff from the hardstanding areas on-site (i.e. based on 17,000m^2 existing hardstanding on-site and runoff) has also been calculated as follows (BCME, 2019c):

- 1year return period = 40.07 l/s (0.04m^3/s)
- 100year return period = 123.11 l/s (0.12m^3/s)
- 200year return period = 134.87 l/s (0.14m^3/s)

Therefore, the runoff from the Site under the existing Site scenario is estimated as less than 5% of the calculated bloody stream flow rates.

5.3.7 Surface Water Catchment Management Unit and Status

The Site is located within the Eastern River Basin District management unit. The Site is mapped by the EPA (EPA, 2019) as within the WFD Catchment of Liffey and Dublin Bay (Catchment I.D. 09), the Mayne_SC_010 Sub-catchment (Sub-catchment I.D. 09_17) and the Howth_010 WFD River Sub Basin (IE_EA_09H230880).

The Bloody Steam has been categorised with a River Water Body Status of 'unassigned' for the period 2010-2015 (EPA, 2019) and have a risk status of 'review'. It is noted that the four (4No.) off-site and unnamed streams on the Howth Peninsula have also received a River Water Body Status of 'unassigned' for the period 2010-2015 (EPA, 2019) and a risk status of 'review'.

The Mayne River has been assigned has been classified by the EPA (EPA, 2019) as having an overall 'poor' water quality status for the period 2010-2015 and has been assigned an 'at risk' status. The Sluice River has received a River Water Body Status of 'unassigned' for the period 2010-2015 (EPA, 2019) and a risk status of 'review'.

The coastal water quality of the Irish Sea Dublin (IE_EA_070_0000) has been classified by the EPA (EPA, 2019) as having an 'unassigned' water quality status for the period 2010-2015 a 'not at risk' status. The transitional water quality for the Mayne Estuary (IE_SE_080_0100) has been classified by the EPA (EPA, 2019) as having an 'unassigned' water quality status (for the period 2010-2015) and a risk status of 'review'.

5.3.8 Surface Water Quality

The EPA Q-Value is a system of water quality rating based on the biological quality of the water body and abundance for specific invertebrate species. There are no active EPA monitoring stations on the Bloody Stream and the closest nearest monitoring station to the Site within the sub-catchment is located at the Hole-in-the-Wall Rd Br (Station Code RS09M030500) approximately 5.7km north west of the Site, on the Mayne River that has been assigned a Q-value of 2-3 in 2016, indicating a 'poor' water quality and unsatisfactory ecological conditions (EPA, 2019).

Bathing water quality data reported by FCC for eighteen (18No.) samples collected at Claremont Strand/Beach (Sample Monitoring Point: 328014E 239497N – FCC, 2019)in 2018 and 2019 were consistently reported as 'Excellent' with the exception of one sample in July 2018 and one in August 2018 which was reported as 'Poor' due to elevated *E. Coli*. It is noted that there is not chemical data included in the bathing water data reported by FCC.

As documented in the Golder, 2019a Report, surface water samples were collected from locations *SW1* and *SW2* on the Bloody Stream located upstream and downstream of the Site respectively, at *SW3* and *SW4* collected from coastal locations at Claremont Strand and at *SAC* collected from Baldoyle Bay SAC during site investigation works completed for the Site. Samples were collected from each sample point and analysed for varying suites of metals, volatile organic compounds (VOCs), benzene, toluene, ethylbenzene, xylenes (BTEX), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons criteria working group (TPHCWG).

Following a review of the surface water analytical results, as documented in the Golder, 2019a report, a number of contaminants were observed to exceed the relevant surface water environmental quality standards (EQS) as detailed below:

A total of 13No. surface water samples results were reported in the Golder, 2019a report. Concentrations of total PAHs at 1No. location (SW1 - upstream) and ammoniacal nitrogen at 6No. locations (SW2 – downstream (on four occasions), SW3 – Baldoyle Bay SAC/Claremont Strand (on one occasion) and SW4 – Baldoyle Bay SAC/Claremont Strand (on one occasion)) were observed to exceed the applicable surface water EQS standards. It is noted that based on the findings as detailed in the CWRA (Golder, 2019b), the elevated ammoniacal nitrogen in the samples collected from Baldoyle Bay SAC / Claremont Strand are not attributable to a pollutant linkage from the Site and could be due to biogenic sources not untypical of marine environments.

5.3.9 Flood Risk

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.

Based on the information included in the SSFRA (BCME, 2019c), the Proposed Development site is in Flood Zone C, where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

Figure 5-7. RPS Strategic Flood Risk Assessment – Fluvial Flood Zone Mapping

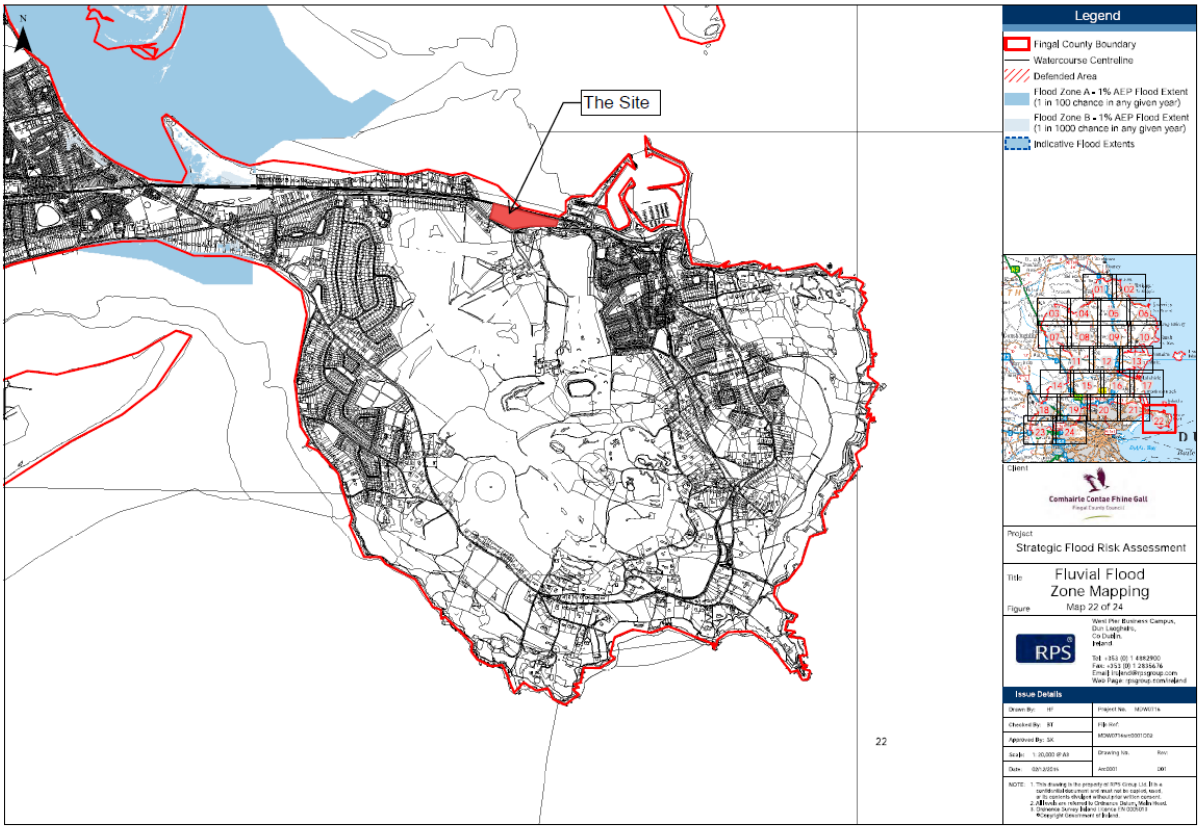
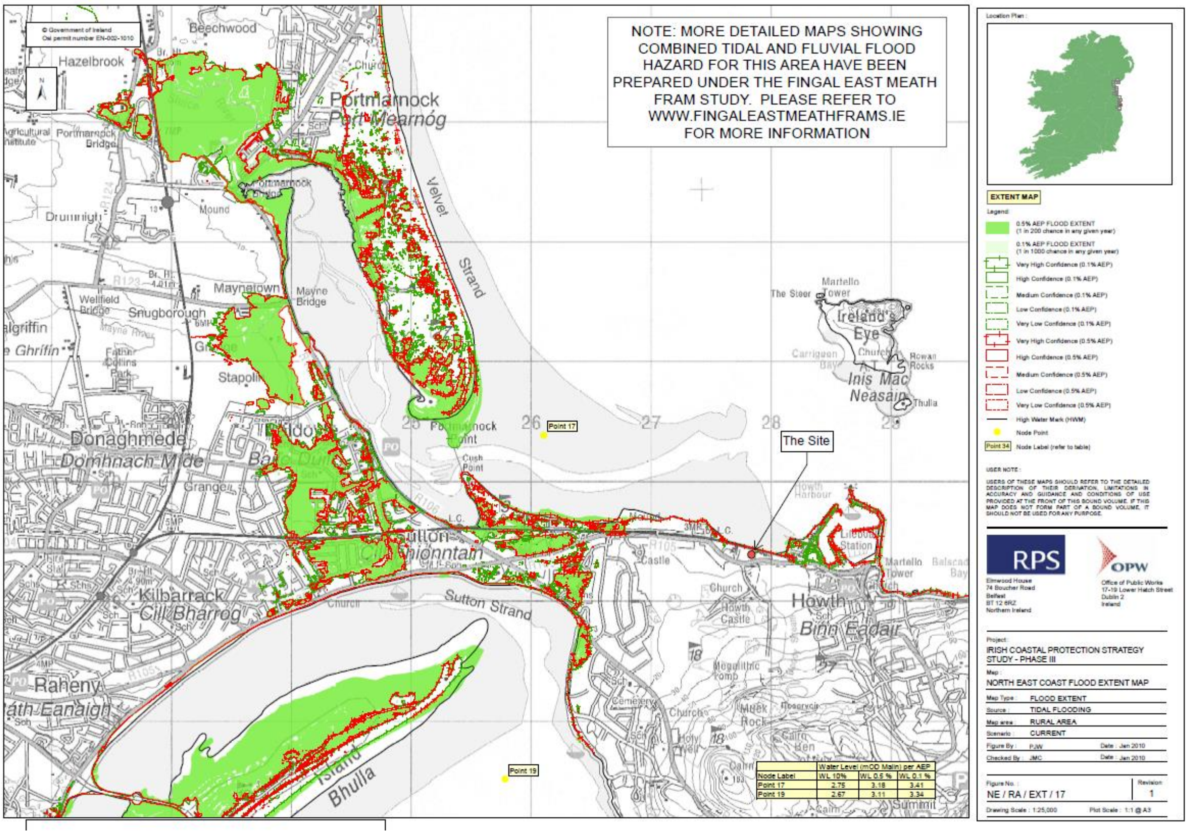


Figure 5-8. Irish Coastal Protection Strategy Study Phase III - North East Coast Flood Extent Map

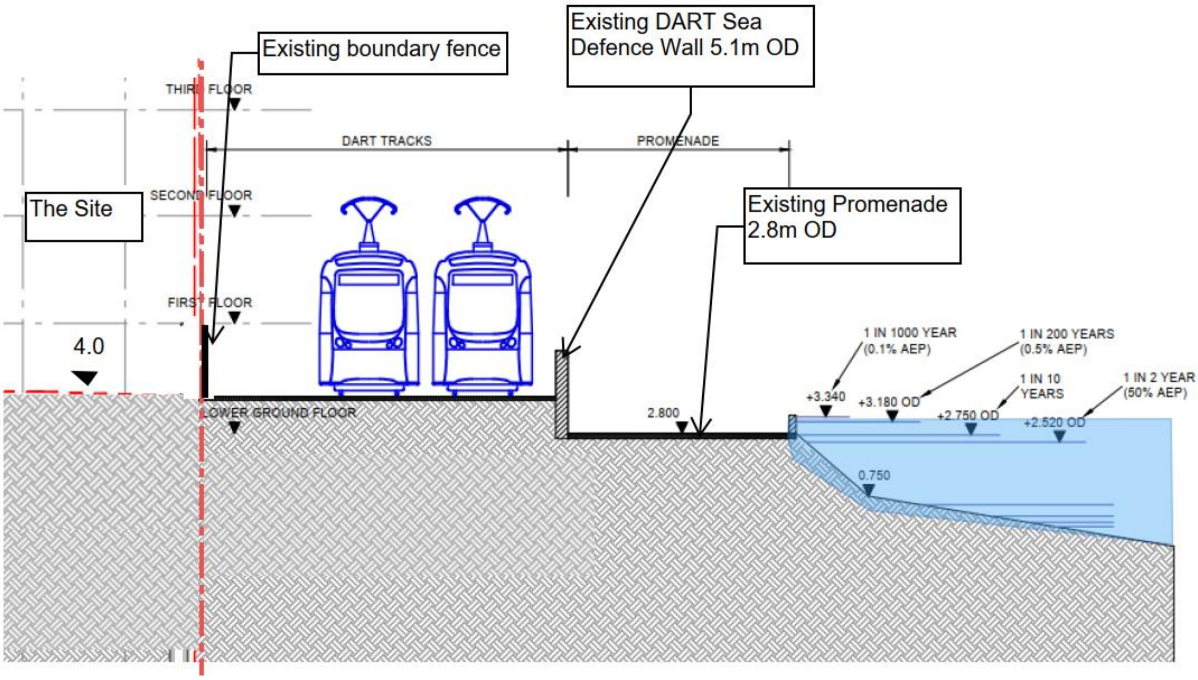


The OPW national flood hazard mapping (NFHM) data base was consulted (OPW, 2019) and lists two flood events for near the Site in recent history. The available information indicates two past recurring flood events at the Bloody Stream Pub east of the Site in November 2002 which is assigned a Flood Quality Code: 3. Both incidents are reported to be as a result of system blockages of a culvert identified underneath the pub. There have been no further reports of flooding.

The Bloody Stream is currently culverted under the Site and based on the information included in the FRA (BCME, 2019c) it is considered that on-site flooding can only happen if the underground culvert system is blocked and the manholes on-site surcharge over their cover levels. It is considered that even in those scenarios the Site levels are such that, water makes its way over ground to the western (lower) end of the Site and flows on the roadside toward Howth harbour.

The Site is beside the Irish Sea, separated via the public promenade and the DART line. The promenade is at 2.8mOD and the defence wall at 5.1mOD, the latter being over 1.5m higher than 4.5m OD - 0.1% AEP plus 1m freeboard as detailed in Figure ***5-9***. Overtop breach is only possible if the promenade and the DART line sea defence wall is removed which is highly unlikely.

Figure 5-9. Typical Section of the Current Situation Along the Northern Boundary (BCME, 2019c)



The existing Site is relatively flat ranging from a level of 4.5mOD to 4.0mOD generally with the slight fall to the east in line with the fall in the Howth Road itself toward Howth village/harbour. Groundwater elevations recorded by Golder (Golder, 2019a) ranged between 1.05mOD and 1.76mOD. This allows a freeboard of over 2.0m. Some tidal response in respect to rising sea levels is expected to influence the ground water level. However, 2.0m freeboard is significantly greater than OPW requirement for the High-End Future Scenario (HEFS) of 1m, therefore the risk of flooding due to rising groundwater level is low (BCME, 2019c).

The flood risk assessment for the Proposed Development is carried out in Chapter 12 – Flood Risk Assessment.

5.3.10 Designated and Protected Areas

The key ecological features of designated sites within 15km of the Site are summarised in Table 5-5 and mapped in Figure 5-10 It is noted that the Baldoyle Bay SAC is located 0.02km north of the Site.

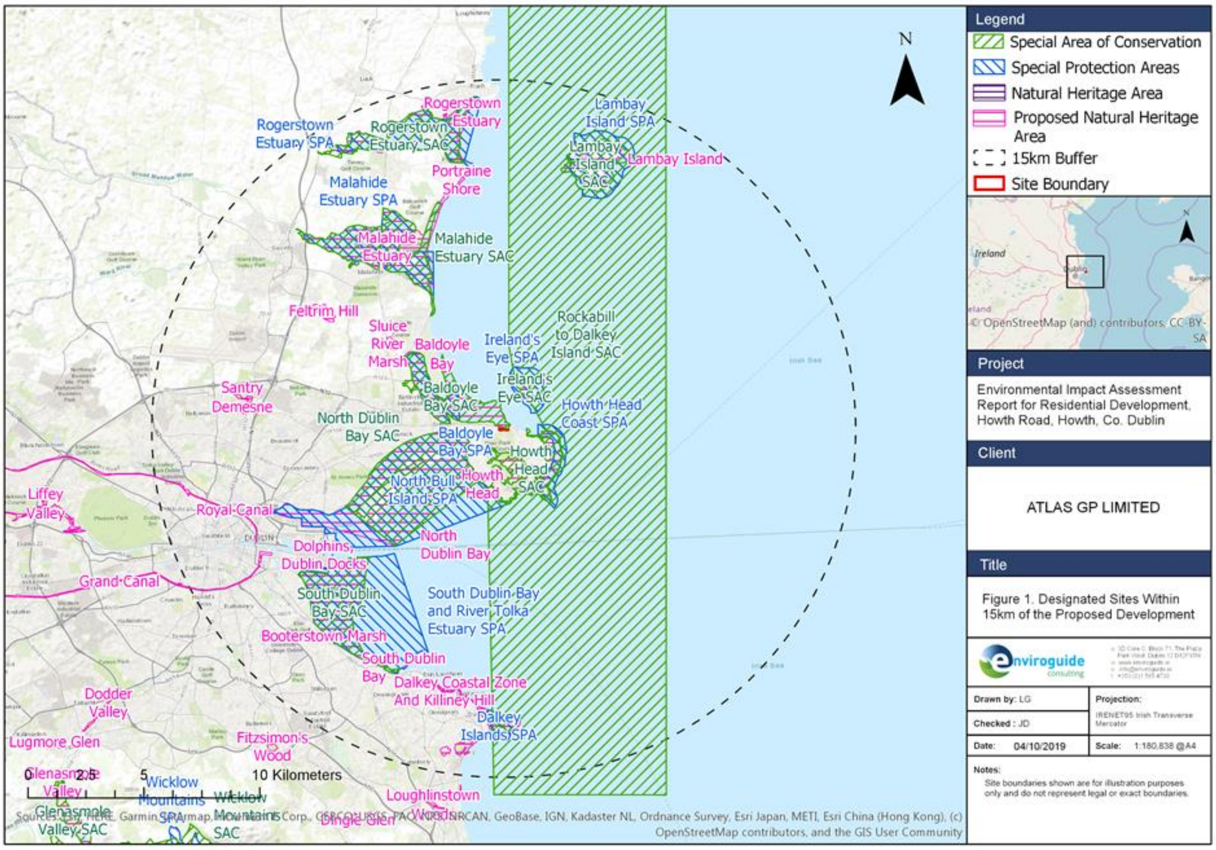
Table 5-5. Designated and Protected Areas

Site Code	Site Name	Distance to Site
	Special Areas of Conservation (SAC)	
000199	Baldoyle Bay SAC	0.02km
000202	Howth Head SAC	0.79km
000206	North Dublin Bay SAC	1.38km

003000	Rockabill to Dalkey Island SAC	1.42km
002193	Ireland's Eye SAC	1.47km
000205	Malahide Estuary SAC	5.65km
000210	South Dublin Bay SAC	7.80km
000204	Lambay Island SAC	10.79km
000208	Rogerstown Estuary SAC	11.54km
Special Protection Areas (SPA)		
004117	Ireland's Eye SPA	1.20km
004113	Howth Head Coast SPA	1.29km
004006	North Bull Island SPA	1.40km
004016	Baldoyle Bay SPA	1.75km
004025	Malahide Estuary SPA	6.24km
004024	South Dublin Bay and River Tolka Estuary SPA	6.70km
004069	Lambay Island SPA	10.55km
004015	Rogerstown Estuary SPA	11.02km
004172	Dalkey Islands SPA	12.12km
Natural Heritage Areas (NHA)		
There are no NHAs within 15km of the Site.		
Proposed Natural Heritage Areas (pNHA)		
000199	Baldoyle Bay	0.02km
000202	Howth Head	0.79km
000206	North Dublin Bay	1.39km
000203	Ireland's Eye	1.49km

001763	Sluice River Marsh	5.55km
000205	Malahide Estuary	5.65km
000210	South Dublin Bay	7.82km
001208	Feltrim Hill	8.48km
000210	Dolphins, Dublin Docks	9.00km
001215	Portraine Shore	9.90km
000178	Santry Demesne	10.73km
000204	Lambay Island	11.01km
001206	Dalkey Coastal Zone and Killiney Hill	11.17km
002104	Grand Canal	11.18km
002103	Royal Canal	11.32km
000208	Rogerstown Estuary	11.59km
001205	Booterstown Marsh	11.62km

Figure 5-10. Designated and Protected Areas



As identified in Table 5-5 and above, it is noted that there are a number of SAC, SPA and NHA sites located within the greater Dublin Bay area. However, there are five (5No.) sites located within a 2km radius of the Site that are identified as SACs, four (4No.) sites located within a 2km radius of the Site that are identified as SPAs and four (4No.) sites that are identified as pNHAs. The designated and protected areas in the vicinity of the Site are summarised in *Table 5-6* below.

Table 5-6. Summary of Designated and Protected Areas within 2km of the Site.

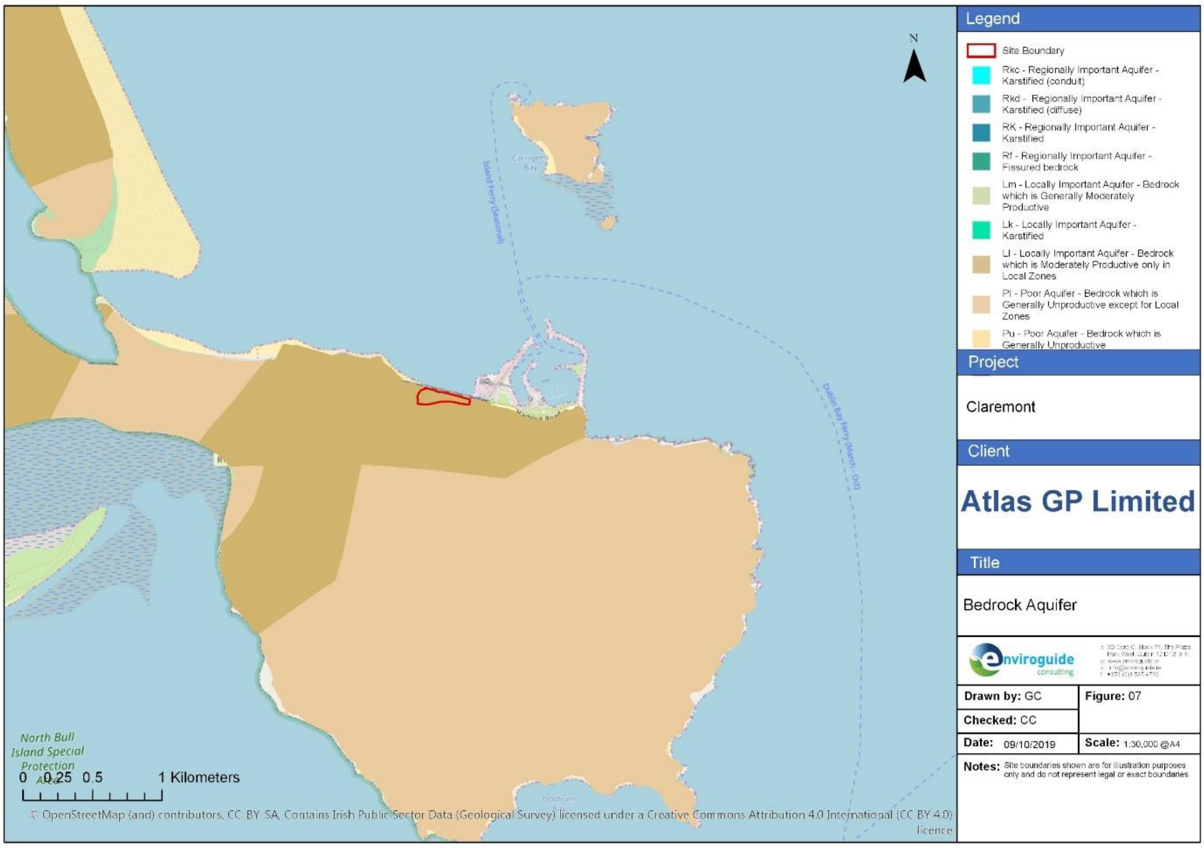
Site Code	Site Name	Distance to Site
	Special Areas of Conservation (SAC)	
000199	Baldoyle Bay SAC	0.02km
000202	Howth Head SAC	0.79km
000206	North Dublin Bay SAC	1.38km
003000	Rockabill to Dalkey Island SAC	1.42km
002193	Ireland's Eye SAC	1.47km
	Special Protection Areas (SPA)	
004117	Ireland's Eye SPA	1.20km
004113	Howth Head Coast SPA	1.29km

Site Code	Site Name	Distance to Site
004006	North Bull Island SPA	1.40km
004016	Baldoyle Bay SPA	1.75km
Natural Heritage Areas (NHA)		
There are no NHAs within 2km of the Site.		
Proposed Natural Heritage Areas (pNHA)		
000199	Baldoyle Bay	0.02km
000202	Howth Head	0.79km
000206	North Dublin Bay	1.39km
000203	Ireland's Eye	1.49km

5.3.11 Aquifer Classification and Vulnerability Rating

Generally, the bedrock of the Waulsortian Limestone is considered hydrogeologically unproductive due to its typically massive or poorly bedded nature (Murray & Henry 2018). However, the GSI (GSI, 2019) has classified the bedrock of the Waulsortian Limestone Formation beneath the Site and surrounding area as a locally important aquifer (LI) (i.e. bedrock which is moderately productive only in local zones). The GIS (GSI, 2019) categorise the Waulsortian Limestone formation underlying the Site as ‘Dinantian pure un-bedded limestones’. The purity of the limestone makes it amenable to dissolution and karst development (Murray & Henry 2018) and will likely facilitate groundwater flow through the limestone. It is noted that the Waulsortian Limestone geology extends from beneath the Site and into Baldoyle Bay, thus the groundwater beneath the Site is in potential hydraulic continuity with saline conditions. It is also noted that there are no gravel aquifers mapped within 2.0km of the Site. The Bedrock Aquifer Map is presented in Figure 5-11.

Figure 5-11. Bedrock Aquifer



The National Roads Authority (NRA) criteria for estimation of the importance of hydrogeological features at the Site during the EIA stage are summarised in Table 5-7.

Table 5-7. Criteria for Rating Site Importance of Hydrogeological Features

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source.

		Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

It is noted that, in accordance with the NRA Guidance as documented by (IGI, 2013), the bedrock aquifer beneath the Site is rated as an attribute of 'medium' importance, due to it being of significance or value on a local scale only. There are also no referenced potable water supplies or groundwater outer source protection areas within a 2.0km radius of the Site (GSI, 2019).

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes, 1999 publication. The guidelines state that 'as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area:

- the subsoils that overlie the groundwater;
- the type of recharge - whether point or diffuse; and
- the thickness of the unsaturated zone through which the contaminant moves.

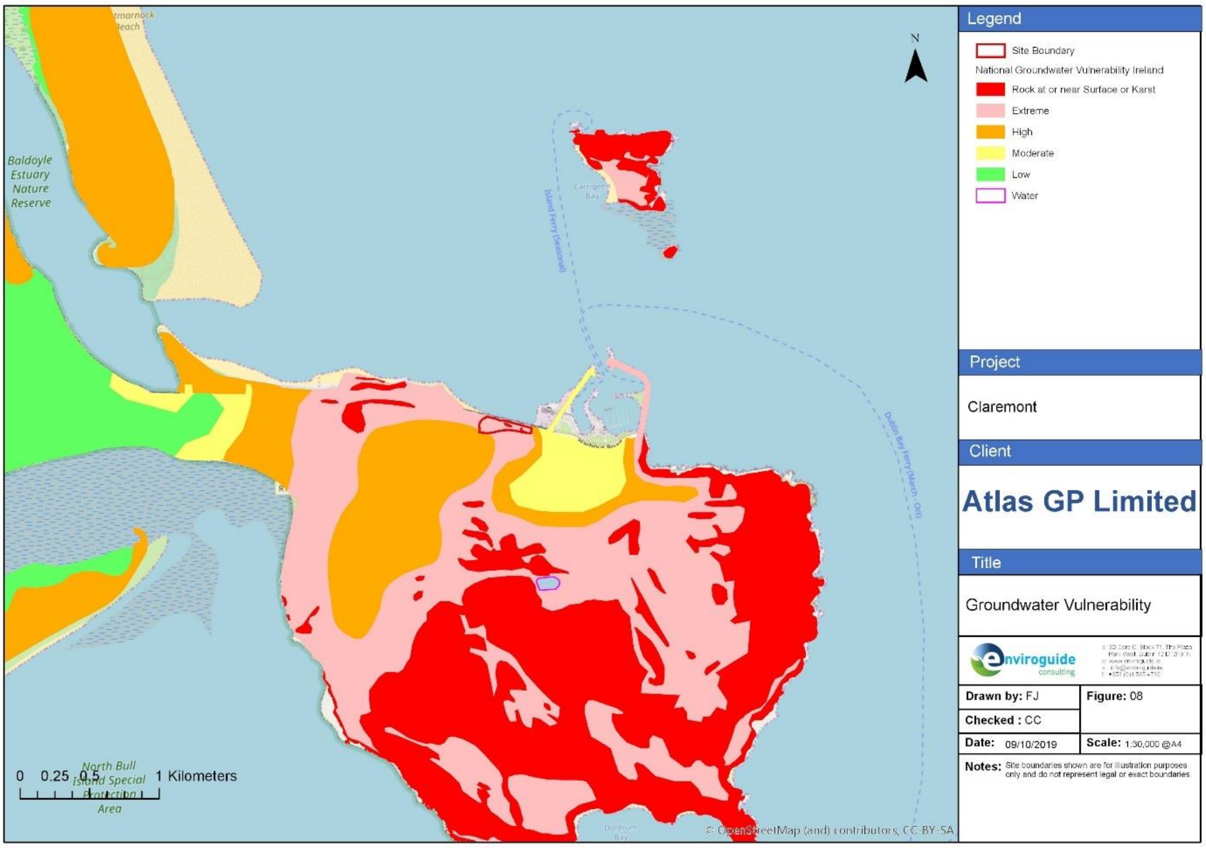
Table 5-8. Vulnerability Mapping Criteria (Groundwater Protection Schemes, 1999)

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability & Type				
	High permeability (sand & gravel)	Moderate permeability (sandy subsoil)	Low permeability (clayey subsoil, clay, peat)	(Swallow holes, losing streams)	(sand & gravel aquifers *only*)
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High
Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.					

In accordance with the criteria outlined in *Table 5-8*, the groundwater vulnerability rating assigned to groundwater in the bedrock aquifer beneath the majority of the Site is Extreme (E) (GSI, 2019) with an Extreme (X) rating where outcrops have been identified at the surface. This implies a very thin overburden depth or highly permeable strata such as gravels.

Based on the groundwater vulnerability rating for the Site (GSI, 2019), it is considered that the groundwater body underlying the Site would be at a high risk from potential contamination at surface. The GSI Groundwater Vulnerability Map is presented in Figure 5-12.

Figure 5-12: Groundwater Vulnerability Map



5.3.12 Recharge

The groundwater recharge map provides an estimate of the average amount of rainwater that percolates down through the subsoils to the water table over a year. The map accounts for rainfall that percolates diffusely through soils and subsoils but does not take into account water that enters aquifers at points (e.g. at sinkholes) or along linear features (e.g. along sinking streams/rivers). Groundwater recharge amounts are estimated by considering soil drainage, subsoil permeability, thickness and type, the ability of the aquifer to accept the recharge, and Met Éireann’s 30year average rainfall and actual evapotranspiration for the period 1971-2000.

The GSI (GSI, 2019) have calculated an effective rainfall value of 304mm/yr and a recharge coefficient of 20% however the recharge cap of 200mm/yr has been applied for the area in the vicinity of the Site.

The existing Site is covered by buildings and hard standing areas that make up 90% of the total site area. Similarly, the majority of the Site will be hard covered with buildings and impermeable pavement on completion of the Proposed Development. Therefore, an estimated infiltration rate for the Site of 10mm/year was calculated by Golder, as documented in the CWRA (Golder, 2019b).

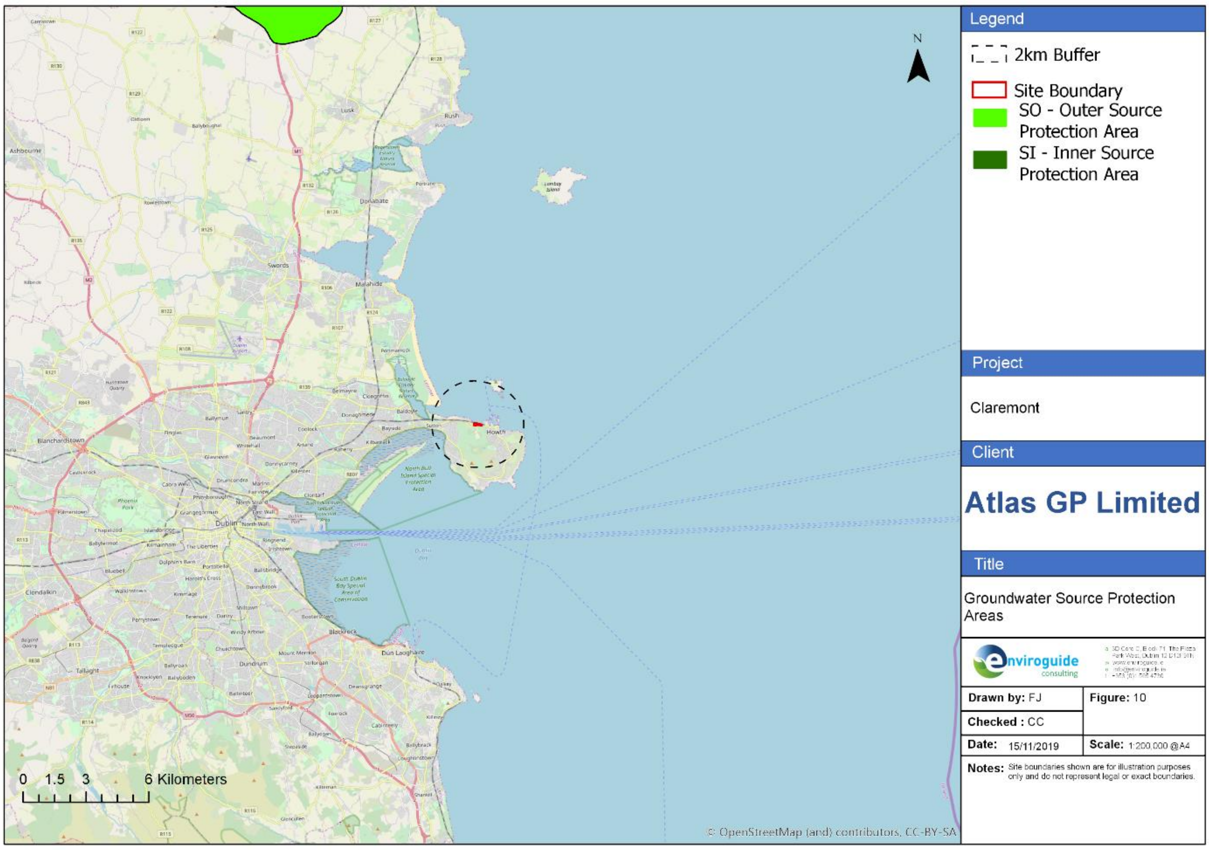
5.3.13 Groundwater Use and Source Protection

A search of the GSI groundwater well database was conducted to identify registered wells and groundwater sources. There is one groundwater source recorded within a 2.0km radius of the Proposed Development (GSI, 2019) located approximately 1.73km southwest of the Site and is identified as a ‘Spring’ (St. Fintan’s Well). A second source is mapped on Howth Head, located approximately 2.4km south of the Proposed Development that is also identified as a ‘Spring’ (Balsaggart Well). It is noted that there are no referenced potable water supplies with a 2.0km radius of the Site (GSI, 2019).

The Site is located within an area serviced by mains water supply and it is proposed that the development will be connected to the IW mains water supply.

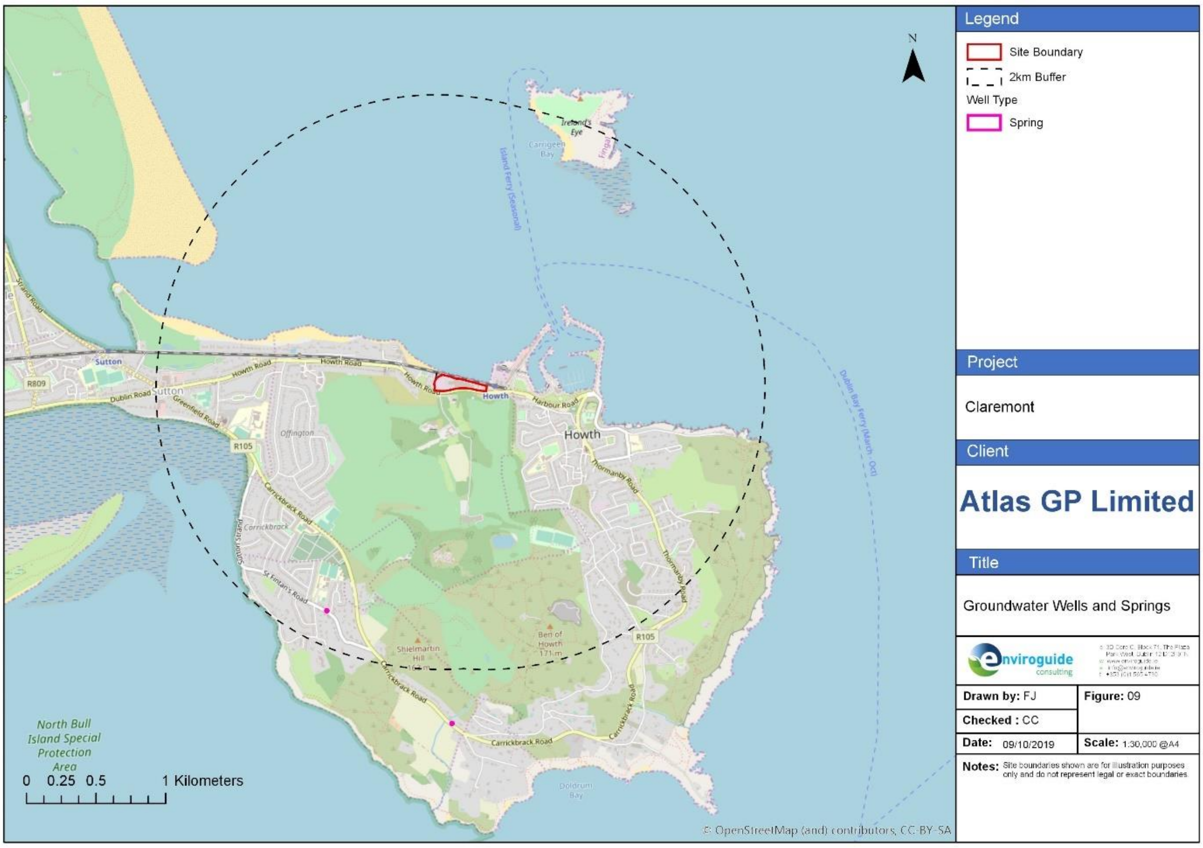
There are no Groundwater Source Protection Areas (Groundwater SPAs) within 2km of the Site. The closest Groundwater SPA is the Dunboyne Public Water Supply SPA (SI), located 26.4km west of the Site (GSI, 2019). The groundwater SPAs are identified in

Figure 5-13: Groundwater Wells and Springs within 2km radius of the Site



As documented in the Golder 2019b report, given the coastal location of the Site, the brackish groundwater conditions, the fact the resource potential of the aquifer is considered to be Locally Important and availability of a public water supply it is unlikely that the underlying groundwater be identified within a Group Scheme or Public Supply Source Protection Zone (thus not an identified drinking water supply aquifer or one requiring protection).

Figure 5-14: Groundwater Wells and Springs within 2km radius of the Site



5.3.14 Groundwater Flow Regimes

The bedrock aquifer beneath the Site is within the Dublin Groundwater Body (Dublin GWB) (EU Code: IE_EA_G_008).

Regionally, groundwater within Dublin GWB will discharge directly to the Irish Sea along the coast (Claremont Strand/Baldoyle Bay). It is reported by the GSI (Dublin GWB Report) that there will also be discharge to the overlying rivers, however the Bloody Stream has been culverted through the Site via a 600mm diameter pipe and therefore discharge to this watercourse will be constrained.

The GSI (Dublin GWB Report) identifies that the majority of groundwater flow will be a rapid flow into the upper weathered zone. It is noted that deeper flow in conduits is commonly recorded at depths of 30mBGL to 50mBGL. The aquifer is not considered to have any primary porosity and flow will be through fractures, some of which will have been enlarged by karstification and dolomitisation. Evidence of these processes was identified in the borehole logs for the ground investigation at the Site (Golder, 2019a).

Groundwater elevations recorded by Golder (Golder, 2019a) ranged from 1.05mOD (BH05) to 1.7mOD (BH09) on the 13th of September 2019 and from 1.13mOD (BH06) to 1.76mOD (BH09) on the 18th of September 2019 and that groundwater beneath the Site flows down-gradient to the north to Baldoyle Bay.

As documented in the Golder environmental assessment reports (Golder, 2019a and 2019b), tidal monitoring data collected from monitoring locations BH02 and BH05 indicate that the groundwater elevation is constantly higher to the south of the Site and lower towards the coast, consistent with a northerly direction of groundwater flow and discharge of groundwater to Claremont Strand. The tidal monitoring data also suggests that tidal influence underlying the Site may be greater in boreholes (and thus groundwater body) closer to the coast.

Golder (Golder, 2019a and 2019b) also concludes that there is strong indication there is vertical hydraulic continuity between bedrock, superficial deposits and made ground groundwater (where encountered) which is to be expected based on the stratigraphy encountered at the Site in the site investigation locations (hydraulic continuity from approximately 2.0mBGL to 3.0mBGL and into the bedrock, and there is no evident perched (separate) groundwater body). Hence, groundwater is considered to be in hydraulic continuity between the Site and Baldoyle Bay.

5.3.15 Groundwater Body and Status

According to the WFD, groundwater beneath the general vicinity of the Site is part of the Dublin GWB (EU Code: IE_EA_G_008). This Dublin GWB is classified by the WFD as having an overall ‘good’ water quality status (for the period 2010-2015). The risk status assigned to the Dublin GWB is identified as ‘not at risk’ (EPA, 2019).

5.3.16 Groundwater Quality

A total of twenty-seven (27No.) groundwater samples were collected from groundwater monitoring wells installed across the Site (BH2, BH3, BH4, BH5, BH6, BH8, BH9, BH11, BH15, BH16, BH17 and BH22) during site investigation works (Golder, 2019a). Groundwater samples were taken from each sample point and analysed for varying suites of metals, VOCs, BTEX, SVOCs, PAHs and TPHCWG.

Following a review of the groundwater analytical results (Golder, 2019a) a number of contaminants were observed to exceed the relevant groundwater guideline threshold values (GTVs) as detailed below:

- Conductivity was recorded to be greater than 800 uS/cm at 1No. location and several in the region of 600 to 700 uS/cm suggesting saline influence on groundwater conditions.
- Concentrations of metals (arsenic and nickel), total PAHs, TPHs, sulphate, nitrite and ammoniacal nitrogen were also observed to exceed the applicable groundwater GTVs.

5.3.17 Sources of Contamination

Following a review of the desk top study, a number of potential sources of contamination were identified at the Site and are summarised in *Table 5-9*.

Table 5-9. Site Operations and Potential Sources of Contamination.

Area	Location	Description
On-site	Existing on-site building occupying most of the central portion of the Site (Techrete).	Area beneath the building (steel assembly and associated assembly tanks, heavy engine and steel works, historical boilers, possible fuel storage, chemical storage, drainage).
	Area north of the existing on-site building (Techrete).	Former paint shop, boiler house, washdown sump, compressors, oil stores, degreasing area etc.
	Former Techrete Steel storage area and later Beshoff motors	Steel storage area, possible vehicle maintenance, oil / chemical storage areas potential drainage / interceptors.
	Former Teeling’s service station in the eastern portion of the Site.	Service station infrastructure. Fuel/oil storage and use, drainage/ interceptors etc., underground storage tanks (USTs.
	Area in southwest portion of the Site.	ESB substation, former infilled pond/hollow.

Area	Location	Description
	Area in the western portion of the Site.	The undeveloped lands in the western portion of the Site, were understood to have historically been used by the local authority and that screenings from the screening plant to the west of the Site were placed on these lands.
Off-Site	Area north of northern Site boundary.	Railway line located along the northern Site boundary.
	Area west of the Site, adjoining the northern and southern boundaries.	Local Authority screen house and pumping station and associated foul sewers.

The Golder site investigation report (Golder, 2019a) indicates that the previous Site uses are largely industrial with brownfield soils across the entirety of the Site largely due to land reclamation of the Site footprint prior to industrial development of the Site (circa 1872 to 1913). The made ground soils underlying the Site are commonly described as dark brown/black, slightly silty, gravelly, sandy CLAY with various inclusions of concrete, brick, textiles, plastics and glass. The made ground soils range in depth across the Site with the average depth of brownfield soils approximately 2.5mBGL.

Soil Quality

Following a review of the soil analytical results as documented in the Golder environmental assessment reports (Golder, 2019a, Golder, 2019b and Golder, 2019d) in Volume 3, Chapter 4 of the EIAR, a number of small parcels of contaminated soil hotspots was identified that present a potential risk to water quality:

- Total Petroleum Hydrocarbon (TPH) hotspot in the area of TP16 at a depth of around 1m and deeper, which is likely attributed to the historical fuel UST (underground storage tanks);
- There is a potential TPH hotspot in the area of TP109 at 0.6mBGL; and
- There are benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(ah)anthracene and lead hotspots identified in the Made Ground soils across the Site.

The contaminated soil hotspots are identified in Drawings 02 through 08 included in the HHRA (Golder, 2019d) report.

5.3.18 Environmental Risk Assessment

The findings of the MMRP (Golder, 2019c), Tier 1, Tier 2 and Tier 3 risk assessment of soils and controlled water data generated from the recent and historic site investigations has indicated the presence of elevated concentrations of several contaminants on the Site primarily within made ground deposits. A summary of the contaminants of concern are provided in Table 5-10 below.

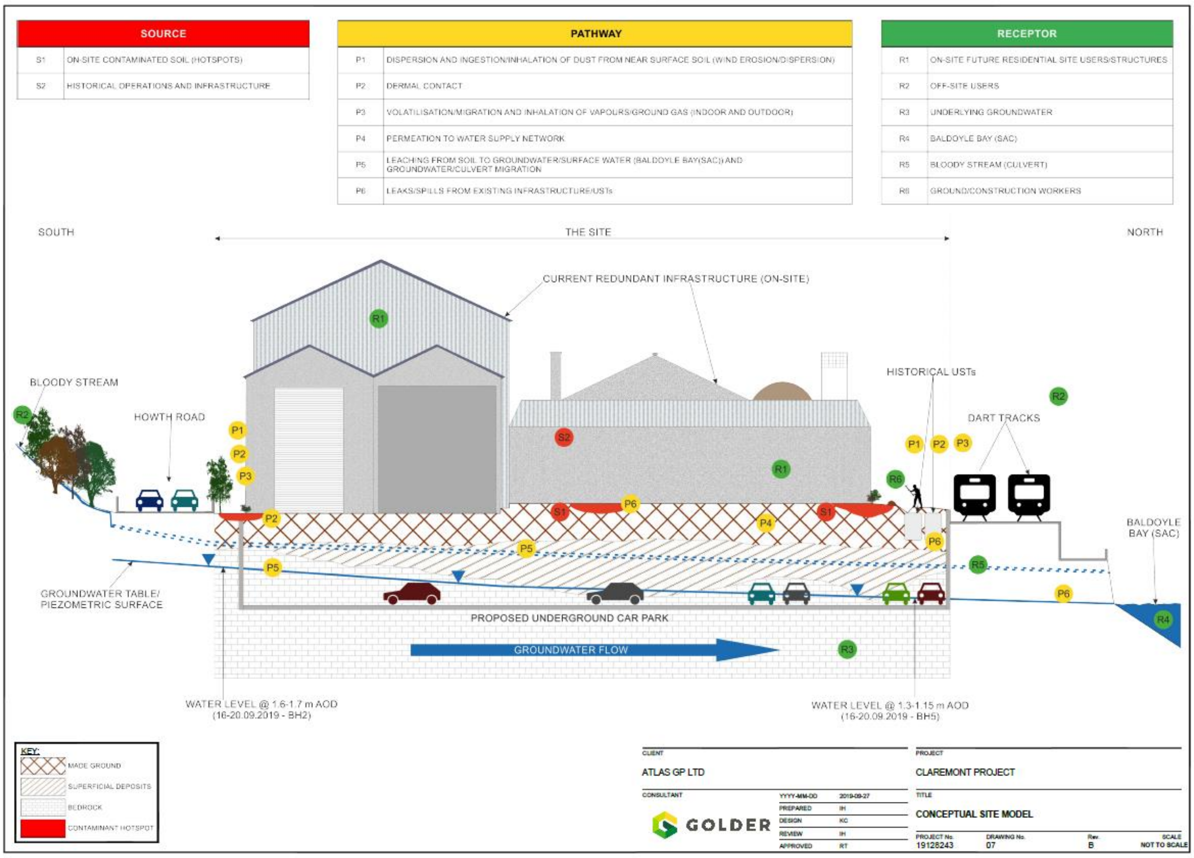
Table 5-10. Contaminants of Concern

Contaminants of Concern – Human Health	Contaminants of Concern – Controlled Waters
Lead	Arsenic
Benzo(a)pyrene	Chromium
Benzo(b)fluoranthene	Lead
Dibenzo(ah)anthracene	Mercury
Asbestos	Sulphate
Speciated and Total Petroleum Hydrocarbons (TPHs)	Total Polycyclic Aromatic Hydrocarbons (PAHs)
	Ammoniacal Nitrogen

These contaminants of concern have been identified following Tier 1, Tier 2 and Tier 3 risk assessment as documented in the CWRA (Golder, 2019b) and the HHRA (Golder, 2019d) where they have failed to meet threshold criteria protective of the receptor.

Based on the findings of the site investigation works completed across the Site by Golder, a Conceptual Site Model (CSM) was developed to describe potential source-pathway-receptor linkages for the Site. The CSM for the Site is detailed in Figure 5-15.

Figure 5-15: Schematic Conceptual Site Model (MMRP (Golder, 2019c))



The refined potential source, pathway and receptor model (Golder, 2019c) is summarised in *Table 5-11*. It is noted that the source, pathway and receptor model has been amended to include the assessment of potential surface water pathways at the Site.

Table 5-11. Source Pathway Receptor

Risk	Source	Pathway	Receptor
Risk to Waters	Contaminants of Concern (CoCs)	• Downward vertical migration of dissolved contaminants through the unsaturated zone to limestone groundwater by rainfall and leaching. • Mixing of dissolved contaminants with groundwater and lateral migration through the saturated limestone / superficial deposits to the Irish Sea (Baldoyle Bay SAC)	• Groundwater beneath the Site. • Surface water of the Baldoyle Bay SAC (groundwater receptor)
		• Contaminated surface water runoff collected without treatment and discharged into the culverted Bloody Stream.	• Surface water quality of the Bloody Stream • Surface water of the Baldoyle Bay SAC
Risk to Humans	Contaminants of Concern (CoCs)	• ~~Groundwater supply.*~~ (Not applicable to the site as there are no identified groundwater supplies and potable mains services the area.)	• ~~Groundwater users (potable supply)~~
		• Offsite Migration to Claremont Strand.	• Bathers

5.3.19 Summary of the Baseline Environment

The generic type of geological/hydrogeological environment of the Proposed Development can be determined based on the IGI guidelines (IGI, 2013). The generic types of geological/hydrogeological environments include:

- Type A – Passive geological / hydrogeological environments e.g. areas of thick low permeability subsoil, areas underlain by poor aquifers, recharge areas, historically stable geological environments;
- Type B – Naturally dynamic hydrogeological environments e.g. groundwater discharge areas, areas underlain by regionally important aquifers, nearby spring rises, areas underlain by permeable subsoils;
- Type C – Man-Made dynamic hydrogeological environments e.g. nearby groundwater abstractions, nearby quarrying or mining activities below the water table, nearby wastewater discharges to ground, nearby geothermal systems;
- Type D – Sensitive geological / hydrogeological environments e.g. potentially unstable geological environments, groundwater source protection zones, karst;
- Type E – Groundwater dependent eco systems e.g. wetlands, nearby rivers with a high groundwater component of base flow.

Therefore, the Site is considered to be Type B as it is a naturally dynamic hydrogeological environment which is attributed to the tidal influence on groundwater beneath the Site and hydraulic connection to Baldoyle Bay SAC.

The nearest water feature is named locally as the Bloody Stream (IE_EA_09H230880) and is culverted beneath Howth Road (R105) via a 600mm diameter pipe, where it flows through the Site, for approximately 0.16km, and under the DART railway line before discharging to the Irish Sea Dublin (HA 09) at Claremont Strand (which forms part of the Baldoyle Bay SAC) approximately 0.02km north of the Site.

Surface water in the Bloody Stream and Baldoyle Bay SAC/Claremont Strand have been impacted with contaminants including PAHs and ammoniacal nitrogen. The elevated PAH concentrations were observed upstream of the Site only and are not considered to be associated with the Site. The elevated ammoniacal nitrogen in the samples collected from Baldoyle Bay SAC/Claremont Strand are not attributable to a pollutant linkage from the Site and could be due to biogenic sources not untypical of marine environments (Golder, 2019b).

The Site is located in Flood Zone C for fluvial and coastal flooding. There is a low risk of flooding affecting the Site from tidal sources, fluvial, pluvial surface water or groundwater and that the Proposed Development is a low risk flood zone acceptable for residential development.

The GSI (GSI, 2019) has classified the bedrock of the Waulsortian Limestone Formation beneath the Site and surrounding area as a locally important aquifer (LI) (i.e. bedrock which is moderately productive only in local zones).

The groundwater at the Site discharges to the north to Baldoyle Bay (SAC) at Claremont Stand. Groundwater is hydraulically connected between overburden and made ground and is tidally influenced.

Groundwater has been impacted with contaminants including polycyclic aromatic hydrocarbons, petroleum hydrocarbons, heavy metals and ammonia. The source is identified as impacted soil (primarily made ground) on-site which is above the groundwater saturated zone and within the extent of the bulk excavation for the basement of the Proposed Development.

The significantly reduced source contaminant mass at the Site that will result from the Proposed Development will improve the overall water quality at the Site and reduce any potential risk to the Baldoyle Bay SAC associated with the Site.

5.4 IMPACT OF PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

The procedure for determination of potential impacts on the receiving hydrological and hydrogeological environment is to identify potential receptors within the Site boundary and surrounding environment and use the information gathered during the desk study and site walkover to assess the degree to which these receptors will be impacted upon in the absence of mitigation. Impacts are described in terms of quality, significance, duration and type as detailed in Table 5-2.

It is noted that groundwater and surface water collected throughout the Construction Phase of the Proposed Development will be pumped through a treatment system to remove elevated suspended solids and hydrocarbon sheen as set out in the Minerex, 2019 dewatering plan. The treated water will be discharged to foul sewer under licence from IW thereby removing any potential impact on the groundwater and surface water quality as a result of water discharges during the construction of the Proposed Development.

It is also noted that welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground. A temporary connection to mains foul sewer (subject to relevant consent from IW) will be constructed in accordance with and FCC guidelines(FCC et al., 2012). Therefore, it is considered that there will be no impact to water quality associated with the temporary foul sewer.

5.4.1 Direct

The excavation of the basement will result in the permanent removal of the contaminant source within the soil at the Proposed Development. The excavation of contaminated soils including identified hotspots that present an unacceptable risk to waters as identified in the CWRA (Golder, 2019b) will result in the removal of a significant contaminant mass from the site (see EIAR Volume 3 Chapter 4 appendix). Therefore, it is considered that there will be an overall 'positive', 'significant' and 'permanent' impact on existing groundwater underlying the Site and on the adjacent Baldoyle Bay SAC during the Construction Phase of the Proposed Development. During development works it is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe as per IW guidelines and therefore it is considered that there will be no impact to the Bloody Stream in the event of such a scenario.

Taking account of the Site history and the extensive site investigation completed at the Site, there remains a potential to encounter as yet unidentified contaminant sources ('hotspots') including isolated heavily contaminated soils, infrastructure (e.g. underground drains, sumps or tanks) during groundworks of the Construction Phase or uncontrolled release of contaminant sources to the hydrological and hydrogeological environment. While the baseline condition of the Site including any unknown contaminant sources may currently present a potential risk to the receiving environment, during the Construction Phase there would be a potential for uncontrolled release any such contaminant sources to the groundwater environment. Therefore, it is considered that, in the event of such an uncontrolled release, there would be a 'negative', 'slight to moderate' and 'medium-term' impact on existing groundwater underlying the Site and the adjacent Baldoyle Bay SAC taking account of the hydrogeological site setting and natural attenuation.

As mentioned above, it is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe and therefore it is considered that there will be no impact to the Bloody Stream in the event of such a scenario as there will be no pathway or mechanism for ingress to the Bloody Stream. The method for the diversion of the Bloody Stream to the temporary culvert and then the final diversion from this culvert to the open riparian stream channel will be in a manner that will not result in any impact.

Fill material will be required during the construction of the Proposed Development which will include imported topsoil and aggregates. In the unlikely event that fill materials are sourced from unlicensed or unauthorised sources, it may result in the importation of contaminated materials, uncertified or material not suitable for use at the Proposed Development. In the unlikely event of the importation of contaminated materials on-site, there would be a 'negative', 'moderate to significant' and 'long term' impact on the underlying groundwater, the surface water (Bloody Stream) and the Baldoyle Bay SAC at the Proposed Development.

If the accidental release of hazardous material including fuels, chemicals and materials being used on-site, through the failure of secondary containment or a materials handling accident on the Site, were to occur over open ground then these materials could infiltrate through the soil contaminating the underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. In the event of such a scenario it is considered that this could result in a 'negative', 'moderate to significant', 'long term' impact on the receiving hydrogeological environment depending on the nature of the incident.

There is a potential risk associated with the cementitious materials used during construction works including piling, basement construction, riparian strip, pavements and other structures impacting on the underlying groundwater at the Site which may result in a 'negative', 'moderate' and 'medium term' impact on the receiving water environment at the Proposed Development. Again, as it is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe, it is considered that there will be no impact to the Bloody Stream in the event of such a scenario.

Groundwater dewatering will be required during the bulk excavation for the basement construction. As mentioned above, there will be no direct discharge of groundwater to the Baldoyle Bay SAC, ground or other water courses associated with the construction phase and therefore the temporary groundwater dewatering will not impact on the water quality of the receiving water environment. However, there is a potential risk of accidental release of untreated water during dewatering to with potential impacts on the receiving water environment (e.g. a breakdown of the temporary treatment system). It is considered that the potential risk of the release of untreated water may present a 'negative', moderate' and 'long term' impact on the underlying groundwater and the Baldoyle Bay SAC.

There is a potential risk for the mobilisation of contaminants during piling works whereby a preferential conduit for contaminants (e.g. identified hotspots, unidentified contaminant sources) at shallower levels to migrate downwards to groundwater (which is already impacted) could be introduced with potential for migration off-site. It is considered that there will be a 'negative', 'moderate' and 'short to medium term' impact on the existing groundwater quality underlying the Site and the Baldoyle Bay SAC as a result of piling.

There will be no direct discharge to groundwater during construction. Similarly, surface runoff will also be managed during construction and there will be no direct discharges to ground. However indirect discharges to the underlying bedrock aquifer may occur and the aquifer vulnerability will increase as the hardstanding and subsoil is removed from the Site, however this will temporary as the pavement and fill materials will reinstate the protection of the aquifer. Such impacts are considered to be 'negative', 'slight' and 'short-term' impact on the underlying groundwater and the Baldoyle Bay SAC. It is noted that there will be no direct pathway for migration of contaminants in runoff via the Bloody Stream or to the Baldoyle Bay SAC as the Bloody Stream will be completely isolated during the construction phase of the Proposed Development.

A secant pile wall will be constructed around the basement perimeter as part of the sequencing of the bulk excavation and basement construction. Temporary dewatering from within the secant pile wall will be required to enable 'dry excavation' to facilitate the bulk excavation of soil including contaminated soil and any underground storage tanks (e.g. at the former fuel/service station). It is considered that there will be temporary drawdown of local groundwater levels during the dewatering operations. However, the extent of the impact is considered to be localised to the immediate area surrounding the basement and that there will be no impact on the Baldoyle Bay SAC. Taking account of the dewatering plan for the Proposed Development (Minerex, 2019) and the CWRA (Golder, 2019b), the potential impact on the groundwater levels and flow regime associated with the works will be 'negative', 'slight' and 'short term'.

The proposed riparian stream will be constructed above the water table. During development works it is proposed that the Bloody Stream will be diverted from the existing culvert into a newly constructed 750mm diameter concrete culvert constructed to IW standards (CMP (BCME, 2019a)) for the duration of the works, only on completion of the Proposed Development construction phase will the Bloody Stream be directed into the new open channel riparian strip. . Discharges to the Bloody Stream during the construction phase of the Proposed Development will not be permitted. At present the integrity of the Bloody Stream culvert remains unknown and potentially contaminants from surrounding soil could seep into the Bloody Stream and it is showing signs of blockage and cleaning the culvert is reportedly very difficult. Therefore, it is considered that both the temporary diversion of the Bloody Stream and the construction of the riparian stream will have a 'positive', 'moderate' and 'temporary' impact on the surface water quality of the Bloody Stream and receiving Baldoyle Bay SAC.

5.4.2 Indirect

As mentioned above, there will be no direct discharge of groundwater to the Baldoyle Bay SAC, ground or other water courses. However, there is a potential risk of accidental release of untreated water during dewatering to the underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. (e.g. a breakdown of the temporary treatment system). It is considered that the potential risk of the release of untreated water may present a ‘negative’, moderate’ and ‘long term’ impact on the underlying groundwater and receiving Baldoyle Bay SAC.

5.4.3 Secondary

Fill material will be required during the construction of the Proposed Development which will include imported topsoil and aggregates. The importation of aggregates or topsoil for use in fill, landscaping at the Site will be subject to control procedures which will ensure suitability for use from an engineering and environmental perspective and shall include testing for contaminants, invasive species and other anthropogenic inclusions. Only material sourced from authorised borrow sites, quarries and suppliers that meet the engineering specification and criteria set out in the MMRP (Golder, 2019c)(see Volume 3 Chapter 4 appendix) to ensure that all necessary consents in place and appropriate quality control procedures to enable verification of suitability for use will be considered for importation of soil to the Site. Overall it is considered that any impacts associated with importation of soil and replacing the removed contaminated soil on-site will have an ‘positive’, ‘slight’ and ‘long term’ impact on the receiving hydrological and hydrogeological environment.

5.4.4 Cumulative

Groundwater and surface water collected throughout the Construction Phase of the Proposed Development will be pumped through a treatment system prior to final discharge to the public foul sewer and directed to Ringsend WwTP in accordance with agreement under licence from IW. As the Ringsend WwTP is requires statutory consents in regard to discharge rates and water quality limits, it is considered that there is no impact on the receiving water impact associated with discharges from the site. Furthermore it is noted that the proposed WwTP at Clonshaugh will in the future reduce the dependency on the Ringsend WwTP and as such it is considered that a worst case scenario has been assessed.

There are no other cumulative impacts associated with the construction phase of the Proposed Development.

5.5 IMPACT OF PROPOSED DEVELOPMENT – OPERATIONAL PHASE

During the Operational Phase of the Proposed Development there is limited to no potential for any adverse impact on the receiving water (hydrological and hydrogeological) environment at the Site taking account of the design for the Proposed Development.

There will be no risk to water quality associated with residual contamination or made ground soil as all identified and as yet unidentified hotspots will be addressed in accordance with the materials management plan for the Proposed Development as detailed in the MMRP (Golder 2019c).

During the Operational Phase the permanent watertight basement structure will be in place at the Proposed Development. However, taking account of the hydrogeological setting at the Site, and findings of the CWRA (Golder 2019d) it is considered that any impact associated with the basement structure on the hydrogeological regime will be ‘imperceptible’, ‘temporary’ and of ‘slight’ significance.

The Bloody Stream riparian zone will be constructed with a concrete lined channel designed and constructed in manner that will be fully impermeable. This design measure will prevent any potential ingress of residual soil or groundwater contaminants albeit at concentrations below the identified Remedial Target Values as set out in the CWRA (Golder, 2019b), into the Bloody Stream and potential discharge to the Baldoyle Bay SAC.

There will be no petroleum hydrocarbon-based fuels used during the Operational Phase and the main operating system for heating will be gas based. Using such a system removes any potential contaminant sources associated with fuels.

The only runoff from the Site directed to ground is rainfall directly onto the permeable paving. Clean rainwater from the building roofs will be managed as part of the SuDs design via green roofs and discharge to the Bloody Stream, thereby eliminating any potential discharge to soil, geology and groundwater.

All below (below ground) drainage infrastructure will be constructed in accordance with current IW (Irish Water, 2017) requirements.

5.5.1 Direct

Hydrogeological Regime

There will be no impact on the hydrology/hydrogeology of the Baldoyle Bay SAC associated with the Operational Phase of the Proposed Development.

There will be no significant impact on the groundwater flow regime of the aquifer associated with the Operational Phase of the Proposed Development taking account of the following hydrogeological conceptual site model facts.

There will be no overall change to groundwater recharge as the locations of permeable and impermeable areas will be similar to baseline conditions at the Site with unpaved or permeable areas remaining in the western portion of the site.

There will be no groundwater abstractions during the Operational Phase of the Proposed Development and no direct discharges to ground.

The basement will be a watertight structure below the current water table thereby potentially impeding the flow of groundwater through-flow in beneath that portion of the Site.

The Block A carpark structure will be at FFL 2.8mOD with a 1.0m zone allowed for a capping beam and slab (i.e. 1.8mOD) which is above the highest measured groundwater levels reported by Golder (1.56mOD-BH02, 1.76mOD-BH09; Golder, 2019a) and therefore will not impact on groundwater through-flow in bedrock or overburden beneath this portion of the Site. It is noted that spring and neap tides were not evaluated as adequate data was not available and would need further consideration as part of the detailed design.

The basement (Blocks B,C and D) will be at a level of -0.2mOD with a 1.0m zone allowed for a capping beam and slab (i.e. -1.2mOD) which is approximately 3.0m below the highest measured groundwater levels at the Site (1.53mOD-BH02, 1.76mOD BH09; Golder, 2019a). The basement will sit within the fractured/dolomitised bedrock and overburden including sand and gravel deposits where bedrock profile undulates.

The basement structure could impede shallow groundwater flow through the aquifer in that very localised portion of the subsurface at the Site. However, given the presence of potentially preferential flow paths immediately surrounding the basement associated with the sand and gravel deposits and the fractured and dolomitised nature of the limestone it considered that presence of the basement structure would likely have a negligible impact groundwater levels and flow within the bedrock aquifer. However, this would need to be assessed as part of the detailed design stage for the basement and dewatering. Furthermore, taking account of the findings of the CWRA (Golder, 2019c) any impact on groundwater will be temporary during works and that there would be no anticipated alteration to the adjacent SACs.

Overall it is considered that any impact on the hydrogeological regime of the locally important aquifer is unavoidable however will be 'negative', 'imperceptible', 'long-term' within a very localised zone of the aquifer.

Surface Water Drainage and SuDS Measures

Surface water and storm drainage at the Proposed Development has been designed in accordance with the principles of Sustainable Drainage Systems (SuDS) taking cognisance of the Greater Dublin Strategic Drainage Study (GDSDS). The provision of SuDS is a requirement to meet the environmental legislation, set out by the Water Framework Directive (WFD).

This requires that storm water drainage design to take cognisance of four Criteria.

(i) Criterion 1 – River Water Quality Protection;
(ii) Criterion 2 – River Regime Protection;
(iii) Criterion 3 – Level of Service (Flooding) / Flood Risk Assessment; and
(iv) Criterion 4 – River Flood Protection.

The Site is located immediately adjacent to the sea (i.e. 0.02km from Claremont Strand/Baldoyle Bay SAC) and there is a direct downstream connection from the Site, therefore, as identified in the IR (BCME, 2019b) report for the Proposed Development (Appendix B Chapter 4) the drainage scheme for the Proposed Development is not required to meet the design objectives.

In summary there is no impact on water quality, surface water leaving the Site is not discharged to a River therefore River Regime Protection and River Flood Protection downstream of the Site are not required.

This is attributed to the proximity to the sea and the fact that surface water / storm water will be discharged directly to the sea via the de-culverted Bloody Stream and Bob Davis Culvert thereby eliminated the requirement for attenuation storage.

Accordingly, as there is no impact on any watercourse downstream of the Site Criterion 2 and Criterion 4 are not applicable for the Proposed Development. Regardless, the proposed design will take account of measures to attenuate runoff and discharge with the result of reducing discharge rates compared to baseline conditions and incorporates measures to address flood risk.

It is noted that rainfall on permeable paving and landscaped areas to the west of the site are not included in the SuDS calculation and assessment as this water infiltrates to ground and does not enter the drainage system or surface water regime.

Criterion 1 – River Water Quality Protection

The surface water drainage incorporates design measures that exceed requirement of 5-10mm (for <1year return period) for interception storage to provide for prevention of runoff to receiving waters.

Interception storage/attenuation will be provided through the use of extensive and intensive green roofs at roof and podium levels. The calculated retention capacity to meet the preferable 10mm (1year return period) 266.89m^3 and the actual interception attenuation / storage provided within green roofs is 555.7m^3 (IR (BMCE, 2019b), refer to Appendix B Chapter 4). The drainage design inherently provides over 50% more interception capacity than the preferred requirement thereby meeting the design objective requirements of Criterion 1 as set out in the GDSDS guidance.

Infiltration to ground will occur in areas where there is no pavement at the western open grassed areas and permeable paved areas. Design of the build-up for the permeable paving is in accordance with BS 7533-13:2009, as detailed in the IR (BMCE, 2019b) report (refer to Volume 3 Appendix B Chapter 4). Permeable paving will replicate the green field infiltration rate.

The drainage design also includes measures that will increase protection of the receiving surface water quality of the Bloody Stream and Baldoyle Bay SAC, including the green roof systems, that will provide filtration of sediments (e.g. debris, bird fouling on roofs) thereby preventing entry of this potentially deleterious material to the Bloody Steam and the inclusion of full retention interceptors for carparks and roads (Howth Road). This is further discussed under 'Water Quality' below.

The improved flow to the Bob Davis Culvert will not impact on the Baldoyle Bay SAC water quality or associated habitats.

Criterion 2: River Regime Protection

There is no specific requirement to meet this criterion as the site drainage discharges to the sea via the Bob Davis Culvert, regardless it is demonstrated that the requirement is achieved in the drainage design.

The de-culverting of the Bloody Stream into an open riparian strip will enhance the river flow regime with increased capacity for runoff from the site and catchment of the Bloody Stream. This approach has been agreed with Fingal County Council as referenced in the site-specific FRA (BMCE, 2019) report and welcomed by NPWS (refer to Volume 3).

It is therefore demonstrated that the calculated runoff for the Proposed Development is reduced compared to the baseline conditions (refer Table 5.12) and that the attenuation within the green roof systems provide adequate protection of the river regime and the objective of this design criterion is achieved.

Table 5-12. Summary of Surface Runoff Rates

Return Period	Catchment Flow (m^3/s)	Existing Surface Water Runoff (m^3/s)	Proposed Surface Water Runoff (m^3/s)
Qbar (~50% AEP)	1.12	--	--
1 Year	2.20	0.04007	0.0055
100 Year	3.27	0.12311	0.0648
200 Year	3.93	0.13487	0.0827

Criterion 3 – Level of Service (Flooding) Site

The riparian strip of the Bloody Stream is designed to the 1 in 100year event with a factor of 30% added to account for climate change. The results of the analysis reported in the FRA (BMCE, 2019c) identified that the maximum flood level for the fluvial (taking account of pluvial) and tidal 1,000year return period events are 3.20mOD and 3.34mOD respectively. Based on this analysis the results confirm that the design objectives set out in the four sub-criteria as set out in Section 16.3 of the GSDS Code of practice are achieved in the proposed drainage design for the Site.

i. Flooding will not occur on Site in a 30year return period event.
    - The riparian strip of the Bloody Stream is designed to the 1 in 100year event with a factor of 30% added to account for climate change.

ii. Flooding of internal property will not occur in 100year return period storm event.

iii. Flooding of internal property will not occur in 100year return period storm event and all floors levels are at least 500mm above maximum river flood levels.
    - Living and sleeping quarters are at a minimum of 5.2mOD on Howth Road area of the development and 6.4mOD for the remainder of the development which based on details of the SSFRA (BMCE, 2019) and Chapter 12 allows a freeboard of almost 2.0m above flood levels for the fluvial and tidal 1000year event.
    - The proposed FFL of residential buildings adjacent to the Riparian Strip is 6.4mOD, with access points set at 4.5m OD in the cores at a split level, therefore representing a freeboard of 1.16m from the openings for the fluvial and tidal 1000year event.

- Commercial units at ground level are at 4.0mOD which is over 500mm above flood levels for the fluvial and tidal 1000year event.
- The underground carparks and basements are watertight (i.e. no groundwater flooding) and all openings to the underground carparks and basements are set above 4.5mOD the ramps at 4.3mOD allowing a freeboard of over 900mm.
- A sea wall will be installed at 4.5mOD providing additional sea flood defence after the Dart (5.1mOD) which provides adequate defence.

iv. Flooding will not occur on areas adjacent to the Site in a 100year return period rainfall event.

As set out in the SSFRA and Chapter 12 of this EIAR there is no flood risk associated with the Proposed Development.

<u>Criterion 4 – River Flood Protection.</u>
The riparian strip of the Bloody Stream is a key element of the design for the Proposed Development and discharges to the Bob Davis Culvert. There is no downstream river that would require flood protection. The riparian strip has been identified not to be at risk of flooding within the Proposed Development.

The riparian strip design enables the following flows to be accommodated within the channel:

- 1 in 1000year tidal HEFS;
- 1 in 1000year fluvial HEFS;
- Combined 1 in 2year coastal + 1 in 2year fluvial (Section 2.4) for HEFS; and
- Combined 1 in 2year coastal + 1 in 200year fluvial (Section 2.4) for HEFS.

Surface water runoff from the development site has been calculated by BMCE in accordance with the methodologies outlined in the Institute of Hydrology Report No.124 (BMCE, 2019b).

The level of the channel is below 1 in 2year high tide (2.52m OD) and the sea will enter the channel on average 2 times a year. Combining the coastal and fluvial events for identifies that there may be times when the channel will surcharge with tidal inundation however this is contained in the overflow catchment area it has been stated by BMCE (2019) that the level will not exceed 4.5m OD (i.e. top of channel level).

Overall the SuDS drainage scheme will require ongoing maintenance and will result in an overall ‘positive’, ‘moderate’ ‘long-term’ impact on surface water of the Bloody Stream and will have a positive impact on the Baldoyle Bay SAC.

Water Quality

There will be no risk to water quality including groundwater, surface water and the Baldoyle Bay SAC associated with the Operational Phase of the Proposed Development. It is considered that the design of the Proposed Development including the riparian strip of the Bloody Stream are in line with the objectives of the Water Framework Directive (2000/60/EC).

All contaminant sources at the Site including as yet unidentified hotspots that present a potential risk to water quality will be managed in accordance with the materials management plan for the Proposed Development as detailed in the CWRA (Golder, 2019b) and the MMRP (Golder 2019c). Accordingly, only soil with contaminants at levels below the identified Remedial Target Values will remain at the site and therefore there will be no residual risk to water quality associated with soil and made ground remaining at the Site during the Operational Phase.

The Bloody Stream riparian zone will be constructed with a concrete lined channel designed and constructed in manner that will be fully impermeable. This design measure will prevent any potential ingress of residual soil or groundwater contaminants, albeit at concentrations below the identified

Remedial Target Values as set out in the CWRA (Golder, 2019b), into the Bloody Stream and potential discharge to the Baldoyle Bay SAC.

There will be no petroleum hydrocarbon-based fuels used during the operational phase and the main operating system for heating will be gas based, thereby removing any potential contaminant sources associated with fuels.

The only runoff from the Site directed to ground will be rainfall directly onto the permeable surfaces. Only clean rainwater from the building roofs will be managed as part of the SuDS design discharged to the Bloody Stream. All drainage from paved areas along roads, ramps and the carparks will be directed to foul sewer in accordance with agreement from IW as outlined in the BMCE Infrastructure Report (BMCE, 2019). Refer to Volume 3 Chapter 4 Appendix A for a copy of the Confirmation of Feasibility Letter and Statement of Design Acceptance for the foul sewer design of the Proposed Development). Therefore, eliminating the potential for any contaminants associated with accidental spills or leaks (e.g. collision or engine leaks) to the receiving water environment.

All below ground drainage infrastructure will be constructed in accordance with IW guidelines (Irish Water, 2017) thereby eliminating any potential contaminant sources associated with drainage including foul sewers.

Surface water runoff from the Howth Road that currently discharges to the Bloody Stream will be discharged via a full retention interceptor to the de-culverted Bloody Stream. The water quality of the Bloody Stream and the receiving Baldoyle Bay SAC will be improved by removal of road runoff contaminants e.g. PAHs attributed to road runoff were occasionally detected upstream of the site.

The drainage design also includes measures that will increase protection of the receiving surface water quality of the Bloody Stream and Baldoyle Bay SAC including the green roof systems will provide filtration out of sediment (e.g. debris, bird fouling on roofs) thereby preventing entry of this potentially deleterious material to the Bloody Steam;

The existing drainage arrangement and connection to the Bob Davis Culvert includes a sequence of sedimentation tanks that interrupts the flow and also results in siltation and blockage that requires regular maintenance including the use of a mechanical excavator at Claremont Strand to remove sediment. The following design features will improve flow and water quality:

- inspection chambers on the discharge outlet to the Bob Davis Culvert will rectify the existing deficiencies in relation to inspection and maintenance;
- The base of the existing Bob Davis culvert will be lined with a concrete V-channel to ensure self-washing flows;
- Grate at the point where the Bloody Stream leaves the site to prevent large debris entering the culvert;
- Overflows drain is to be constructed in the unlikely event that the grate becomes blocked; and
- The invert levels on the Bloody Stream will reduce the number of tidal inundation events to two per year thereby improving the freshwater quality of the Bloody Stream.

A full retention interceptor will be installed at Howth Road for treatment of surface water runoff that potentially includes silt and oils (petroleum hydrocarbons, PAHS) prior to discharge to the Bloody Stream.

The reduced number of tidal inundations will improve the fresh-water quality of the Bloody Stream.

The removal of the existing arrangement of settlement tanks at the point where the Bloody Stream enters the Bob Davis culvert will also remove the requirement for routine removal of sediment at the outfall and chambers which is carried out on the shore by Fingal County Council using a mechanical excavator that potentially causes routine disturbance of sediment on the shore.

This proposed drainage design including SuDS measures will result in a ‘positive’, ‘moderate’, ‘long-term’ impact on water quality of the Bloody Stream and associated Baldoyle Bay SAC.

5.5.2 Indirect

There will be no indirect impacts associated with the Operational Phase of the Proposed Development.

5.5.3 Secondary

There are no secondary impacts associated with the Operational Phase of the Proposed Development.

5.5.4 Cumulative

Surface water runoff from Howth Road adjoining the Site currently discharges to the Bloody Stream. As agreed with FCC (refer to Volume 3 Chapter 5 Appendix A) this water will be directed via a full retention interceptor to the de-culverted Bloody Stream as part of the Proposed Development. This design measure has been considered in the storm water and flood risk assessment for the Proposed Development submitted with this Application and will result in improved flow of storm waters and quality of water entering Bloody Stream and the Baldoyle Bay SAC. Overall this cumulative impact will have and will have a ‘positive’, ‘slight - moderate’, ‘long-term’ impact on water quality of the Bloody Stream.

Surface runoff from the carparks will be discharged to foul sewer and directed to Ringsend WwTP in accordance with agreement from IW. As the Ringsend WwTP is requires statutory consents in regard to discharge rates and quality limits, it is considered that there is no impact on the receiving water impact associated with discharges from the site. Furthermore, it is noted that the proposed WwTP at Clonshaugh will in the future reduce the dependency on the Ringsend WwTP and as such it is considered that a worst case scenario has been considered.

There are no other cumulative impacts associated with the operational phase of the Proposed Development including taking account of other relevant developments (refer to Section 5.1.4).

5.6 ‘DO NOTHING’ IMPACT

In the ‘Do Nothing’ scenario the Proposed Development did not proceed and the potential impact on the receiving hydrological and hydrogeological environment is considered.

It is considered that there would be no change or resulting impact on the brownfield nature of the Site which would remain as a dis-used commercial / industrial site and there would be no impact or change to the hydrological and hydrogeological environment at the Site.

The potential positive impact on the receiving water quality including at Baldoyle Bay SAC associated with the Proposed Development would not occur and the ongoing potential risks to water quality associated the existing site condition would remain.

5.7 MITIGATION MEASURES

5.7.1 Construction Phase

The following mitigation measures have been developed in consultation with relevant Design Team members including Enviroguide and BCME. These mitigation measures have been developed in conjunction with the measures set out in the various management plans for the Proposed Development including the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BMCE, 2019a) and the CDWMP (BCME, 2019d) which have been submitted with this application.

Mitigation measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include:

- Management and control of soil and bedrock during bulk excavation for the Proposed Development;
- Management and control of water during construction including dewatering of groundwater for the construction of the basement
- Management and control of imported soil and aggregates from off-site sources;
- Fuel and Chemical handling, transport and storage;
- Accidental release of contaminants – notify relevant statutory authorities

Control and Management of Soil and Bedrock

Managing Contaminated Soil and Excavation of Contamination Hot Spots

Prior to excavation, a detailed review of the final cut and fill model will be carried out to confirm cut and fill volumes. Detailed quantities of material to be excavated will be verified through accurate survey techniques by the groundworks contractor at the Construction Phase. Confirmation of final hotspot volumes will be provided and incorporated into an excavation plan.

The specific types and quantities of waste arising from the cut and fill are detailed in Chapter 11 – Material Assets Waste of this EIAR.

As detailed in the Golder, 2019a, 2019b, 2019c and 2019d reports, a number of contaminated soil and hazardous soil hotspots have been identified on-site that are required to be excavated for disposal off-site. It is noted that a large portion of the Site requires some form of excavation works. Many of the hotspots that require remediation fall within the excavation areas and these will be removed off-site for appropriate disposal at suitably licensed waste facilities. The main areas for hotspot removal relate to asbestos and TPH. The asbestos and TPH hotspots are indicated in the MMRP (Golder, 2019c).

It is noted that the delineation of hazardous hot spots as identified for excavation reports will need to be completed once buildings and the Site infrastructure are removed. The extent of the hazardous hotspots will be determined through additional testing to refine the volume of hazardous materials to be exported off-site for disposal.

As detailed in the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BMCE, 2019a), the Contractor will undertake their works such that all potentially contaminated hotspots, as identified in the MMRP (Golder, 2019c), will be removed without any impact to the receiving water environment. An excavation plan will be established by the contractor prior to the commencement of any excavation. The plan shall take into account the findings of the Site Investigation Reports produced by Golder (Golder 2019a, 2019b, 2019c and 2019d).

It is proposed that the basement bulk excavation will be a ‘dry excavation’ through a robust methodology for installation of the secant pile wall and dewatering methodologies that will be developed by the contractor in accordance with the recommendations of the Dewatering Design (Minerex, 2019).

A sampling and analysis plan will be provided by the Environmental Consultant appointed by the Contractor which will address all required sampling and analysis following the removal of the buildings and infrastructure on the Site. Excavation of these areas will not take place until the Site has been investigated and the soil has been classified.

Verification sampling will be carried out to confirm the findings in the Golder, 2019a site investigation report and to verify the removal of the contaminated material. This shall be carried out in accordance with the sampling and analysis plan for the development. The removal of contaminated soil will be supervised by a competent and qualified consultant.

Records will be maintained according to the waste records procedures and including photographs of the removal of contaminated material. A log of all contaminated material removed will be maintained on-site.

All contaminated soil from excavations will be handled in accordance with the procedures outlined in the Waste Management and Management of Stockpile sections of the CDWMP (BCME, 2019d) and the OCEMP (Enviroguide, 2019a) and must have due regard to the procedures for stockpile management outlined in the MMRP (Golder 2019c) in order to protect the receiving water environment.

Importation of Soil and Aggregates

Contract and procurement procedures will ensure that all aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations.

The importation of aggregates or topsoil for use in fill, landscaping etc. shall be subject to management and control procedures which shall include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development. Therefore, any unsuitable material will be identified prior to unloading / placement on-site.

Piling Methodology

The proposed piling methodology as detailed in the CMP (BCME, 2019a) and the OCEMP (Enviroguide, 2019a) will minimise the potential for introduction of any temporary conduit between contaminated materials and underlying groundwater. Piles that require rock sockets will be drilled under bentonite or cased to rock head level, to ensure stability of the bore through the water bearing sands. Continuous flight augering (CFA) piles will be carefully monitored to ensure positive pressure in the concrete below the auger head as it is retracted.

Management of Stockpiles

Segregation and storage of wastes generated during works will be segregated and temporarily stored on-site (pending removal or for re-use on-site) in accordance with the CMP (BCME, 2019a), the CDWMP (BCME, 2019d) and the OCEMP (Enviroguide, 2019a).

While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows:

- A suitable temporary storage area shall be identified and designated;
- All stockpiles shall be assigned a stockpile number;
- Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings;
- Erroneous pieces of concrete shall be screened from the stockpiled soils and segregated separately;
- Non-hazardous and hazardous soil (if required to be stockpiled) shall be stockpiled only on hard-standing or high-grade polythene sheeting to prevent cross-contamination of the soil below; and
- Soil stockpiles will be sealed to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust.

Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery; and

- Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

Handling of Chemicals, Waste Materials and Fuel

Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable).

Fuel, oils and chemicals used during the construction stage are classified as hazardous. If fuel is stored on-site for machinery and construction vehicles, then areas around fuel tanks and draw off points will be bunded and clearly marked. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Oils and chemicals used and stored on-site will also be will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage into the local surface water network or groundwater. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

Portable generators or similar fuel containing equipment will also be placed on suitable drip trays.

Emergency procedures will be developed, and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures for in the event of accidental fuel spillages.

Concrete Works

The cementitious grout used during the construction of the basement and the riparian stream will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

The proposed piling methodology as detailed in the CMP (BCME, 2019a) and the OCEMP (Enviroguide, 2019a) will prevent any risk of dispersion of grout from the piling bore (e.g. through the use of bentonite or quick cure grout).

Basement construction will be within a ‘dry box’ (within the secant pile wall and robust dewatering) thereby removing any potential for contact of cementitious materials with groundwater.

All ready-mixed concrete shall be delivered to the Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be emptied into a skip. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

Control and Management of Groundwater

Groundwater will be encountered during the construction works in particular the basement excavation. All excavations will be encompassed by secant pile wall around the basement excavation to allow dewatering and dry excavation. Where water must be pumped from the excavations, water will be managed through robust dewatering and water treatment methodologies in accordance with the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BMCE, 2019a) and the CDWMP (BCME, 2019d), the dewatering plan (Minerex, 2019), best practice standards (i.e. CIRIA – C750) and regulatory consents. Water will not be discharged to open water courses (e.g. the Bloody Stream or shore) and will be disposed to foul sewer.

Robust dewatering methodologies in accordance with the MMRP (Golder, 2019c), Dewatering Plan (Minerex, 2019), best practice standards (i.e. CIRIA – C750) and regulatory consents to minimise the potential impact on the local groundwater flow regime and associated receptors, namely the Baldoyle Bay SAC water regime.

Groundwater in the excavation will be controlled based on the methodology outlined in the Dewatering Design (Minerex, 2019). The treatment system will be installed on-site for the duration of the project to meet the requirements of the discharge licence but will typically include a number of stages of settlement and filtration to remove sludge, suspended solids, free-phase hydrocarbons (oils) and dissolved phase hydrocarbons to ensure the conditions of the temporary discharge consent are met.

There will be no direct discharge of groundwater from the site to groundwater or surface water. The groundwater removed will be discharged into the public sewer in accordance with the necessary consent/licence issued under Section 16 of the Local Government (Water Pollution) Acts and Regulations and must be obtained from IW. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements. All dewatering will be undertaken in strict compliance with the conditions of the discharge licence for the Construction Phase of the Proposed Development.

A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer. The monitoring programme shall be designed by the Environmental Consultant assigned to the project and shall include analysis of samples by an accredited laboratory for all parameters detailed in the monitoring programme. The specific analytical suite and compliance values and points for groundwater will be determined in accordance the recommendations of the MMRP (Golder, 2019c). In addition, as detailed in the Minerex, 2019 dewatering plan, there will be continuous automatic text alarmed monitoring of key parameters such as flow rate, pH and suspended solids.

Water is anticipated to be treated and pumped to a holding area where it will be sampled and tested by the Contractor prior to discharge. Upon receipt of analysis results and screening against required consent limits, the Contractor will arrange the appropriate disposal, with the groundwater treated and discharged to foul sewer in accordance with temporary discharge consent.

If free product is identified during works, in the case of an accidental release appropriate remediation measures would be required depending on the nature and extent of any contamination caused under such a scenario. The contamination would be assessed in accordance with the recommendations of the MMRP (Golder, 2019c). If it is identified that remediation is required to mitigate any identified potential risk associated with the incident remedial measures would include excavation and removal of contaminated soil, removal of any free-phase materials or liquids via vac tanker or in-situ remediation methods to address soil and groundwater this will be pumped, and removed off-site via tanker to a licensed waste disposal facility. In the event of such a scenario, the dewatering operation will be immediately stopped and investigated, and the relevant authorities notified.

The full details of the dewatering works can be found in the CMP (BCME, 2019a) and OCEMP (Enviroguide, 2019a) accompanying this planning application.

Control and Management of Surface Water – Protection of the Bloody Stream

During the excavation phase, the Bloody Stream will be re-routed. It is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe as per IW guidelines until the development is complete. This eliminates the possibility of contamination from the works above. To ensure no damage from plant/activity above the pipes will be encased in 150mm concrete.

Discharges to the Bloody Stream during the Construction Phase of the Proposed Development will not be permitted.

Post construction, the Bloody Stream will be de-culverted through the site creating a riparian strip. The riparian strip will be one of the last areas to be completed. This will involve construction of an open concrete channel with an impermeable base spanning the breadth of the site, underground drainage connections at either end, a settlement chamber and landscaped banks on either side of the channel. During the connection of the stream to the new route, a pump will be used to divert the water to safe location in the new channel while the connection is being completed.

The proposed riparian stream will be constructed above the water table and therefore will not be in contact with groundwater. As mentioned above, the cementitious grout used during the construction of the riparian stream will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

Control and Management of Surface Water Runoff

Surface water collected throughout the Construction Phase of the Proposed Development will be pumped through a treatment system to remove elevated suspended solids and hydrocarbon sheen as set out in the Minerex, 2019 dewatering plan. The treated water will be discharged to foul sewer only under licence from IW. The Contractor is to ensure that no contaminated water/liquids leave the Site (as surface water run-off or otherwise), enter the local storm drainage system or direct discharge to the Baldoyle Bay SAC.

As mentioned above, there will be no direct discharge of groundwater from the site to ground or surface water. However, there may be a temporary increase in the exposure of the underlying groundwater during earthworks due to the temporary removal of hardstanding areas. Silt laden and contaminated runoff associated with exposed soils and stockpiling of excavated soils across the Site may also migrate into the underlying groundwater. Accordingly, pollution prevention controls/ mitigation measures including correct handling and storage of potentially polluting substances. All measures as detailed in the CMP (BCME, 2019a) and the OCEMP (Enviroguide, 2019a) will be strictly implemented during the Construction Phase of the Proposed Development to prevent off-site impacts to surface waters and groundwater.

As part of the overall construction methodology, sediment and water pollution control risks arising from construction-related surface water discharges will be considered. All works carried out as part of these infrastructure works will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990 and the contractor will cooperate fully with the Environment Section of Fingal County Council in this regard.

Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground. A temporary connection to mains foul sewer (subject to relevant consent from IW) will be constructed in accordance with IW and FCC guidelines.

Inspection and Monitoring

The inspection and monitoring stage of the construction activities increase the effectiveness of environmental mitigation, as this addresses any environmental problems that may be occurring and assists in intervention and response at an early stage.

Sentinel wells will be installed for the purposes of sampling gas and groundwater in order to monitor the impacts of the works and identify trends arising which may indicate appropriate measures to be undertaken.

In addition, the area of made ground in the south west corner of the basement excavation will continue to be monitored via the installed well until such time as the earthworks are complete.

Gas, groundwater and surface water monitoring and sampling/testing rounds will be undertaken, before, during and after the earthworks works; this will comprise:

- Pre-earthworks - 3no. weekly visits over a two month period;
- During earthworks – 1no. per month for duration of earthworks; and
- Post-earthworks – 3no. visits monthly post completion of earthworks.
- Results from the monitoring rounds will be provided in monthly reports to be completed and assessed against Tier 1 screening values and will comprise previous monitoring round (cumulative) datasets undertaken and allowing information to be graphically displayed for identification and review of trends.

All gas, ground and surface water monitoring including monitoring of Baldoyle Bay will be carried out in line with the recommendations in MMRP (Golder, 2019c) and Dewatering Plan (Minerex, 2019).

5.7.2 Operational Phase

Ongoing regular maintenance of the green roofs and the riparian strip will be required to ensure that the positive impacts on water quality and hydrology including the Baldoyle Bay SAC will be required for the Proposed Development. This will be incorporated into the overall management strategy for the Proposed Development.

There is no other requirement for mitigation measure for the Operational Phase of the Proposed Development.

5.8 RESIDUAL IMPACTS

There will be no significant adverse residual impacts on or associated with water (hydrology and hydrogeology) associated with the Proposed Development.

It is considered that the Proposed Development will have an overall ‘positive’, ‘slight to moderate’ and ‘long-term’ impact the receiving water environment in particular water quality including the adjoining Baldoyle Bay SAC.

The predicted impacts of the Construction Phase are described in Table 5-13 in terms of quality, significance, extent, likelihood and duration. The relevant mitigation measures are detailed, and the residual impacts are identified which take account of the mitigation measures.

Table 5-13. Summary of Residual Impacts

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Bulk Excavation of Soil and Stones (including Basement, Riparian Strip and Lower Ground Level Block A).	Groundwater, Surface Water and Baldoyle Bay SAC	Excavation of soil will result in the removal of contaminant source within the soil. This will ultimately result in an improvement to receiving water quality of the underlying groundwater, surface water and associated Baldoyle Bay SAC	Positive	Significant	Permanent	Direct	Removal of source of contaminant loading through removal impacted soils from the Site. Furthermore, the Bloody Stream will be diverted to an open channel with an impermeable base therefore further protecting the Bloody Stream and connected Baldoyle Bay SAC.	Positive
Encountering any as yet unidentified contaminant sources ('hotspots') during groundworks of the construction phase.	Groundwater, Surface Water (incl. Baldoyle SAC)	Potential for uncontrolled release of unidentified contaminant sources to the water environment	Negative	Slight to moderate	Medium term	Direct	As detailed in the MMRP, OCEMP and CMP, appropriate mitigations will be put in place to robustly manage any contaminant hotspots and prevent any impact to the receiving water environment	Imperceptible
Import of topsoil and aggregates on-site.	Groundwater, Surface Water (incl. Baldoyle SAC)	In an unlikely event, there exists the possibility of unauthorised importation of unsuitable materials including: a) contaminated material; or b) uncertified materials/soils/aggregates from an unauthorised borrow site.	Negative	Moderate to Significant	Long term	Direct	Contract and procurement procedures will ensure that all aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations. Quality control procedures will be in place to check and verify all materials being imported to the Site. Therefore, any unsuitable material	Imperceptible

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
		Potential impacts may include contamination groundwater and migration to Baldoyle SAC.					will be identified prior to unloading / placement on Site	
Use of cementitious material	Groundwater, Surface Water and Baldoyle Bay SAC	Potential release of cementitious material during construction works including piling, basement construction, riparian strip and pavements, and other structures	Negative	Moderate	Medium term	Direct	All works will be carried out in accordance with industry standards and robust methodologies that will be developed by the Contractor taking account of the specific requirements of the MMRP, OCEMP and CMP to prevent any potential impact to the water environment. The proposed piling methodology will prevent any risk of dispersion of grout from the piling bore (e.g. use of bentonite or quick cure grout). Basement construction will be within a ‘dry box’ (within the secant pile wall and robust dewatering) thereby removing any potential for contact of cementitious materials with groundwater. The riparian strip will be constructed above the groundwater table and therefore will not be in contact with the water. The Bloody Stream will be diverted and fully isolated during construction works and therefore	Imperceptible

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
							there will be no connection or risk to the Baldoyle Bay SAC.	
Accidental release of hazardous material including fuel, chemicals and hazardous materials.	Groundwater, Surface Water and Baldoyle Bay SAC	Potential for uncontrolled release of unidentified contaminant sources to the water environment	Negative	Moderate / Significant	Long term	Indirect/ Direct	Mitigation measures as detailed in the MMRP, CDWMP, OCEMP and CMP will be implemented across the Site. If fuel is stored on-site for machinery and construction vehicles, then areas around fuel tanks and draw off points will be bunded and clearly marked. Oils and chemicals used and stored on-site will also be will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas. Portable generators or similar fuel containing equipment will also be placed on suitable drip trays. Emergency procedures will be developed, and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures for in the event of accidental fuel spillages.	Imperceptible
Dewatering (management of contaminated water).	Groundwater and Baldoyle Bay SAC	There will be no discharges to Baldoyle Bay SAC, ground or other water courses. All water will be discharged to sewer.	Negative	Moderate	Long term	Direct	Management of groundwater required for construction of the basement will be in accordance with the requirements of the MMRP, CDWMP, OCEMP and CMP.	Imperceptible

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
		There is a potential risk of accidental release of untreated water during dewatering with possible impacts on the receiving water environment					Robust dewatering and water treatment methodologies will prevent any impact to water quality. There will be no direct discharge of water from the Site to groundwater or surface water. All discharges of water will be managed through licensable discharge to public sewer.	
Piling.	Groundwater Quality and Baldoyle Bay SAC	Potential introduction of preferential pathway from contaminated material (e.g. identified hotspots unidentified contaminant source) to groundwater (which is already impacted) with potential for migration offsite.	Negative	Moderate	Short to medium term	Direct	The proposed piling methodology will minimise the potential for introduction of any temporary conduit between contaminated materials and underlying groundwater.	Imperceptible
Bulk Excavation of Soil and Stones (including Basement, Riparian Strip and Lower Ground Level Block A).	Groundwater, Surface Water and Baldoyle Bay SAC	Potential contaminated run-off percolating to groundwater. Note there will be no direct pathway for migration of contaminants in runoff via the Bloody Stream or to the Baldoyle Bay SAC as the Bloody Stream will be completely isolated during construction works. .	Negative	Slight	Short term	Direct	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 as the subsoil is removed from the 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. All measures set out I the MMRP, CDWMP, OCEMP and CMP will be strictly implemented during the construction works.	Imperceptible

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Dewatering (groundwater levels)	Groundwater / Surface Water/ Baldoyle Bays SAC	Temporary drawdown of local groundwater levels during dewatering required for bulk excavation and basement construction. Dewatering will be carried out following construction of the secant pile walls. However, the extent of the impact is considered to be localised to the immediate area surrounding the basement. There will be no impact on the Baldoyle Bay SAC.	Negative	Slight	Short term	Direct	The requirement to dewater will be managed through robust dewatering methodologies that will minimise the potential impact on the local groundwater flow regime and associated receptors, namely Baldoyle Bay SAC water regime. The recovery of groundwater will be considered in accordance with	Imperceptible
Import of topsoil and aggregates.	Groundwater and receiving Surface Water	The importation of fill, will be subject to control procedures which to ensure suitability for use from engineering and environmental perspective and absence of contaminants, invasive species and other anthropogenic inclusions. The imported fill and topsoil will replace (where required) the	Positive	Slight	Long term	Second ary	Management Procedures and appropriate quality control procedures to enable verification of suitability for use will be implemented for importation of soil and aggregates to the Site.	Positive

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
		excavated contaminated soils.						
Temporary Diversion of the Bloody Stream	Surface Water Quality	The temporary diversion will prevent ingress of any runoff or contamination during bulk excavation to the Bloody Stream or Baldoyle Bay SAC	Positive	Moderate	Short-term	Direct	The temporary diversion of the Bloody Stream will be managed as part of the environmental management procedures that will be implemented for the construction phase	Positive
Operational Phase								
Basement	Groundwater (hydrogeological regime)	The groundwater flow regime will be altered within the very localised area around the basement. There will be no impact Baldoyle Bay SAC associated with constructed basement. As the surrounding materials are porous (gravel rich sediments, fractured bedrock) and taking account of the tidal influence on the downgradient side of the basement it is considered that there will be no overall impact on the groundwater flow regime within the bedrock aquifer. .	Negative	Imperceptible	Long-term	Direct	Mitigation	Imperceptible

Activity or Attribute at Proposed Development	Environmental Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Storm Drainage	Hydrology of Bloody Stream	Storm drainage at the site has been designed in accordance with SuDs and therefore it is anticipated that there will be an overall positive impact on the flow of water to the Bob Davis Culvert and the Baldoyle Bay SAC.	Positive	Moderate	Long-term	Direct	Ongoing maintenance of the SuDS and storm drainage will be incorporated in the overall management strategy for the Proposed Development	Positive
Storm Drainage	Water Quality	There will be no impact on water quality and it is anticipated that the overall drainage scheme will improve water quality discharging from the site including that discharged to Baldoyle Bay SAC.	Positive	Moderate	Long-term	Direct	Ongoing maintenance of the SuDS and storm drainage will be incorporated in the overall management strategy for the Proposed Development	Positive

5.9 INTERACTIONS

5.9.1 Public Health

No general public health issues associated with the water (hydrology and hydrogeology) conditions at the Site of the Proposed Development have been identified for the Construction Phase or Operational Phase of the Proposed Development in regard to management of contaminants.

Procedures for dealing with potentially contaminated groundwater during the required dewatering for the construction of the basement are outlined in the MMRP (Golder, 2019c) and proven, robust, site specific procedures will be implemented for the works by the Contractor taking account of the recommendations set out in the CDWMP (BCME, 2019d), the OCEMP (Enviroguide, 2019a), the CMP (BCME, 2019a) the Dewatering Plan (Minerex, 2019) for the Proposed Development (see Volume 3, Chapter 4 Appendices).

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

The design of the Proposed Development includes remedial measures to adequately address any potential human health issues associated with the baseline water conditions at the Site as outlined in the MMRP (Golder, 2019c). The design of the Proposed Development will ensure that the Site will be suitable for use for the Operational Phase as a residential and mixed-use commercial / retail development of the proposed end-use of the development and that there are no residual issues associated the water environment at the Site.

It is noted that specific issues relating to Public Heath associated with the Proposed Development are set out in Chapter 3 or this EIAR.

5.9.2 Material Assets - Water

BCME have carried out an assessment of the potential impact of the Proposed Development on the Material Assets and water utilities. Groundwater dewatering at the Site will be required during bulk excavation works to allow construction of the basement levels at the Site. It is proposed that treated groundwater will be discharge to the public foul sewer network only under a temporary discharge consent from IW.

5.9.3 Land, Soil, Geology and Hydrogeology

Enviroguide have carried out an assessment of the potential impact of the Proposed Development on the existing land, soils, geological and hydrogeological environment with emphasis on the excavation and removal off-site of soil and bedrock that will result in the removal of the primary contaminant source associated with the current site condition, potential accidental release of construction materials or contaminated materials to ground or water during construction works and importation of fill and aggregates. Measures for the mitigation of these impacts are set out in Chapter 4 Land, Soil, Geology and Hydrogeology.

5.9.4 Biodiversity

Enviroguide have carried out an assessment of the potential impacts of the Proposed Development on the Biodiversity of the Site, with emphasis on habitats, flora and fauna which may be impacted a result of construction activities, including exaction works and groundwater dewatering, at the Proposed Development. It also 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 are set out in Chapter 8 Biodiversity.

5.9.5 Material Assets - Waste

Enviroguide have carried out an assessment of the potential impacts associated with the waste that will be generated during the Construction Phase as set out in Chapter 11 Material Assets - Waste. There will be a requirement for the handling and storage of waste in addition during the Construction Phase of the Proposed Development.

5.9.6 Flood Risk Assessment

BCME have carried out an assessment of floor risk and associated potential impacts associated with the Proposed Development as set out in Chapter 12. Storm runoff at the site will be managed in accordance with SuDS and it has been identified that there is no flood risk associated with the Proposed Development.

5.10 DIFFICULTIES ENCOUNTERED IN COMPILING REQUIRED INFORMATION

There were no difficulties encountered in compiling water (hydrology and hydrogeology) assessment.

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Chapter 6
Air Quality and Climate, Including Microclimate

6.1 Air Quality and Climate

6.1.1 INTRODUCTION AND METHODOLOGY

AWN Consulting Limited has been commissioned to conduct an assessment of the likely impact on air quality and climate associated with the proposed development site on Howth Road, Howth, Co. Dublin. The development site is made up of three separate sites, a precast manufacturing plant – formerly Techrete, a motor garage- formerly Teeling Motors and a garden centre. This EIAR chapter is completed as part of the proposed development and outlines the methodology used to assess the potential air quality and climate impacts of the proposed development.

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 and specialises in the fields of air quality, EIA and air dispersion modelling.

6.1.1.1 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

6.1.1.2 CHARACTERISTICS OF DEVELOPMENT RELEVANT TO THIS CHAPTER

During the construction stage the main source of air quality impacts will be as a result of fugitive dust emissions from site activities, in particular during the excavation of the basement. The area of demolition is 8,162 m^2, height of structure averaging 5m. There will be up to 80 HGV per day during the worst case construction period.

The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the increased traffic flows due to the traffic movements associated with the development in the local area.

6.1.1.3 DESCRIPTION OF OTHER RELEVANT DEVELOPMENTS

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. The area of impact for dust is limited as dust 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.

During the operational phase any developments which also increase traffic on the same link roads is relevant to the impact of this development, this includes the proposed Rennie Place Development in Howth Village. Traffic impacts have included for known developments in the vicinity and included the cumulative impact of these in the traffic numbers modelled.

6.1.2 METHODOLOGY - AIR QUALITY AND CLIMATE ASSESSMENT

This study is a desk top based assessment with background information on air quality sourced from EPA monitoring data as discussed in Section 6.3.3 of the EIAR . Qualitative studies were carried out for the assessment of dust impacts during the construction stage, detailed mitigation measures are provided in order to prevent significant nuisance dust, human health or ecological impacts due to the construction phase. Quantitative modelling studies were conducted for the operational phase impacts of vehicle emissions associated with the development on local and regional air quality, climate and ecology. These assess the potential impacts of the development on human health, the environment and ecology.

6.1.2.1 STUDY AREA

The construction phase study area is focused on potential impacts arising due to the generation of dust. These impacts usually occur within 500 metres of the dust generating activity as dust particles fall out of suspension in the air (Guidance on the assessment of dust from demolition and construction 2014 by the Institute of Air Quality Management). Dust impacts during the construction phase due to material handling activities on site, including excavation and backfill, typically emit dust. Deposition typically occurs in close proximity to each site and therefore the study area is limited to a 500m radius from any dust generating activities. The study area with respect to impacts from air quality emissions from vehicle and HGV movements is limited to sensitive receptors less than 200m from road links which are affected by significant changes in volume (i.e. above 5%). This study area is the same for designated conservation areas (either Irish or European designation) with respect to ecology as the potential to impact is highest within 200m of the proposed development and when significant changes in Annual Average Daily Traffic (AADT) (>5%) occur.

The most significant operational phase air quality impacts will occur within 200m of any road links which are impacted by the redistribution of traffic on other routes. The UK DMRB guidance (UK Highways Agency 2007) on which TII guidance (Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes 2011) is based, states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor.

Due to the nature of climatic effects, if significant emissions occur they will have the potential to impact Ireland’s commitments and targets under various EU Climate Agreements and other international agreements.

6.1.2.2 AIR QUALITY AND CLIMATE 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 6.0.1).

Air quality significance criteria (see appendix 6.2) 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 Council and Parliament Directive 2008/50/EC which has set limit values for the pollutants NO_2, PM_{10}, benzene and CO (see Table 6.0.1). 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 6.1).

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/m³ NO_2
		Annual limit for protection of human health	40 μg/m³ NO_2
		Annual limit for protection of vegetation	30 μg/m³ 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/m³ PM_{10}
		Annual limit for protection of human health	40 μg/m³ PM_{10}
$PM_{2.5}$ (Stage 1)	2008/50/EC	Annual limit for protection of human health	25 μg/m³ $PM_{2.5}$
$PM_{2.5}$ (Stage 2)	-	Annual limit for protection of human health	20 μg/m³ $PM_{2.5}$
Benzene	2008/50/EC	Annual limit for protection of human health	5 μg/m³
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m³ (8.6 ppm)
Dust Deposition	German TA-Luft	Annual average guideline for dust nuisance and human health impacts	350 mg/(m²*day)

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Note 2 EU 2008/50/EC states - ‘Stage 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’.

Table 6.0.1 - Air Quality Standards Regulations 2011
Source: Based on EU Council Directive 2008/50/EC

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 6.0.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

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

With regard to 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/(m²*day) averaged over a one-year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

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 to the Convention (COP24) took place in Katowice, Poland from the 4th to the 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 greenhouse gas 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 adaptation onto the same level as action to cut and curb emissions.

The EU, on the 23/24th of 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 greenhouse gas 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.

In 2019 the Department of Communications, Climate Action & Environment published a Climate Action Plan (DCCAE 2019) with targets to assist in Ireland's achievement of its emissions targets. The Climate Action Plan breaks down how Ireland will achieve the its targets within sectors such as Power Generation, Transport, Built Environment, Industry and Agriculture in order to achieve decarbonisation targets.

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), 55 kt 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 Council and Parliament Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), 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. The data available from the EPA in 2019 (EPA 2019a) indicated that Ireland complied with the emissions ceilings for SO_2 and NH_3 but failed to comply with the ceiling for NO_X and NMVOCs. 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 $PM_{2.5}$.

6.1.2.3 AIR QUALITY AND CLIMATE ASSESSMENT METHODOLOGY

Relevant Guidance Documents

The air quality assessment was carried out following procedures described in the publications by the EPA:

- 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)

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:

- UK DEFRA (2018) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG(16)
- UK DEFRA (2016) 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)

Local Air Quality - Vehicle Emissions

The assessment of air quality is carried out using a phased approach as recommended by the UK Department for Environment, Food and Rural Affairs (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 scoping of key pollutants will be carried out at sensitive receptors (i.e. residential properties). 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 2019, 2018), has indicated that sulphur dioxide (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 in regard to nitrogen dioxide (NO_2) and PM_{10} at busy junctions in urban centres (EPA 2019, 2018). Benzene, although previously reported at quite high levels in urban centres (EPA 2019, 2018), has recently been measured at several city centre locations to be well below the EU limit value (EPA 2019, 2018). 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 2019, 2018). 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 Screening Model (UK Highways Agency 2007) (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (UK Department for Environment, Food and Rural Affairs, 2019) (Version 7.1), and following guidance issued by Transport Infrastructure Ireland (TII 2011), UK Highways Agency (UK Highways Agency 2007), UK Department for Environment, Food and Rural Affairs (UK DEFRA 2016, 2018) and the EPA (EPA 2002, 2003, 2015).

Transport Infrastructure Ireland 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 Transport Infrastructure Ireland 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 AADT or more;
- 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, annual average daily traffic movements (AADT), percentage heavy goods vehicles, annual average traffic speeds and background concentrations. The UK Design Manual for Roads and Bridges 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 Design Manual for Roads and Bridges model uses conservative emission factors, the formulae for which are outlined in the Design Manual for Roads and Bridges 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 6.2 sets out the impact criteria for assessment of potential impacts due to traffic emissions discussed in the TII Guidance and the EPA Guidance (2017).

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 volatile organic compounds (VOCs), nitrogen oxides (NO_x) and carbon dioxide (CO_2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes and can be applied to any 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.

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.

Transport Infrastructure Ireland 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, 2019) which was originally published in 2009 and is currently on version 7.1. 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 Transport Infrastructure Ireland 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.

Ecological Sites

The EU Habitats Directive (92/43/EEC, as amended) and Birds Directive (2009/147/EC, as amended) provide the EU legislative framework of protecting rare and endangered species of flora and fauna, and habitats. These instruments, as implemented in Ireland, require the establishment and conservation of a network of sites of particular conservation value that are to be termed 'European Sites'. There are three principal types of European site, a Special Area of Conservation (SAC), a Special Protection Area (SPA) and Sites of Community Importance. The candidate forms of each of these are also included and are afforded the same legislative protection as defined under SI 473/2011. These sites form part of "Natura 2000" a network of protected areas throughout the European Union. Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are heritage sites that are designated for the protection of flora, fauna, habitats and geological sites under Irish domestic legislation being the Wildlife (Amendment) Act 2000. These sites do not form part of the Natura 2000 network however.

The development site is located within close proximity to Baldoyle Bay SAC, with some impacted road links in proximity to North Dublin Bay SAC. Therefore, an assessment of the ecological impact of the proposed development is required on any links with a significant change in AADT flows. For routes which pass within 2 km 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 200 m 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 of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of the Environment, Heritage and Local Government, 2010) provide details regarding the legal protection of designated conservation areas.

The assessment criteria states that if a designated area of conservation is within 200 m 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 2 μg/m^3 or more and causing overall concentrations to be within 10% of the 30 μg/m^3 limit, then the sensitivity of the habitat to NO_x should be assessed by the project Ecologist. There are ecological sites within 200m of the roads impacted by the proposed development, therefore an assessment of NO_x sensitivity is required.

Dispersion modelling and prediction was carried out at typical traffic speeds at the locations of concern and ambient NO_X concentrations predicted for the opening and design years along a transect of up to 200m within the Baldoyle Bay SAC and North Dublin Bay SAC were modelled. The road contribution to dry deposition along the transect was also calculated using the methodology outlined in Appendix 9 of the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011).

An appraisal has been carried out to assess the risk to sensitive ecological receptors of dust soiling due to the construction phase in accordance with the Institute of Air Quality Management's 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 designated ecological sites such as Baldoyle Bay SAC.

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 (i.e. residential properties) of dust soiling and health impacts due to the construction phase in accordance with the Institute of Air Quality Management's publication *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014). This guidance provides mitigation measures that the impact risk assessment assumes are implemented during the construction period. 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 the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In 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.

6.1.2.4 Odour Assessment Methodology

Odours are sensations resulting from the reception of a stimulus by the olfactory sensory system, which consists of two separate subsystems: the olfactory epithelium and the trigeminal nerve. The olfactory epithelium, located in the nose, is capable of detecting and discriminating between many thousands of different odours and can detect some of them in concentrations lower than those detectable by analytical instruments (Water Environment Federation 1995). The function of the trigeminal nerve is to trigger a reflex action that produces a painful sensation. It can initiate protective reflexes such as sneezing to interrupt inhalation. The olfactory system is extremely complex and peoples' responses to odours can be variable. This variability is the result of differences in the ability to detect odour; subjective acceptance or rejection of an odour due to past experience; circumstances under which the odour is detected and the age, health and attitudes of the human receptor.

Odour Intensity and Threshold

Odour intensity is a measure of the strength of the odour sensation and is related to the odour concentration. The odour threshold refers to the minimum concentration of an odorant that produces an olfactory response or sensation. This threshold is normally determined by an odour panel consisting of a specified number of people, and the numerical result is typically expressed as occurring when 50% of the panel correctly detect the odour. This odour threshold is given a value of one odour unit and is expressed as 1 OUE/m^3. The odour threshold is not a precisely determined value, but depends on the sensitivity of the odour panellists and the method of presenting the odour stimulus to the panellists. An odour detection threshold relates to the minimum odorant concentration required to perceive the existence of the stimulus, whereas an odour recognition threshold relates to the minimum odorant concentration required to recognise the character of the stimulus. Typically, the recognition threshold exceeds the detection threshold by a factor of 2 to 10 (AEA Technology 1994, Water Environment Federation 1995).

Odour Character

The character of an odour distinguishes it from another odour of equal intensity. Odours are characterised on the basis of odour descriptor terms (e.g. putrid, fishy, fruity etc.). Odour character is evaluated by comparison with other odours, either directly or through the use of descriptor words.

Hedonic Tone

The hedonic tone of an odour relates to its pleasantness or unpleasantness. When an odour is evaluated in the laboratory for its hedonic tone in the neutral context of an olfactometric presentation, the panellist is exposed to a stimulus of controlled intensity and duration. The degree of pleasantness or unpleasantness is determined by each panellist's experience and emotional associations. The responses among panellists may vary depending on odour character; an odour pleasant to many may be declared highly unpleasant by some.

Adaptation

Adaptation, or Olfactory Fatigue, is a phenomenon that occurs when people with a normal sense of smell experience a decrease in perceived intensity of an odour if the stimulus is received continually. Adaptation to a specific odorant typically does not interfere with the ability of a person to detect other odours. Another phenomenon known as habituation or occupational anosmia occurs when a worker in an industrial situation experiences a long-term exposure and develops a higher threshold tolerance to the odour.

Odour Guidelines

The exposure of the population to a particular odour consists of two factors; the concentration and the length of time that the population may perceive the odour. By definition, 1 OU_E/m^3 is the detection threshold of 50% of a qualified panel of observers working in an odour-free laboratory using odour-free air as the zero reference (the selection criteria result in the qualified panel being more sensitive to a particular odorant than the general population). The recognition threshold is generally about five times this concentration (5 OU_E/m^3) and the concentration at which the odour may be considered a nuisance is between 5 and 10 OU_E/m^3 based on hydrogen sulphide (H_2S) (The Scottish Office (1996). Clarkson and Misslebrook (C.R. Clarkson and T.H. Misselbrook 1991) proposed that a "faint odour" was an acceptable threshold criterion for the assessment of odour as a nuisance. Historically, it has been generally accepted that odour concentrations of between 5 and 10 OU_E/m^3 would give rise to a faint odour only, and that only a distinct odour (concentration of >10 OU_E/m^3) could give rise to a nuisance (J.E. McGovern & C.R. Clarkson 1994). However, this criterion has generally been based on wastewater treatment plants where the source of the odour is generally hydrogen sulphide. In 1990, a survey of the populations surrounding 200 industrial odour sources in the Netherlands showed that there were no justifiable complaints when 98^{th} percentile compliance with an odour exposure standard of a "faint odour" (5-10 OU_E/m^3) was achieved (CH2M Beca Ltd 2000).

DEFRA (Environment Agency 2002, 2003) in the UK has published detailed guidance on appropriate odour threshold levels based in part on the offensiveness of the odour. The potential odour source in relation to the proposed development is related to an Irish Water pumping station which is not included in Table 6.0.5. However, as shown in Table 6.0.2, a WWTP is listed with a ranking of 17 (median) and 16.1 (mean) in terms of pleasantness which is likely to be the worst-case odour type from the pumping station. This pumping station is located adjacent to the proposed development and therefore has the potential to impact the proposed development with respect to odour nuisance.

DEFRA has also detailed installation-specific exposure criteria based on the "annoyance potential" (Environment Agency 2002) which is defined as "the likelihood that a specific odorous mixture will give reasonable cause for annoyance in an exposed population". Industrial sources have been ranked into three categories based on their relative offensiveness which are "low", "medium" and "high" and exposure criteria assigned to each category (as shown in Table 6.0.3). The relevant exposure criteria vary from 1.5 OU_E/m^3 for highly odorous sources to 6.0 OU_E/m^3 for the least offensive odours. Due to the potential offensiveness of the odours to the proposed development, the worst-case exposure criteria for the facility is used. An odour exposure criterion of 1.5 OU_E/m^3 which is expressed as a 98th%ile and based on one hour means over a one-year period can be assigned to the pumping station.

Environmental Odour Industrial Source	Ranking UK Median	Ranking UK Mean	Ranking Dutch Mean
Bread Factory	1	2.5	1.7
Coffee Roaster	2	3.9	4.6
Chocolate Factory	3	4.6	5.1
Beer Brewery	6	7.7	8.1
Fragrance & Flavour Factory	8	8.5	9.8
Charcoal Production	8	9.2	9.4
Green Fraction composting	9	10.3	14
Fish smoking	9	10.5	9.8
Frozen Chips production	10	11	9.6
Sugar Factory	11	11.3	9.8
Car Paint Shop	12	11.7	9.8
Livestock odours	12	12.6	12.8
Asphalt	13	12.7	11.2
Livestock Feed Factory	15	14.2	13.2
Oil Refinery	14	14.3	13.2
Car Park Bldg	15	14.4	8.3
Wastewater Treatment	**17**	**16.1**	**12.9**
Fat & Grease Processing	18	17.3	15.7
Creamery/milk products	10	17.7	-
Pet Food Manufacture	19	17.7	-
Brickworks (burning rubber)	18	17.8	-
Slaughter House	19	18.3	17.0
Landfill	20	18.5	14.1

Table 6.0.2-Ranking Table For Various Industrial Sources (Environment Agency 2002)

Industrial Sectors	Relative Offensiveness of Odour	Indicative Criterion
Rendering Fish Processing Oil Refining Creamery WWTP Fat & Grease Processing	High	1.5 OU_E/m^3 as a 98^{th}%ile of hourly averages at the worst-case sensitive receptor
Intensive Livestock Rearing Food Processing (Fat Frying) Paint-spraying Operations Asphalt Manufacture	Medium	3.0 OU_E/m^3 as a 98^{th}%ile of hourly averages at the worst-case sensitive receptor
Brewery Coffee Roasting Bakery Chocolate Manufacturing Fragrance & Flavouring	Low	6.0 OU_E/m^3 as a 98^{th}%ile of hourly averages at the worst-case sensitive receptor

Table 6.0.3 Indicative Odour Standards Based On Offensiveness Of Odour (Environment Agency 2002)

6.1.3 Receiving Environment

6.1.3.1 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) (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 approximately 6.5 km 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 6.0.1). For data collated during five representative years (2014 - 2018), the predominant wind direction is westerly to south-westerly. The average wind speed over the period 1981 – 2010 is approximately 5.3 m/s.

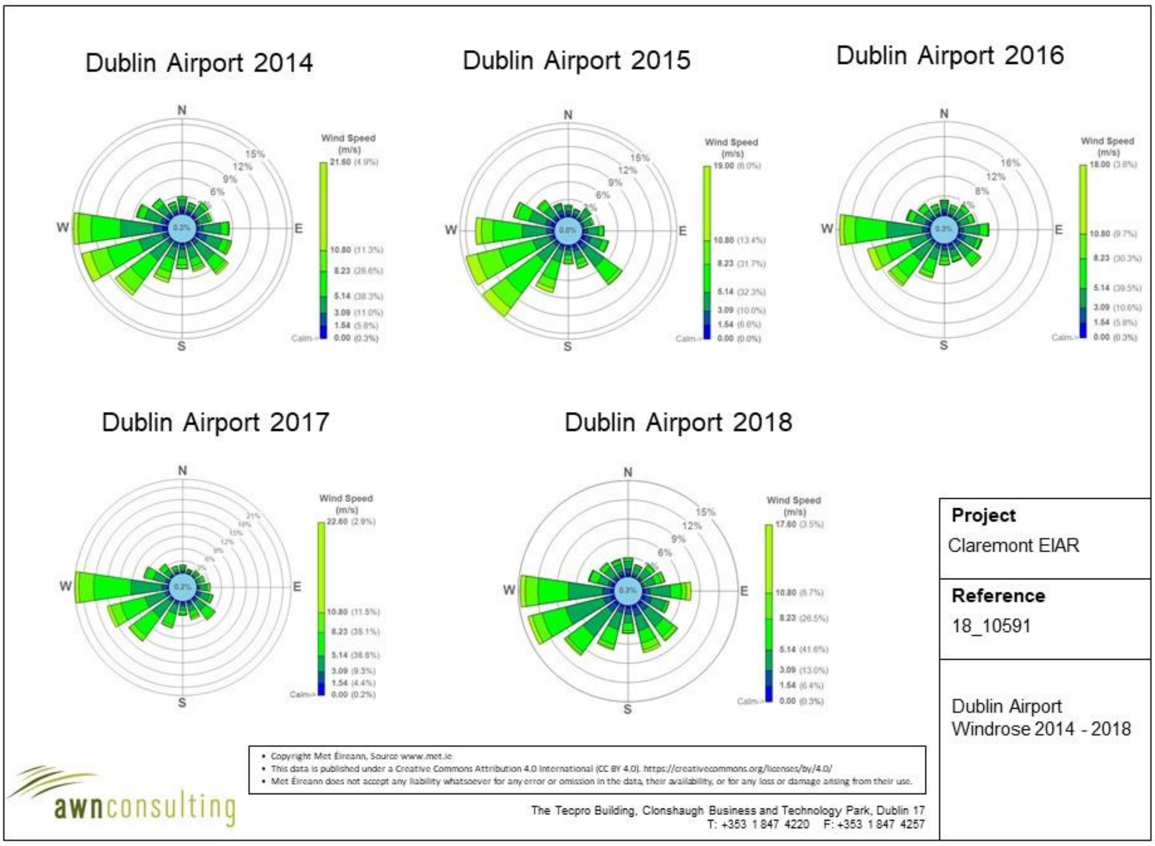

Figure 6.0.1 Dublin Airport Windroses 2014-2018

6.1.3.2 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 (HA) published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years.

6.1.3.3 Baseline Air Quality - EPA Air Quality 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, 2019b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, Raheny is within the Zone A Dublin region (EPA, 2019b). 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 average concentrations are significantly below the annual average limit of 40 µg/m^3. Long-term NO_2 monitoring was carried out at the Zone A 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 18 µg/m^3 (Table 6.0.4) for the suburban background locations. Long-term average concentrations are significantly below the annual average limit of 40 µg/m^3. Based on the above information and keeping regard for the further distance from the city centre, a conservative estimate of the current background NO_2 concentration for the region of the proposed development is 17 µg/m^3.

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).

Table 6.0.4 - Trends In Zone A Air Quality - Nitrogen Dioxide (NO_2)

Continuous PM_{10} monitoring was carried out at four Zone A locations from 2013 - 2017, Rathmines, Dún Laoghaire, Tallaght and Phoenix Park. These showed an upper average limit of no more than 15 µg/m^3 (Table 6.0.5). Levels range from 9 - 17 µg/m^3 over the five-year period with at most 5 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m^3 in 2017 (35 exceedances are permitted per year) (EPA, 2018). Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 15 µg/m^3.

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/m³ (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 6.0.5 -Trends In Trends In Zone A Air Quality - PM_{10}

Average $PM_{2.5}$ levels in Rathmines over the period 2013 - 2017 ranged from 9 - 11 µg/m³, 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 10.5 µg/m³.

In terms of benzene, the annual mean concentration in the Zone A monitoring location of Rathmines for 2017 was 0.92 µg/m³. This is well below the limit value of 5 µg/m³. Between 2013 - 2017 annual mean concentrations at the Zone A site ranged from 0.92 – 1.01 µg/m³. Based on this EPA data a conservative estimate of the current background benzene concentration in the region of the proposed development is 1.0 µg/m³.

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 (10 mg/m³) (EPA, 2018). Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the proposed development is 0.5 mg/m³.

Table 6.0.6 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.

NO_2	PM_{10}	$PM_{2.5}$	Benzene	Carbon Monoxide
17 µg/m³	15 µg/m³	10.5 µg/m³	1.0 µg/m³	0.5 mg/m³

Table 6.0.6 - Estimated Background Concentrations

Background concentrations for opening year 2022 and design year 2037 were calculated for the EIAR assessment. These use predicted 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).

In terms of receptor sensitivity to dust soiling, there are less than 10 high sensitivity receptors (i.e. residential dwellings) which are less than 20m from the construction boundary. As a result, the sensitivity of the area to dust soiling effects on people and property is medium according to the IAQM guidance in Table 6.0.7 (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

Table 6.0.7 - Sensitivity of the Area to Dust Soiling Effects on People and Property (IAQM, 2014)

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 is 17 µg/m³. As shown in Table 6.0.8 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.

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

Table 6.0.8 - Sensitivity of the Area to Human Health Impacts (IAQM, 2014)

6.1.3.4 Baseline Climate

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details emissions up to 2017 (EPA, 2019c). Agriculture was the largest contributor in 2017 at 33.3% of the total, with the transport sector accounting for 19.8% of emissions of CO_2 (EPA, 2019c).

2017 is the fifth year where compliance with the European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC) was assessed. Ireland had total GHG emissions of 60.74 Mt CO_2eq in 2017. This is 2.94 Mt CO_2eq higher than Ireland's annual target for emissions in 2017 (EPA, 2019c). Emissions are predicted to continue to exceed the targets in future years, therefore, reduction measures are required in all sectors.

The EPA 2019 GHG Emissions Projections Report for 2018 – 2040 (EPA 2019d) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 – 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No 406/2009/EC) 2020 targets by approximately 10 Mt CO_2eq under the With Existing Measures scenario and 9 Mt CO_2eq under the With Additional Measures scenario (EPA, 2019d).

6.1.3.5 BASELINE ECOLOGY

The development site is located within close proximity to Baldoyle Bay SAC, with some impacted road links in proximity to North Dublin Bay SAC. Therefore, an assessment of the ecological impact of the proposed development with respect to dust in the construction phase and on any links with a significant change in AADT flows during the operational phase is required.

An appraisal has been carried out to assess the risk to sensitive ecological receptors of dust soiling due to the construction phase in accordance with the Institute of Air Quality Management's 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 designated ecological sites such as Baldoyle Bay SAC.

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes, reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. The proposed development red line boundary is in close proximity (roughly 20 m) to Baldoyle Bay SAC which is classed as a highly sensitive receptor. As shown in Table 6.0.9 the worst-case sensitivity of the area to ecological impacts is considered high under this guidance.

Receptor Sensitivity	Distance from source (m)	
	<20	<50
High	**High**	Medium
Medium	Medium	Low
Low	Low	Low

Table 6.0.9- Sensitivity of the Area to Ecological Impacts

6.1.4 IMPACTS OF THE PROPOSED DEVELOPMENT - CONSTRUCTION PHASE

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 stages:

A. construction phase, and;
B. operational phase.

During the construction stage 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.

The impact of odour on the proposed development as a result of the nearby pumping station has also been qualitatively assessed as part of the operational phase.

6.1.4.1 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. Dust arises from four potential general sources:

- Demolition
- Earthworks
- Construction
- Trackout

Dust from those sources can have the following impacts:

- Soiling
- Human health impacts
- Ecological impacts

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. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. Most importantly, when the dust minimisation measures detailed in the Construction Management Plan and Appendix 6.3 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 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 can broadly be described as silt. Emission rates are normally predicted on a site-specific particle size distribution for each dust emission source.

Whilst construction activities are likely to produce some level of dust during earth moving and excavating phases of the 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 6.3.3 and Section 6.3.5 of this Chapter to assess the risk to sensitive receptors of dust soiling, health and ecological impacts due to the construction phase in accordance withthe Institute of Air Quality Management's publication *Guidance on the Assessment of Dust from Demolition and Construction* (2014).

Demolition

The dust emission magnitude from demolition can be classified as small, medium or large and is described below.

- **Large:** Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level.
- **Medium:** Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.
- **Small:** Total building volume 20,000 m^3, construction material with low potential for dust release, demolition activities <10 m above ground, demolition occurring during wetter months.

The area of demolition is 8,162 m^2, height of structure averaging 5m. Therefore, the demolition volume is circa 40,810 m^3 and therefore the dust emission magnitude for the proposed demolition activities can be classified as medium, due to the volume involved. This results in an overall medium risk of temporary dust soiling impacts (as it is medium sensitivity area in terms of dust soiling), an overall low risk of temporary human health impacts (as it is a low sensitivity area in terms of human health) and a medium risk to ecology impacts (as it is high sensitivity area in terms of ecology) as a result of the proposed demolition activities as outlined in Table 6.0.10.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.0.10 Risk of Dust Impacts – Demolition

Earthworks

Earthworks will primarily involve excavating material for basements, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. The 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 4 – 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 26,800 m^2 site area. 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, low risk of temporary human health impacts and high risk with respect to ecology impacts as a result of the proposed earthworks activities as outlined in Table 6.0.11.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.0.11 Risk of Dust Impacts – Earthworks

Construction

Dust emission magnitudes from construction 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 proposed construction activities can be classified as large due to the volume of construction. This results in a medium risk of temporary dust soiling impacts, an overall low risk of temporary human health impacts and a high risk with respect to ecology impacts as a result of the proposed construction activities as outlined in Table 6.0.12.

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.0.12 Risk of Dust Impacts – Construction

Trackout

Trackout is the movement of dust onto the local road network from the site via the wheels of vehicles leaving the site. Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. Dust emission magnitudes 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 (up to 80 per day). This results in an overall medium risk of temporary dust soiling impacts, an overall low risk of temporary human health impacts and a high risk of ecology impacts as a result of the proposed trackout activities as outlined in Table 6.0.13.

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6.0.13 - Risk of Dust Impacts – Trackout

Summary of Dust Emission Risk

In order to minimise dust emissions during demolition, earthworks, construction and trackout as detailed in Table 6.0.14, a series of mitigation measures associated with a high risk of dust soiling, health and ecology 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 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 6.3 are implemented, fugitive emissions of dust from the site will be not significant in the short-term construction period and pose no nuisance at nearby receptors including ecology.

Potential Impact	Dust Emission Magnitude			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk
Ecology	High Risk	High Risk	High Risk	High Risk

Table 6.0.14 - Summary of Dust Risk to Define Site-Specific Mitigation

In addition to construction dust, there is the potential for asbestos impacts to occur. A report completed by Golder "Materials Management & Remedial Strategy Plan" (Dated: October 2019) noted that asbestos fibres are observed in the buildings and in the made ground on the site of the former Techcrete Facility. Section 13.4 of this report contains an Asbestos management plan. A Refurbishment and Demolition Survey of these buildings will be required prior to commencing of the demolition phase. This is a fully intrusive asbestos containing materials survey which will involve destructive inspection. Further details are also included in Chapter 4 of the EIAR.

6.1.4.2 AIR QUALITY IMPACTS FROM CONSTRUCTION TRAFFIC

There is the potential for a number of emissions to the atmosphere during the construction phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene and PM_{10}. However, impacts from these emssions have been screened out using the UK DMRB guidance (UK Highways Agency 2007), on which the TII guidance was based. This guidance states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

The proposed development increase in construction phase HGVs will be a maximum of 80 HGVs per day. The AADT volume, speeds or road alignment do not change by an amount greater than the criteria discussed above. Therefore, none of the road links impacted by the proposed development satisfy the above criteria and an assessment of the impact of traffic emissions on ambient air quality during the construction phase is not necessary. The impacts will be short-term, not significant and localised.

6.1.4.3 CONSTRUCTION PHASE CLIMATE IMPACTS

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction phase of the development. Road traffic and space heating of buildings may give rise to CO_2 and N_2O emissions. However, due to the short-term nature of the construction phase of the development and the relatively low volume of machinery required emissions are not predicted to be significant.

Therefore, the likely overall magnitude of the changes on climate in the construction stage is imperceptible and short-term.

6.1.4.4 CONSTRUCTION PHASE HUMAN HEALTH

Construction phase traffic impacts on human health have been scoped out due to the predicted impacts as discussed 6.4.2. Therefore, the likely magnitude of the changes on human health due to traffic impacts in the construction stage is localised, imperceptible and short-term.

6.1.4.5 CONSTRUCTION PHASE CUMULATIVE IMPACTS

Should the construction phases of the development and any localised permitted developments coincide, including the proposed Rennie Place Development in Howth Village, it is predicted that once appropriate mitigations are put in place during the construction for the above schemes, impacts will not be significant.

6.1.5 IMPACTS OF THE PROPOSED DEVELOPMENT - OPERATIONAL PHASE

6.1.5.1 AIR QUALITY IMPACTS FROM OPERATIONAL TRAFFIC

As with the construction phase there is the potential for a number of emissions to the atmosphere during the operational phase of the 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 on this project (Margaret Costello, Project Engineer at Barrett Mahony) on 30/08/2019 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 (2011/92/EU, as amended) 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 6.2.3).

The impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the 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 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 200 m) to the road links impacted by proposed development. The traffic data used in this assessment is shown in Table 6.0.15, with the percentage of HGV shown in parenthesis below the annual average daily traffic (AADT). Sensitive receptors in the vicinity of the proposed development are a school and a residential housing estate. Four sensitive receptors have been chosen as they have the potential to be adversely impacted by the development, these receptors are shown in Table 6.0.16.

Link Number	Road Name	Base Year	Do-Nothing		Do-Something		Speed (kph)
		2019	2022	2037	2022	2037	
1	Howth Road West	8510 (4%)	9222 (4%)	10256 (4%)	10256 (4%)	11716 (4%)	50
2	Carrickbrack Road	7757 (4%)	8706 (4%)	8923 (4%)	8923 (4%)	10254 (4%)	50
3	Church Road	1589 (4%)	1722 (4%)	1722 (4%)	1722 (4%)	1995 (4%)	40
4	Howth Road East	7327 (4%)	7940 (4%)	8974 (4%)	8974 (4%)	10232 (4%)	50

Table 6.0.15 - Traffic Data used in this assessment

Name	Receptor Type	X	Y
R1	Residential	693853	5919648
R2	School	692834	5919688
R3	Residential	692494	5919259
R4	Residential	694379	5919504

Note: UTM Co-ordinates Zone 29N, approximate to nearest 5m.
Table 6.0.16 - Sensitive Receptors Used in Modelling Assessment

"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 6.0.21 and Table 6.0.22. Concentrations are well within the limit values at all worst-case receptors. Levels of both pollutants are at most 27% and 21% of the respective limit values in 2022 and 2037.

PM_{10}

The results of the "do nothing" modelling assessment for PM_{10} in the opening and design years are shown in Table 6.0.19. Concentrations are well within the annual limit value at all worst-case receptors. In addition, the 24-hour PM_{10} limit of 50 μg/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 2022 and 2037.

$PM_{2.5}$

The results of the "do nothing" modelling assessment for $PM_{2.5}$ in the opening and design years are shown in Table 6.0.20. 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 2022 and 2037.

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 6.0.17 for the Highways Agency IAN 170/12 and Table 6.0.18 using the DEFRA technique respectively. The concentrations are below the limit value at all locations, with levels ranging up to 43% of the limit value in 2022 and 42% in 2037, using the more conservative IAN prediction.

The hourly limit value for NO_2 is 200 µg/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 2022 or 2037.

"Do Something" Modelling Operational Phase Assessment

CO and Benzene

The results of the modelled impact of the development for CO and benzene in the opening and design years are shown in Table 6.0.21 and Table 6.0.22 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 27% of the respective limit values in 2022 and 2037. 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 2022 and 2037. 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 either 2022 and 2037 will be an increase of 0.2% of their respective limit values at Receptor 4. Thus, using the assessment criteria outlined in Appendix 6.2 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. With respect to EPA Guidance the CO and benzene impacts can be described as likely, localised, negative, imperceptible and long term.

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 6.0.19. 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 2022. In addition, the 24-hour PM_{10} concentration of 50 µg/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 50 µg/m^3 24-hour mean limit value in 2022 and 2037. 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 2037.

The impact of the proposed development can be assessed relative to "do nothing" levels in 2022 and 2037. 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 four receptors assessed will experience an increase in concentrations of over 0.15% of the limit value in 2022 and 2037. Thus, the magnitude of the changes in PM_{10} are negligible at all receptors based on the criteria outlined in Appendix 6.2.

With respect to EPA Guidance the PM_{10} impacts can be described as likely, localised, negative, imperceptible and long term.

$PM_{2.5}$

The results of the modelled impact of the proposed development for $PM_{2.5}$ in the opening and design years are shown in Table 6.0.20. Predicted annual average concentrations in the region of the proposed development are below the ambient standards at all worst-case receptors, levels are 45% of the limit value in 2022. Future trends with the proposed development in place indicate similarly low levels of $PM_{2.5}$. Annual average $PM_{2.5}$ concentrations are also 45% of the limit in 2037.

The impact of the proposed development can be assessed relative to “Do nothing” levels in 2022 and 2037. 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 four receptors assessed will experience an increase in concentrations of over 0.15% of the limit value in 2022 and 2037. Thus, the magnitude of the changes in $PM_{2.5}$ are negligible at all receptors based on the criteria outlined in Appendix 6.2.

With respect to EPA Guidance the $PM_{2.5}$ impacts can be described as likely, localised, negative, imperceptible and long term.

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 6.0.17 for the Highways Agency IAN 170/12 and Table 6.0.18 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 44% and 43% of the annual limit value in 2022 and 2037 using the IAN technique and concentrations are 40% and 35% of the annual limit value in 2022 and 2037 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 2022 and 2037. 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 four receptors assessed will experience an increase in concentrations of over 0.7% of the limit value in 2022 and 2037. Thus, using the assessment criteria outlined in Appendix 6.2, the impact of the operational phase of the proposed development in terms of NO_2 is negligible at all four receptors assessed.

With respect to EPA Guidance the NO_2 impacts can be described as likely, localised, negative, imperceptible and long term.

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, negative, imperceptible and long term.

Receptor	Impact Opening Year (2022)					Impact Design Year (2037)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	16.8	17.0	0.23	Imperceptible	Negligible Increase	16.2	16.5	0.23	Imperceptible	Negligible Increase
2	16.6	16.8	0.21	Imperceptible	Negligible Increase	16.0	16.2	0.22	Imperceptible	Negligible Increase
3	17.5	17.6	0.14	Imperceptible	Negligible Increase	17.0	17.1	0.15	Imperceptible	Negligible Increase
4	16.9	17.2	0.27	Imperceptible	Negligible Increase	16.3	16.6	0.28	Imperceptible	Negligible Increase

Table 6.0.17 - Annual Mean NO_2 Concentrations (µg/m^3) (using IAN 170/12 V3 Long Term NO_2 Trend Projections)

Receptor	Impact Opening Year (2022)					Impact Design Year (2037)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	15.5	15.7	0.21	Imperceptible	Negligible Increase	13.3	13.5	0.19	Imperceptible	Negligible Increase
2	15.3	15.5	0.19	Imperceptible	Negligible Increase	13.1	13.2	0.18	Imperceptible	Negligible Increase
3	16.2	16.3	0.13	Imperceptible	Negligible Increase	14.0	14.1	0.12	Imperceptible	Negligible Increase
4	15.6	15.8	0.25	Imperceptible	Negligible Increase	13.4	13.6	0.23	Imperceptible	Negligible Increase

Table 6.0.18 - Annual Mean NO_2 Concentrations (µg/m^3) (using Defra's Technical Guidance).

Receptor	Impact Opening Year (2022)					Impact Design Year (2037)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	17.2	17.2	0.05	Imperceptible	Negligible Increase	17.3	17.3	0.05	Imperceptible	Negligible Increase
2	17.1	17.2	0.05	Imperceptible	Negligible Increase	17.2	17.3	0.05	Imperceptible	Negligible Increase
3	17.3	17.4	0.03	Imperceptible	Negligible Increase	17.4	17.5	0.03	Imperceptible	Negligible Increase
4	17.2	17.3	0.06	Imperceptible	Negligible Increase	17.3	17.3	0.06	Imperceptible	Negligible Increase

Table 6.0.19 - Annual Mean PM_{10} Concentrations (µg/m^3).

Receptor	Impact Opening Year (2022)					Impact Design Year (2037)				
	DM	DS	DS-DM	Magnitude	Description	DM	DS	DS-DM	Magnitude	Description
1	11.2	11.2	0.03	Imperceptible	Negligible Increase	11.2	11.2	0.03	Imperceptible	Negligible Increase
2	11.1	11.2	0.03	Imperceptible	Negligible Increase	11.2	11.2	0.03	Imperceptible	Negligible Increase
3	11.3	11.3	0.02	Imperceptible	Negligible Increase	11.3	11.3	0.02	Imperceptible	Negligible Increase
4	11.2	11.2	0.04	Imperceptible	Negligible Increase	11.2	11.3	0.04	Imperceptible	Negligible Increase

Table 6.0.20 - $PM_{2.5}$ Annual Mean $PM_{2.5}$ Concentrations (μg/m³).

Receptor	**Impact Opening Year (2022)**					**Impact Design Year (2037)**				
	DM	**DS**	**DS-DM**	**Magnitude**	**Description**	**DM**	**DS**	**DS-DM**	**Magnitude**	**Description**
1	2.65	2.67	0.017	Imperceptible	Negligible Increase	2.67	2.69	0.017	Imperceptible	Negligible Increase
2	2.64	2.65	0.015	Imperceptible	Negligible Increase	2.66	2.67	0.015	Imperceptible	Negligible Increase
3	2.70	2.71	0.010	Imperceptible	Negligible Increase	2.73	2.74	0.010	Imperceptible	Negligible Increase
4	2.66	2.68	0.020	Imperceptible	Negligible Increase	2.68	2.70	0.020	Imperceptible	Negligible Increase

Table 6.0.21 - Maximum 8-hour CO Concentrations (mg/m³).

Receptor	**Impact Opening Year (2022)**					**Impact Design Year (2037)**				
	DM	**DS**	**DS-DM**	**Magnitude**	**Description**	**DM**	**DS**	**DS-DM**	**Magnitude**	**Description**
1	1.03	1.04	0.004	Imperceptible	Negligible Increase	1.04	1.04	0.004	Imperceptible	Negligible Increase
2	1.03	1.04	0.004	Imperceptible	Negligible Increase	1.04	1.04	0.004	Imperceptible	Negligible Increase
3	1.04	1.05	0.002	Imperceptible	Negligible Increase	1.05	1.05	0.002	Imperceptible	Negligible Increase
4	1.04	1.04	0.005	Imperceptible	Negligible Increase	1.04	1.05	0.005	Imperceptible	Negligible Increase

Table 6.0.22 - Annual Mean Benzene Concentrations (μg/m³).

6.1.5.2 OPERATIONAL PHASE – 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 Transport Infrastructure Ireland (TII 2011) and the UK Department for Environment, Food and Rural Affairs (UK DEFRA 2018). The results (see Table 6.0.23) 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 2022, the predicted impact of the changes in AADT is to increase NOx levels by 0.00049% of the NOx emissions ceiling and increase VOC levels by 0.00019% of the VOC emissions ceiling to be complied with in 2020. Similarly low increases are predicted in 2037.

Therefore, the likely overall magnitude of the changes on air quality in the operational stage is imperceptible and long-term.

6.1.5.3 OPERATIONAL PHASE - 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 6.0.23). The results show that the impact of the proposed development in the year 2022 will be to increase CO_2 emissions by 0.00049% of Ireland's EU 2020 Target or 0.000702% of the 2030 target. Thus, the impact of the proposed development on national greenhouse gas emissions will be insignificant in terms of Ireland's obligations under the EU 2020 Target (EU 2017).

The Climate Action Plan (DCCAE 2019) states under Section 3 spatial and Planning Policy that there is a target for higher density residential development, which tends to comprise smaller units such as apartments. The target is due to the requirement for less energy to heat. NPF targets require the proportion of apartments to treble, from 13% in 2019, to 39% by 2030. This development will assist in achieving the stated target.

The proposed development aims to achieve an A3 BER (Building Energy Rating) for the apartments. The proposed development also proposes the use of renewable technologies to meet the NZEB (Nearly Zero Energy Buildings) standard such as Heat Pumps/CHP plant based on optimum technical and economic considerations which will off-set Primary Energy as stated in the Sustainability Report associated with the planning application. 1 in 10 parking spaces have been designated for electric vehicles and include parking spaces, with additional ducting included should this require ratio require an increase in future.

The proposed development's location, close to Howth DART station and bus links to Dublin City Centre, will assist in the Climate Action Plan's (DCCAE 2019) requirement for improved use of public transport. Within the plan there is an aim to increase the use public transport in major cities in Ireland by 50%.

The likely overall magnitude of the changes on climate in the operational stage is imperceptible and long-term.

Year	Scenario	VOC (kg/annum)	NO_X (kg/annum)	CO_2 (tonnes/annum)
2021	Do Nothing	1,076	3,227	1,868
	Do Something	1,184	3,553	2,057
2036	Do Nothing	1,242	3,716	2,166
	Do Something	1,341	3,964	2,333
Increment in 2021		108.3 kg	325.8 kg	188.4 Tonnes
Increment in 2036		99.3 kg	248.4 kg	167.5 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 (%)		0.0001908%	0.000492%	0.000496%
Impact in 2036 (%)		0.0002104%	0.00081%	0.000702%

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

Table 6.0.23 - Regional Air Quality Assessment.

With respect to climate change impacts on the proposed development, the greatest impact is predicted to be due to flooding. A Site-Specific Flood Risk Assessment has been carried out (Dated 17.07.19 Barrett Mahony Consulting Engineers) in accordance with the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities". The site according to the OPW and RPS for fluvial and Coastal flooding show the site to be in Zone C. The Site is beside the Irish Sea but protected due to the existing DART Sea defence wall and the promenade. However, additional precautions are taken to protect the occupants and the development, in the event that the existing defences are overcome. Appraisal of the availability and adequacy of existing information includes a factor for future climate change impacts. Surface water drainage is designed for a 1 in 100-year event and a factor of 20% has been added for climate change. With mitigation measures proposed in the Site-Specific Floor Risk Assessment, the likelihood of flooding on site is low from either Tidal, Fluvial, Pluvial Surface Water or Groundwater. Therefore, it can be seen from the above the proposed development is in a low risk flood zone and is acceptable for residential development.

6.1.5.4 Operational Phase Ecology Assessment

The predicted annual average NO_x level in the Balydoyle Bay SAC is within the limit value of 30µg/m^3 for the "do minimum" scenario in 2022 and 2037, with NO_x concentrations reaching at most 74% of this limit in 2022 and 75% in 2037. Levels with the proposed development in place are similar reaching 75% of the limit value for the "do something" scenario in 2022 and 2037.

The predicted annual average NO_x level in the North Dublin Bay SAC is within the limit value of 30µg/m^3 for the "do minimum" scenario in 2022 and 2037, with NO_x concentrations reaching at most 80% of this limit in 2022 and 82% in 2037. Levels with the proposed development in place are similar reaching 81% and 83% of the limit value for the "do something" scenario in 2022 and 2037 respectively.

The predicted annual average NO_x levels at the two SACs is within the limit value of 30µg/m^3 for the "do minimum" and "do something" scenarios in both the opening and design years. The impact of the proposed development leads to an increase in NO_x concentrations of at most 0.12 µg/m^3 at the Baldoyle Bay SAC and 0.16 µg/m^3 at the North Dublin Bay SAC. The TII guidelines state in Appendix 9 that where the development is expected to cause an increase of more than 2 µg/m^3 and the predicted concentrations (including background) are close to, or exceed the standard, then the sensitivity of the habitat to NO_X should be assessed by the project ecologist. The NO_x impact is 8% of the threshold to require a project ecologist assessment and therefore no further assessment is required.

The road contribution within the SAC to the NO_2 dry deposition rate is also calculated. The maximum decrease in the NO_2 dry deposition rate is 0.007 Kg(N)/ha/yr in 2022 and 0.006 Kg(N)/ha/yr in 2037 in Baldoyle Bay SAC and 0.009 Kg(N)/ha/yr in 2022 and 0.009 Kg(N)/ha/yr in 2037 in North Dublin Bay SAC. This is a negligible impact within both the North Dublin Bay SAC and Baldoyle Bay SAC for NO_2 dry deposition due to the development. The critical loads for nitrogen dry deposition as per TII Guidance (TII 2011) is 10 - 20 Kg(N)/ha/yr. These rates are associated with dry heath which is found in the North Dublin Bay SAC and Baldoyle Bay SAC.

Therefore, the likely overall magnitude of the changes on ecological impacts in the operational stage is imperceptible and long-term and the project ecologist has been made aware of the findings.

6.1.5.5 Operational Phase Human Health

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the 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 both with and without the proposed development and therefore, will not result in a significant impact on human health.

6.1.5.6 Operational Phase Odour Assessment

Due to the proximity of the Irish Water pumping station to the west of the site, the potential odour impacts from the pumping station on the proposed development have been qualitatively assessed.

The predominant wind direction in the region is south-westerly (see Figure 6.0.1) which would indicate that dispersal of any potential odours from the pumping station would be blown out to sea the majority of the time. In addition, the odour exposure criteria (1.5 OU_E/m^3 for pumping station, see Table 6.0.6) is expressed as a 98^{th} percentile of hourly means at the worst-case sensitive receptor and is averaged over a one-year period – this allows a total of 175 exceedances per year before it is considered an issue.

Overall, there is the potential for odour impacts to occur during the operational phase of the proposed development as a result of the nearby pumping station. These impacts would be considered negative and brief in nature as they are unlikely to last for prolonged periods of time. However, it is the overall responsibility of Irish Water, the operators of the WWTP pumping station to ensure no odour nuisance impacts are occurring at any nearby sensitive receptors such as the proposed development.

6.1.5.7 Operational Phase Cumulative Assessment

Traffic volumes modelled as part of the operational phase assessment include known developments in the vicinity, such as the proposed Rennie Place development in Howth Village, and asses the impacts of both in the do-nothing and do-something assessments. The cumulative impact in the operational phase does not cause air quality to change from the TII Guidance levels of “well below objectives” as shown in Appendix 6.2. Therefore, the cumulative impact can be considered as long-term and not significant.

6.1.6 Do-Nothing

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.

The Do-Nothing scenario in relation to the operational phase is detailed in Section 6.1.5.1.

6.1.7 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.

6.1.7.1 CONSTRUCTION PHASE

Air Quality

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 6.3 and Construction Environmental Management Plan (CEMP)) are adhered to, the air quality impacts during the construction phase will be not be significant. In summary the measures which will be implemented will include:

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

- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.

- Vehicles 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.

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.

Prior to commencement of the demolition works, all asbestos containing materials identified by the Management Asbestos Survey and Refurbishment and Demolition Survey will be removed by a suitably trained and competent person. Asbestos containing materials will only be removed from site by a suitably permitted/licenced waste contractor and will be brought to a suitably licenced facility. The Health and Safety Authority should be contacted in relation to the handling of asbestos and material should be dealt with in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, as amended and associated approved Codes of Practice.

Climate

Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to the short-term and temporary nature of these works the impact on climate will not be significant and therefore no mitigation measures are required.

Human Health

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. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be negative, short-term and imperceptible with respect to human health.

6.1.7.2 Operational Phase

Air Quality

Due to the not significant impact of the proposed development on air quality during the operational phase no mitigation measures are required.

Climate

Due to the not significant impact of the proposed development on climate during the operational phase no 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 negligible and no further mitigation is required. The flood risk represented by ground water is negligible and no further mitigation is required.

6.1.8 Residual Impacts

6.1.8.1 Construction Phase

As dust mitigation measures must be included as part of the risk assessment the impact assessment and residual impacts are identical. When the dust minimisation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will be insignificant, short-term, localised 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 and therefore an imperceptible residual, short-term impact.

6.1.8.2 OPERATIONAL PHASE

No mitigation measures are proposed for operational air quality as 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 with respect to the operational phase for the long term. Therefore, the residual impacts of the proposed development on air quality and climate are also predicted to be imperceptible with respect to the operational phase for the long term

There is the potential for odour impacts to occur during the operational phase of the proposed development as a result of the nearby pumping station. However, it is the overall responsibility of Irish Water, the operators of the pumping station to ensure that odour impacts are not occurring outside the boundary of their site.

6.1.9 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 and Air Quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place 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.

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 not significant.

The construction and operation 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 on ecology is assessed in this chapter and is predicted to be not significant 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, the effects of the proposed development do not exceed the criteria set down for ecologically sensitive sites as discussed in this Chapter. Therefore, the interactions between air quality and flora and fauna are not significant for both the construction and operational phases. Impacts have been discussed in the NIS under section 7.1.2 Dust and 7.1.3 Traffic Pollution.

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 negligible and no further mitigation is required. The flood risk represented by ground water is negligible and no further mitigation is required.

6.1.10 DIFFICULTIES IN COMPILING

There were no difficulties in compiling this Section of the EIAR.

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6.2 Wind Microclimate

6.2.1 INTRODUCTION

B-Fluid Limited has been commissioned by 'Atlas GP Limited' to carry out a wind micro- climate modelling study for the proposed Claremont Development in Howth, Co. Dublin. This EIAR chapter is completed as part of the proposed development and outlines the methodology used to assess the wind microclimate impacts of the proposed development.

Wind microclimate study identifies the possible wind patterns around the existing environment and 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 the development and to identify areas of concern in terms of downwash/fun- neling/downdraft/critical flow accelerations that may likely occur. The Advanced CFD numerical algorithms applied here are solved using high speed supercomputing computer clusters.

This study results will be utilized by Atlas GP Limited design team as an EIAR chapter as part of the proposed development. The objective 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 development. Pedestrian areas include side-walks, street frontages, pathways, building entrance areas, open spaces, amenity areas, outdoor sitting areas, and accessible roof top areas among others.

For this purpose, 18 different wind scenarios and directions have been modelled as shown in Table 6.1 in order to take into consideration all the different relevant wind directions in Dublin. In particular, a total of 18 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.

DUBLIN WIND SCENARIOS AND DIRECTIONS		
Velocity (*m/s*)	Direction (deg)	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

Table 6.1: Summary of The 18 Wind Scenarios Modelled for proposed Claremont Development

This modelling study focuses on reporting 9 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 development. The 9 modelled scenarios reported in this study are presented in Table 6.2

REPORTED 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	4.169	45	2.180

Table 6.2: Reported Wind Scenarios

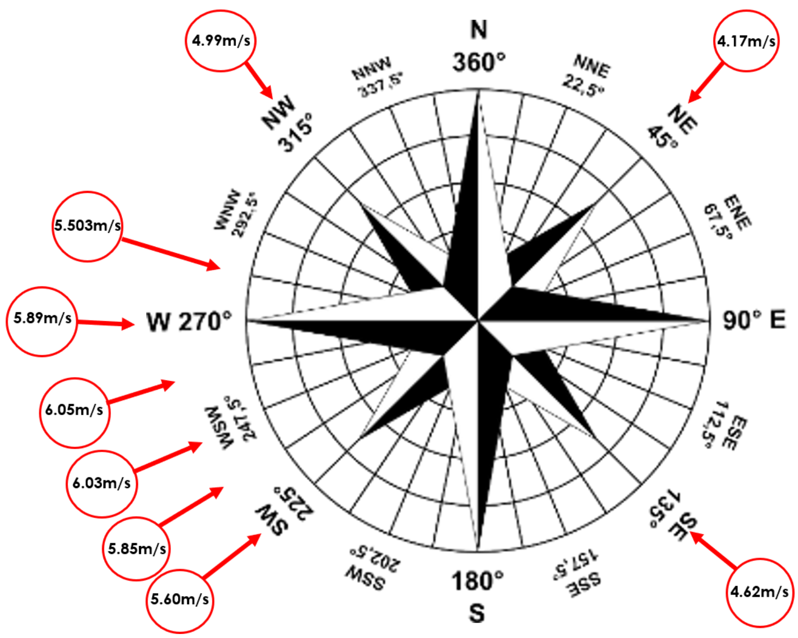


Figure 6.1: Summary of 9 Wind Scenarios Reported

Figure 6.2 shows a view of the development site.

Figure 6.2: Development Site

This Wind Microclimate study is completed by Dr. Cristina Paduano, Dr. Eleonora Neri and Dr. Arman Safdari.

Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environments 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. Eleonora Neri is a CFD Aerodynamics Engineer and member of Engineers Ireland who specialises in computational fluid dynamics applications for the urban environment, and in wind tunnel measurements for the aerospace industry. She holds a PhD in Aeroacoustics from Trinity College Dublin, a M.Sc. and B.Sc. in Aeronautical Engineering.

Dr. Arman Safdari is a CFD Modelling Engineer who specialises in computational fluid dynamics applications. He is an expert in airflow modeling, heat and mass transfer and multi-phase flow simulations. He holds a PhD in Mechanical Engineering from Pusan National University, a M.Sc. and B.Sc. in Mechanical Engineering.

6.2.2 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.

The following sections give details on the methodology utilized.

6.2.2.1 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, funneling and downdraft can be experienced as well.

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 funneling effects could potentially occur.

Impacts of the development on the local wind microclimate are quantified through modelling of different wind scenarios and all areas of potential critical wind impact 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.

6.2.2.2 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 6.3 shows the wind velocity profile, as described above.

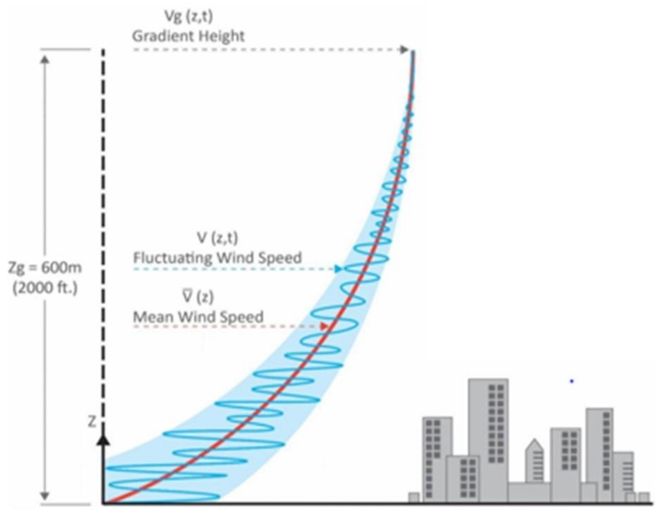


Figure 6.3: Wind Velocity Profile

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 general rule, wind speed increases with height.

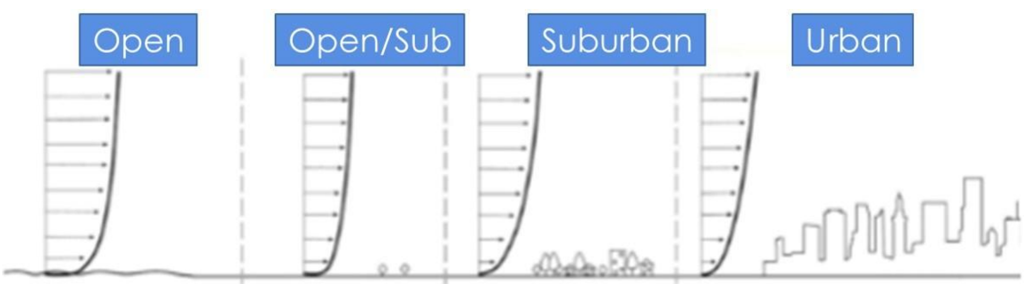


Figure 6.4: Wind Velocity Profile for different terrains

In order to assess the wind conditions in a particular area, it is important to know (Figure 6.5):

- Weather conditions in the area
- Location and orientation of the site
- Distribution of buildings in the area
- Flow patterns at the relevant buildings

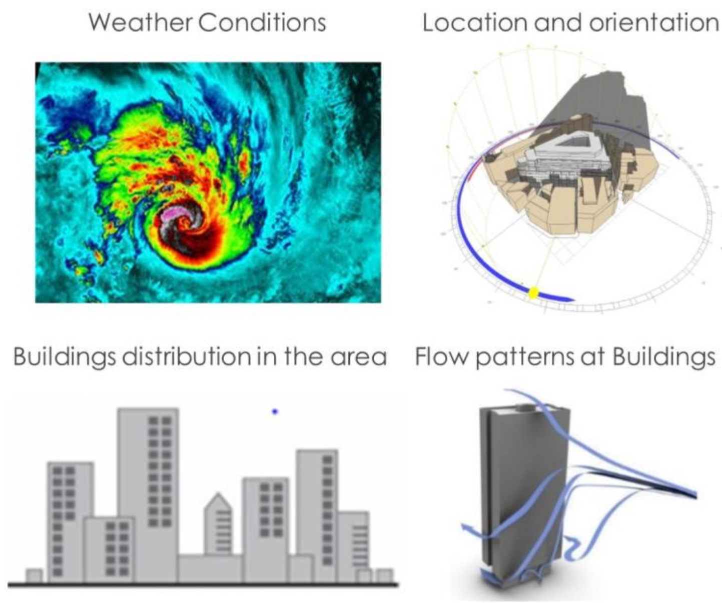


Figure 6.5: Parameters to know for Wind Conditions Assessment

Moreover, it is important to understand key flow features (Figure 6.6):

- Broad Building Face creates "DOWNWASH"
- Low Building Upwind Increases Wind Effects
- Gaps Between Buildings Increases Wind Velocity
- Low Building Upwind Increases Wind Effects

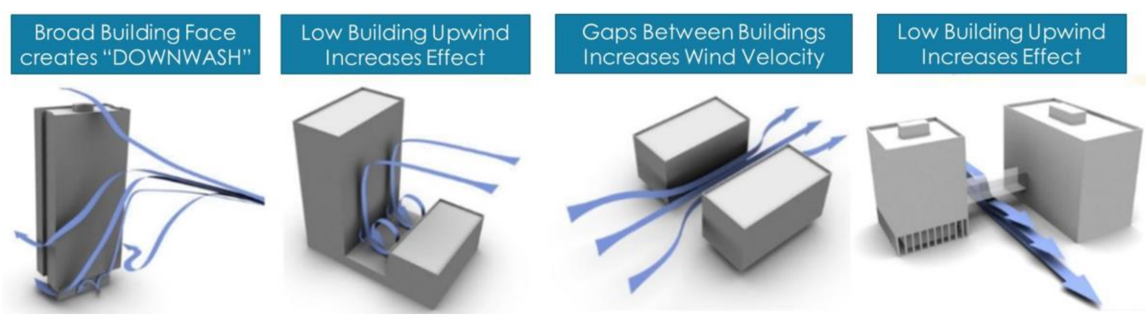


Figure 6.6: Parameters to know for Wind Conditions Assessment

6.2.2.3 Acceptance Criteria

Pedestrian Comfort

Pedestrian Wind Comfort is measured in function of the frequency of wind speed thresh- old exceeded based on 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 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. This is intended to identify wind conditions 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 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed, aerodynamic forces approach body weight and it rapidly becomes impossible for anyone to remain standing. Where wind speeds exceed these values, pedestrian access should be discouraged.

The above criteria set out six pedestrian activities and notes that calm activity requires calm wind conditions, which are summarised by the Lawson scale, shown in Figure 6.7. 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 6.8. The Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. A 20% exceedance is used in these criteria to determine the comfort category, which suggests that wind speeds would be comfortable for the corresponding activity at least 80% of the time or four out of five days.

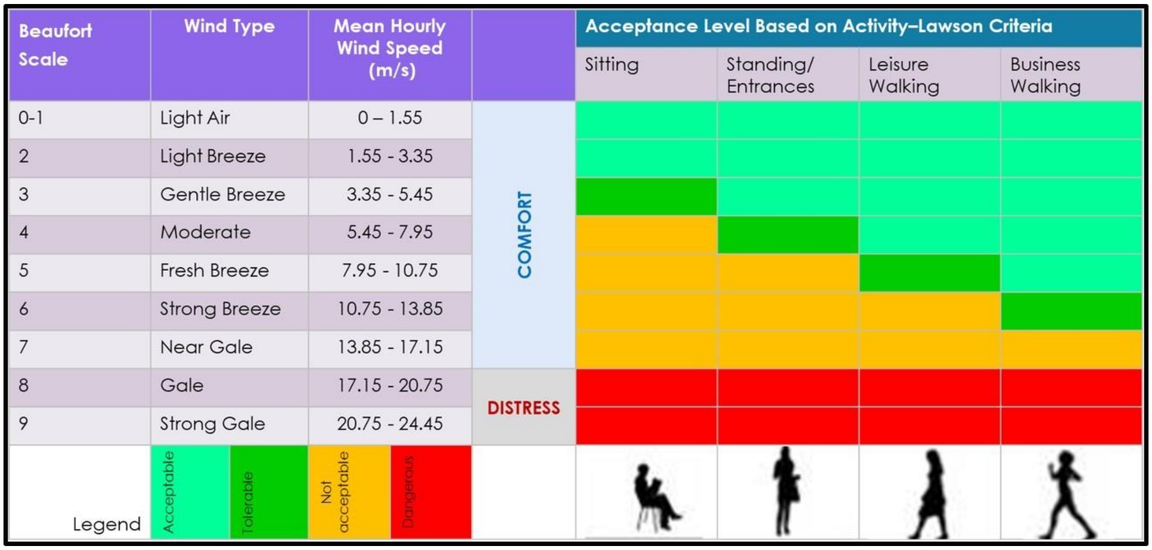
These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, etc. which can all affect a person’s perception of a local microclimate. Moreover, pedestrian activity alters between winter and summer months. The criteria assume that people will be suitably dressed for the time of year and individual activity. It is reasonable to assume, for instance, that areas designated for outdoor seating will not be used on the windiest days of the year.

Weather data measured are used to calculate how often a given wind speed will occur each year over a specified area. Pedestrian comfort criteria are assessed at 1.5m above ground level. Unless in extremely unusual circumstances, velocities at pedestrian level increase as you go higher from ground level.

A breach of the distress criteria requires a consideration of:

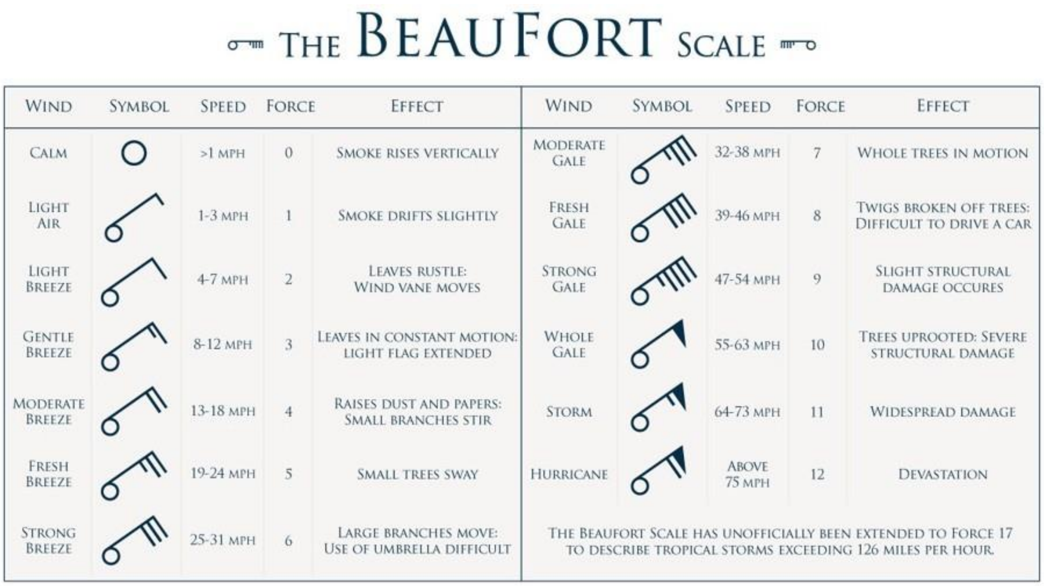
- whether the location is on a major route through the complex,
- whether there are suitable alternate routes which are not distressful.

If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity and mitigation measures should be implemented into the design.



Beaufort Scale	Wind Type	Mean Hourly Wind Speed (m/s)		Acceptance Level Based on Activity–Lawson Criteria			
				Sitting	Standing/ Entrances	Leisure Walking	Business Walking
0-1	Light Air	0 – 1.55	COMFORT				
2	Light Breeze	1.55 - 3.35					
3	Gentle Breeze	3.35 - 5.45					
4	Moderate	5.45 - 7.95					
5	Fresh Breeze	7.95 - 10.75					
6	Strong Breeze	10.75 - 13.85					
7	Near Gale	13.85 - 17.15					
8	Gale	17.15 - 20.75	DISTRESS				
9	Strong Gale	20.75 - 24.45					
Legend	Acceptable / Tolerable	Not acceptable / Dangerous					

Figure 6.7: Lawson Scale



The Beaufort Scale

Wind	Symbol	Speed	Force	Effect	Wind	Symbol	Speed	Force	Effect
Calm		>1 mph	0	Smoke rises vertically	Moderate Gale		32-38 mph	7	Whole trees in motion
Light Air		1-3 mph	1	Smoke drifts slightly	Fresh Gale		39-46 mph	8	Twigs broken off trees: Difficult to drive a car
Light Breeze		4-7 mph	2	Leaves rustle: Wind vane moves	Strong Gale		47-54 mph	9	Slight structural damage occures
Gentle Breeze		8-12 mph	3	Leaves in constant motion: Light flag extended	Whole Gale		55-63 mph	10	Trees uprooted: Severe structural damage
Moderate Breeze		13-18 mph	4	Raises dust and papers: Small branches stir	Storm		64-73 mph	11	Widespread damage
Fresh Breeze		19-24 mph	5	Small trees sway	Hurricane		Above 75 mph	12	Devastation
Strong Breeze		25-31 mph	6	Large branches move: Use of umbrella difficult	The Beaufort scale has unofficially been extended to force 17 to describe tropical storms exceeding 126 miles per hour.				

Figure 6.8: Beaufort Scale

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 6.9 shows the hourly wind gust rose for Dublin, from 1985 to 2019. This will be necessary to assess how many hours per year on average the velocity exceed the threshold values.

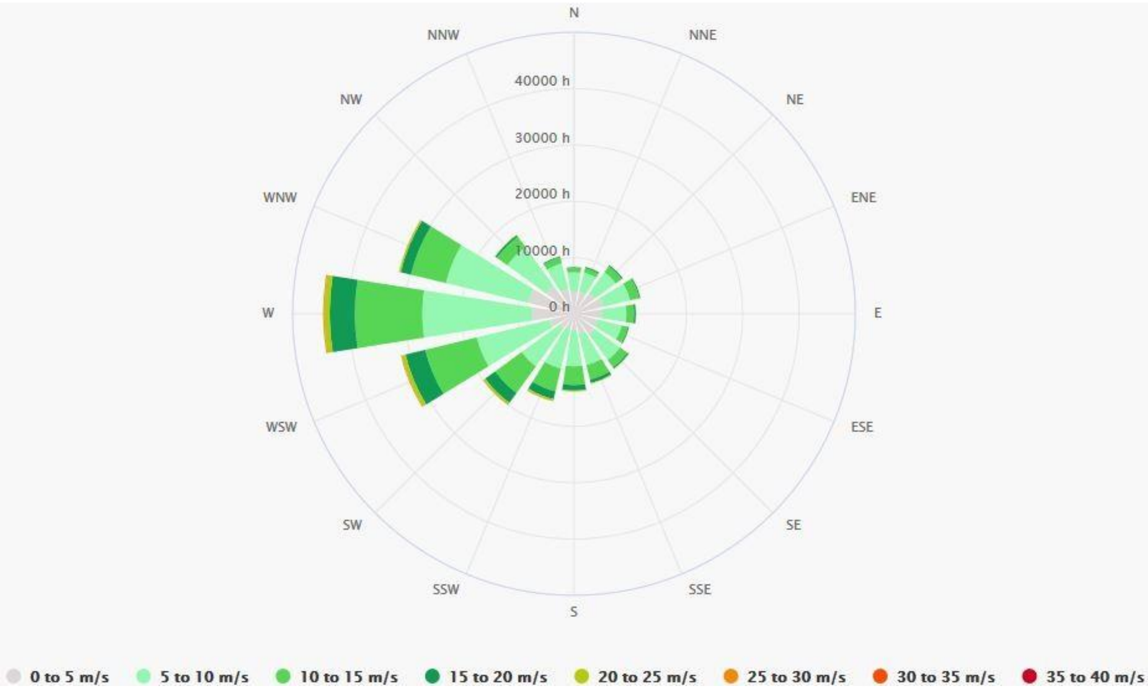


Figure 6.9: Hourly Dublin Wind Gust Rose (Data from Dublin Airport)

Distress for Frail Person or Cyclist

The criteria for distress for a frail person or cyclist is 15m/s wind occurring for more than two hours per year. Limiting the results from the above wind rose to the only values above 15m/s (as reported in Figures 6.10 and 6.11 respectively as cumulative hours and cumulative percentage), it is possible to see how many hours in 30 years the gust velocity of 15m/s is exceed at pedestrian level in each direction.

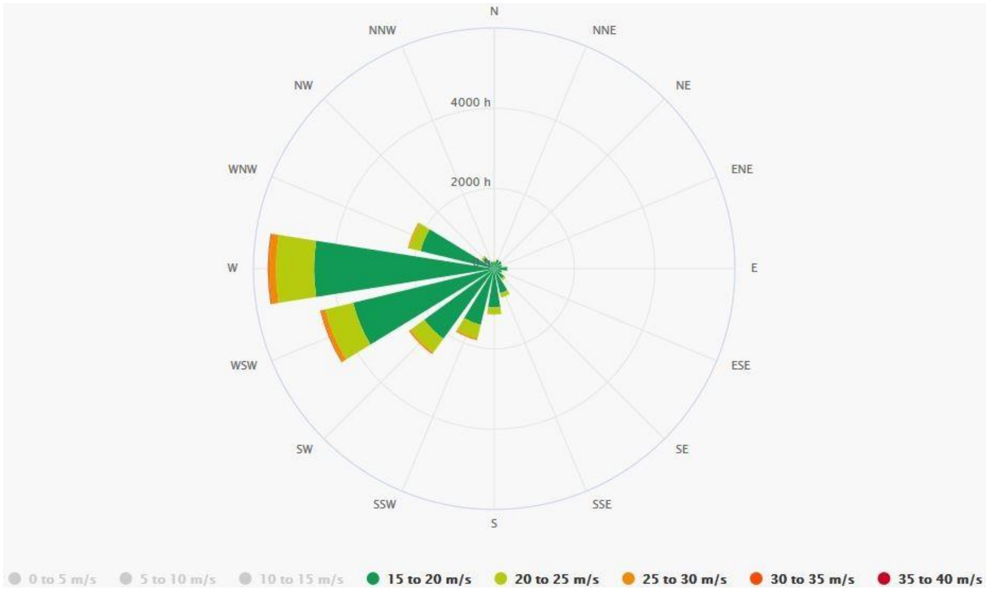


Figure 6.10: Hourly Dublin Wind Gust Rose - Cumulative hours when the velocity is above 15m/s

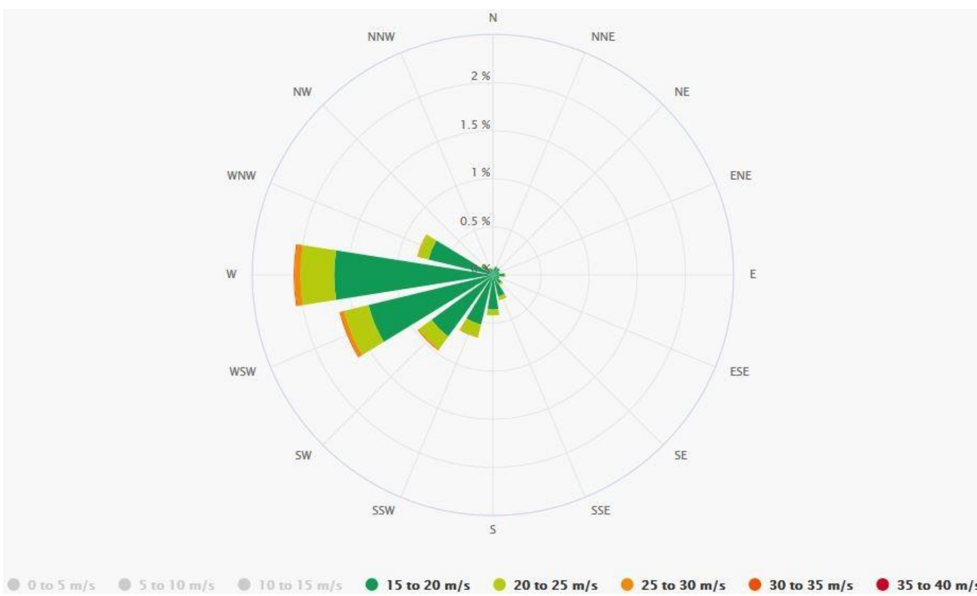


Figure 6.11: Hourly Dublin Wind Gust Rose - Cumulative percentage of time when the velocity is above 15m/s

A total of 2 hours per years corresponds to 0.02% in one year, which means 0.6% in 30 years. Looking at the wind roses above, it is possible to notice that a velocity of 15m/s was reached in Dublin only for the following directions (in increasing order of percentage) over the years 1985-2019:

1. West 270°
2. West-South-West 247.5°

3. South-West 225°

Distress for General Public

The criteria for distress for a member of the general population is 20m/s wind occurring for more than two hours per year. Limiting the results from the above wind rose to the only values above 20m/s (as reported in Figures 6.12 and 6.13 respectively as cumulative hours and cumulative percentage), it is possible to see how many hours in 30 years the gust velocity of 20m/s is exceeded at pedestrian level in each direction.

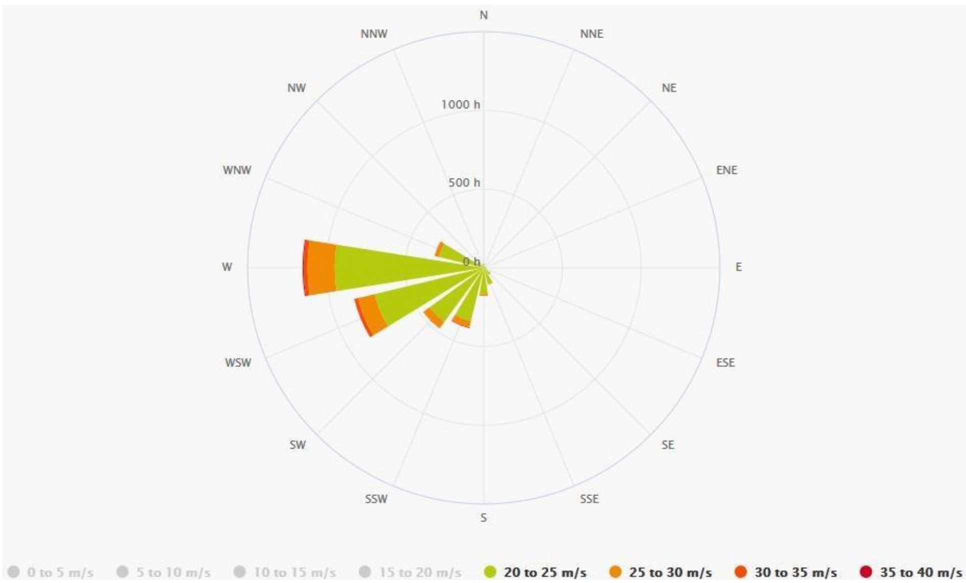


Figure 6.12: Hourly Dublin Wind Gust Rose - Cumulative hours when the velocity is above 20m/s

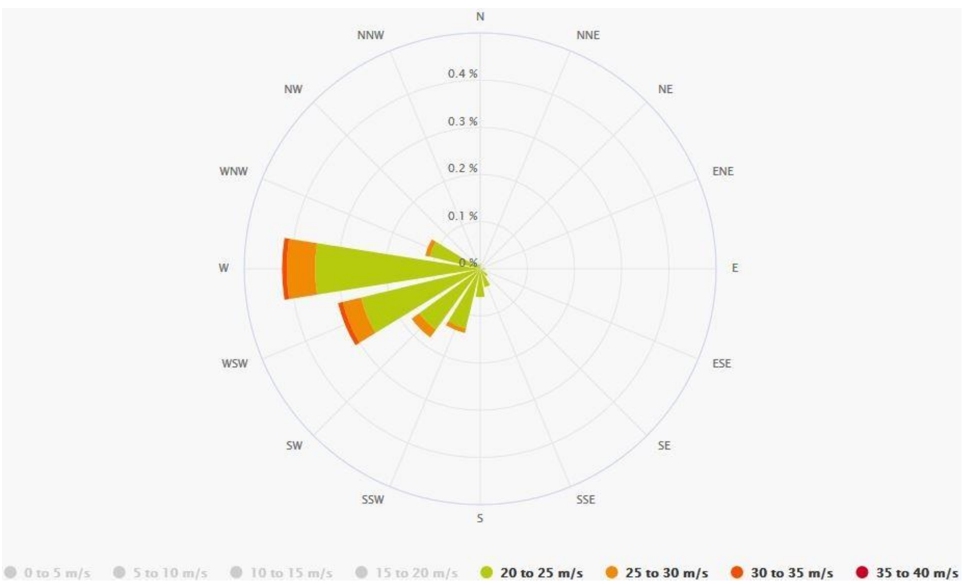


Figure 6.13: Hourly Dublin Wind Gust Rose - Cumulative percentage of time when the velocity is above 20m/s

A total of 2 hours per year corresponds to 0.02% in one year, which means 0.6% in 30 years. Looking at the wind roses above, it is possible to notice that a velocity of 20m/s was never reached in Dublin over the years 1985-2019.

6.2.2.4 Mitigation Measures

If the wind conditions exceed the threshold, these conditions become unacceptable for favourable pedestrian activities and mitigation measures should be accounted for.

Mitigation measures include:

- **Landscaping** : the use of 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 6.14 and 6.15):

- **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.

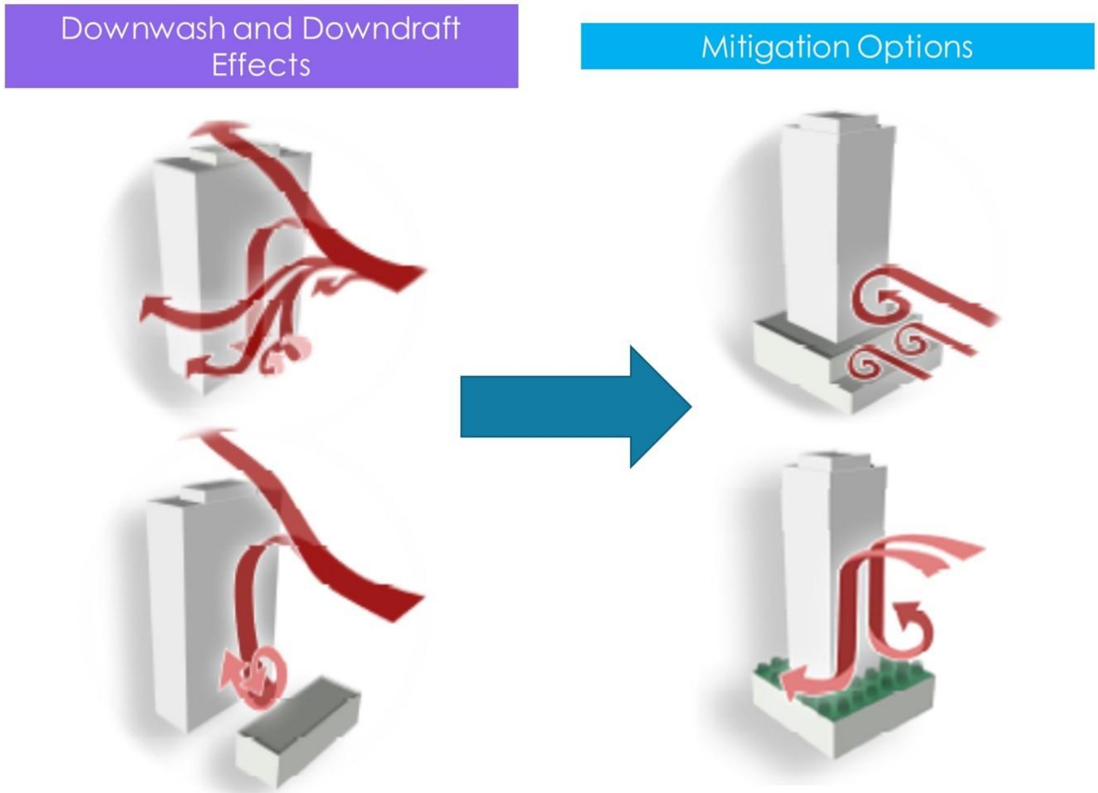


Figure 6.14: Mitigation Measures for Downwash and Downdraft Effects

- **Funneling Effects:** Wind speed is accelerated when wind is funneled 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 effects 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.

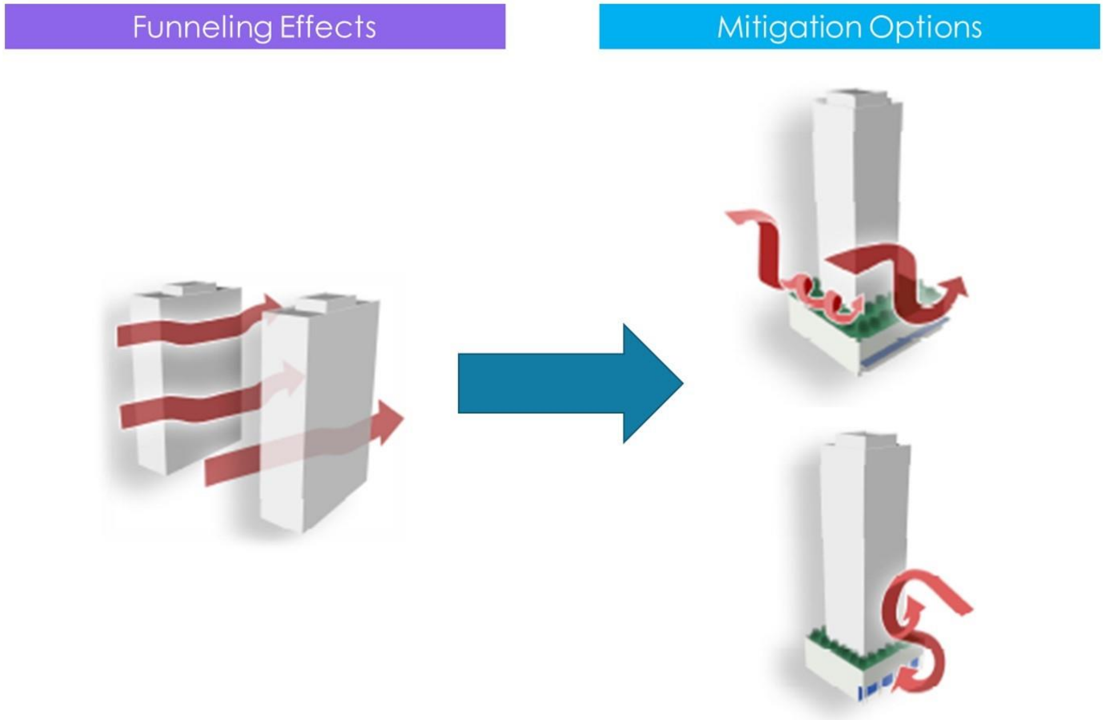


Figure 6.15: Mitigation Measures for Funneling Effects

6.2.2.5 CFD Modelling Method

Computational Fluid Dynamics (CFD) is a numerical technique used to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. CFD modelling includes three main stage: pre-processing, simulation and post-processing as described in Figure 6.16. 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.

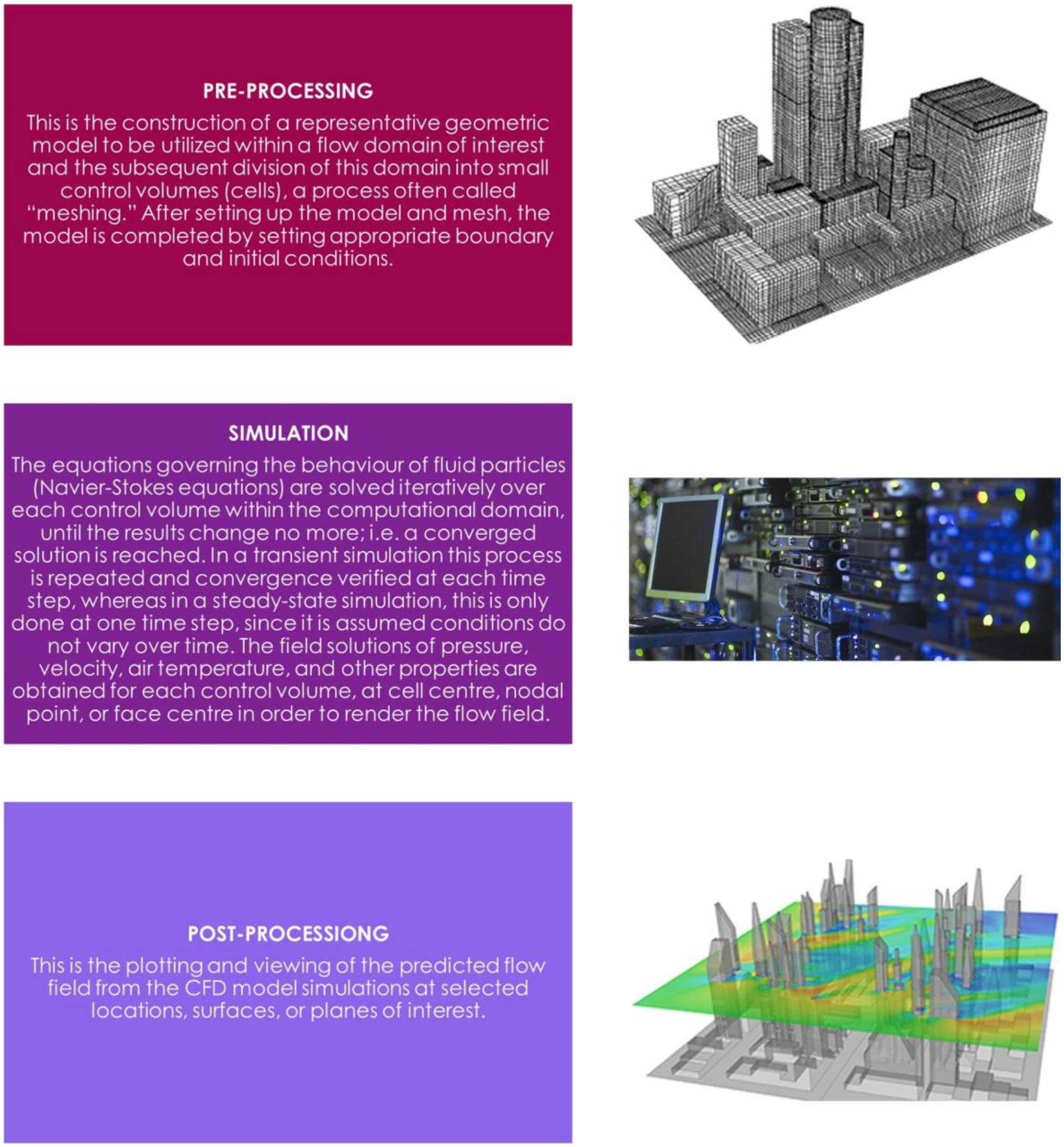


Figure 6.16: CFD Modelling Process Explanation

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 6.17: Main Categories for Pedestrian Activities (Source: Lawson Categories)

6.2.2.6 CFD Model Details Of The Proposed Development

This subsection describes all features included in the geometrical and physical representation of proposed Claremont Development CFD model. Any objects 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 Claremont Development Model is shown in Figure 6.18.

The modelled layout and dimensions of the surrounding environment are outlined in the table below (Table 6.3).

In order to represent reality and consider the actual wind impacting on the site, the modelled area for the wind modelling study comprises a wider urban area of 1km² around the proposed Claremont Development, as shown.

	MODELLED CFD ENVIRONMENT DIMENSIONS		
	Width	Length	Height
CFD Mesh Domain	950m approx	950m approx	120m approx

Table 6.3: Modelled Environment Dimensions

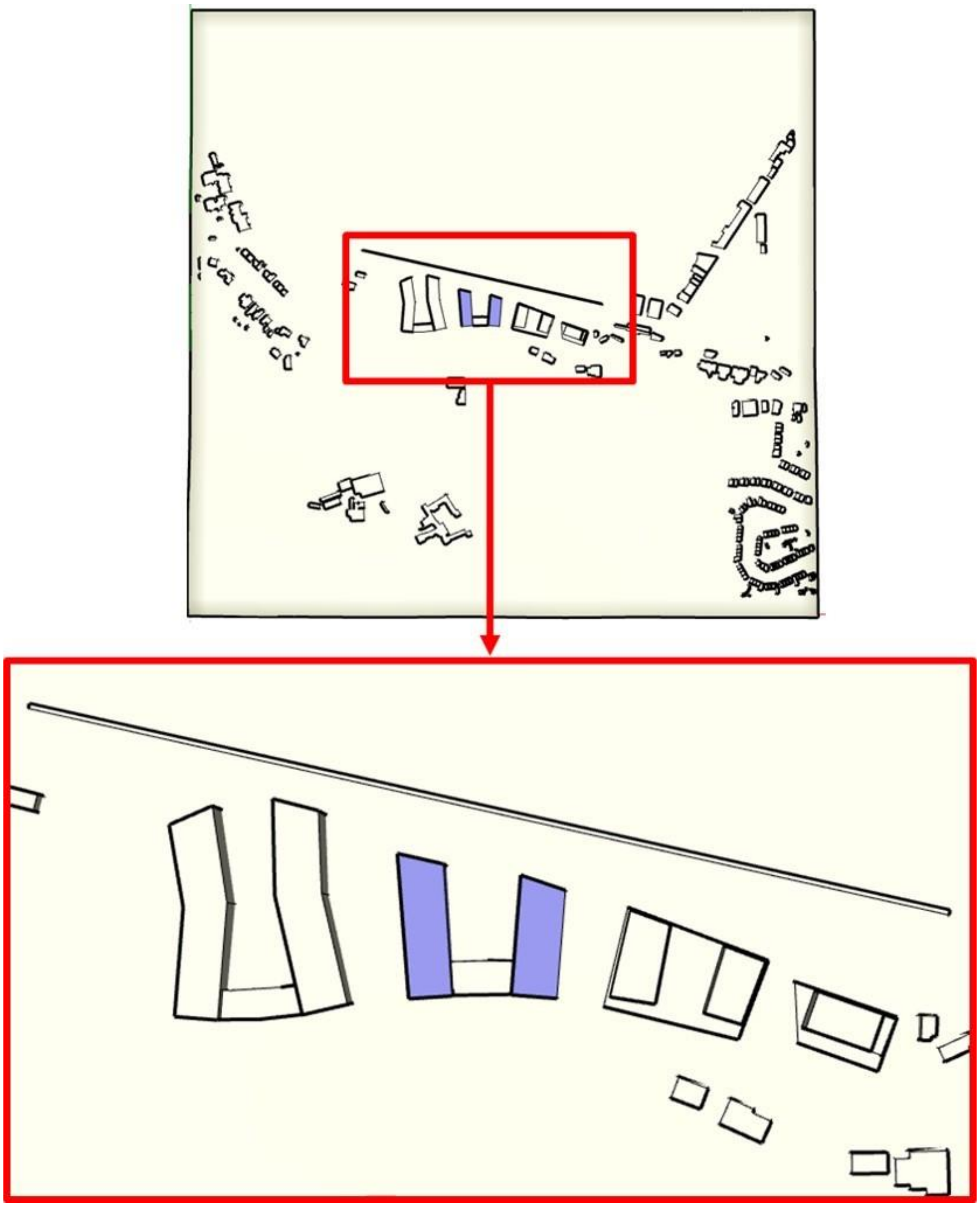


Figure 6.18: Proposed Claremont Development Extents of Modelled Area - Top View

6.2.2.7 Boundary Conditions

A rectangular computational domain was used for the analysis. The wind directions were altered without changing the computational mesh. For each simulation scenario, an initial wind velocity was set according to the statistical weather data collected in order to consider the worst case scenario. Building surfaces within the model are specified as 'no slip' boundary conditions. This condition ensures that flow moving parallel to a surface is brought to rest at the point where it meets the surface. Air flow inlet boundaries possess the 'Inlet' wind profile velocity patch boundary condition with its appropriate inflow turbulence intensity and dissipation rates. Air exits the domain at the 'pressure outlet' boundary condition.

The wind velocity data provided by the historical data collection and by the local data measuring are used in the formula below for the logarithmic wind profile to specify the wind velocity profile (wind velocity at different heights) to be applied within the CFD model:

$$v_2 = v_1 \cdot \frac{ln\frac{h_2}{z_0}}{ln\frac{h_1}{z_0}} \qquad (6.1)$$

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 6.19 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 6.19: 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 6.20.

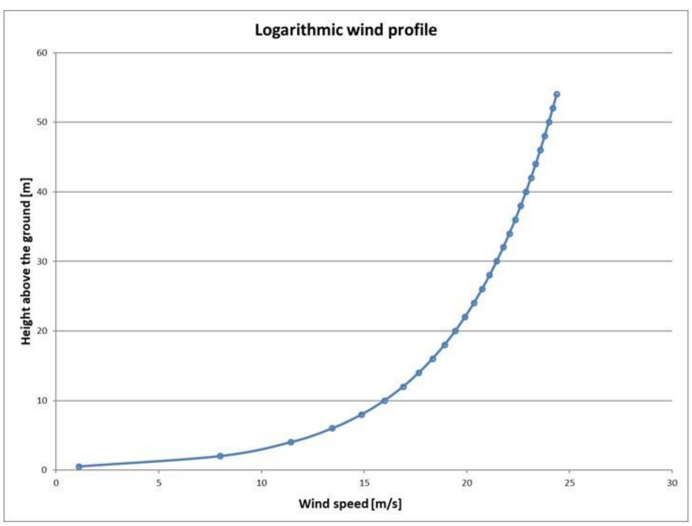


Figure 6.20: Wind profile used in the model

6.2.2.8 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 6.4, while an example of the utilized computational mesh grid is as shown in Figure 6.21 to 6.22.

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 center 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 ρ	$1.2 kg/m^3$
Ambient Temperature (T)	$288K (approx. 15C^{\circ})$
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 6.4: Air and Computational Mesh Parameters

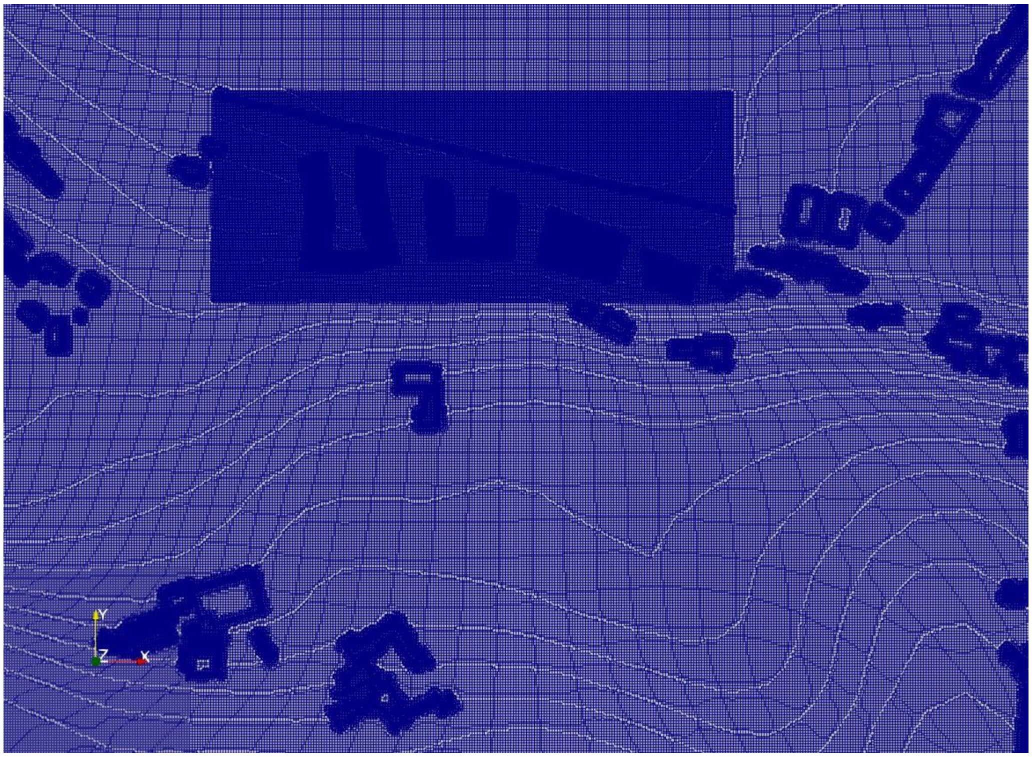


Figure 6.21: Proposed Claremont Development Computational Mesh Utilized: Top View

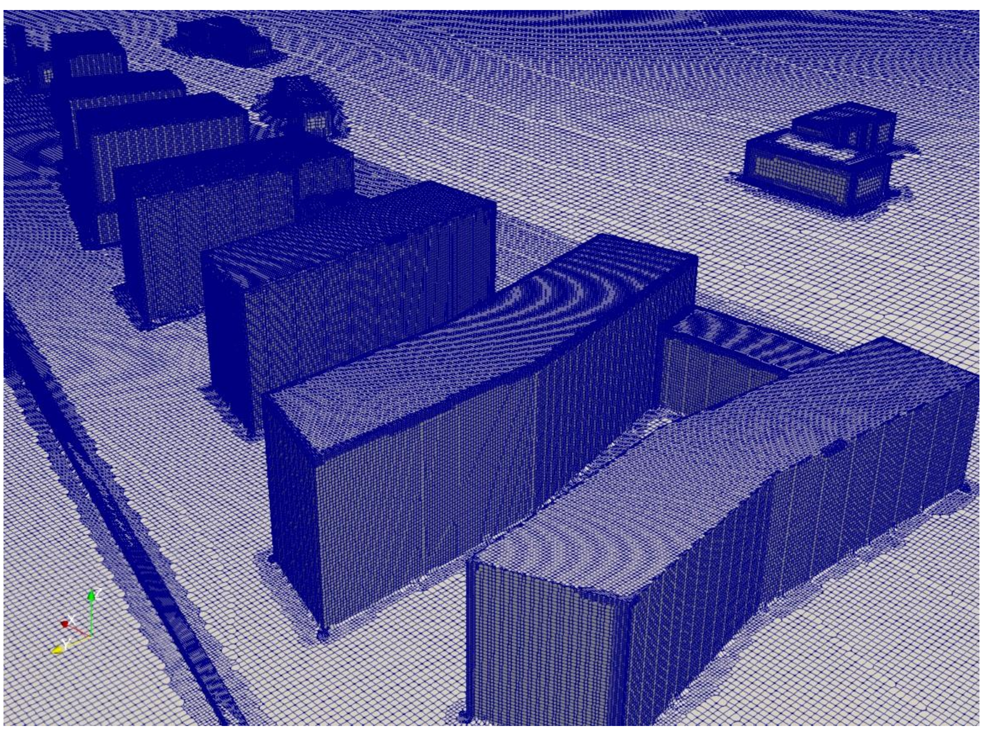


Figure 6.22: Proposed Claremont Development Computational Mesh Utilized: North-West View of the Development

A summary of CFD model input data used in this project is given in the table shown in Figure 6.23. This summarizes the numerical modelling technique and parameters utilized.

Parameter	CLAREMONT MODELS
Environment Conditions	
Ambient pressure	101325 Pa
Wind profile	Logarithmic atmospheric profile (as in Figure X)
Ambient temperature	15°C
Analysis type	Steady state (LES)
Computational Details	
Total cells used	> 20,000,000
Mesh size	< 0.2 m
Turbulence treatment	K-epsilon turbulence model
Convergence Criteria	< 10^{-6}
Boundary Conditions	
CFD Domain Inlet	Wind Velocity inlet
CFD Domain Outlet	Pressure Outlet condition (zero pressure gradient)
Claremont Buildings	Zero velocity gradient (No-slip condition)

Figure 6.23: Summary of CFD Model Input Data

6.2.3 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for

Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

Figures 6.24 and 6.25 shows views of the entire proposed development.

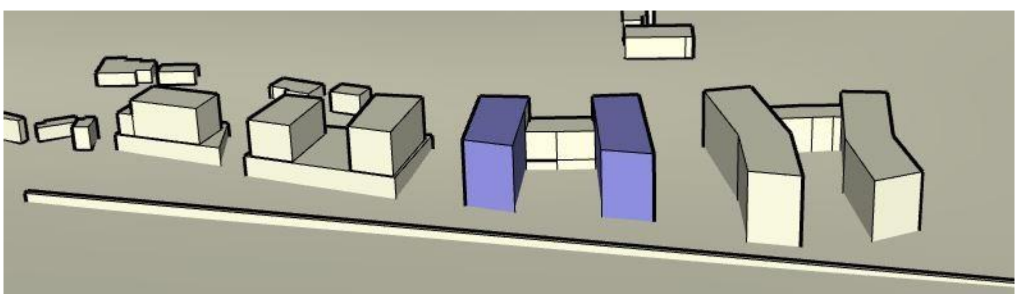


Figure 6.24: Proposed Claremont Development (North View)

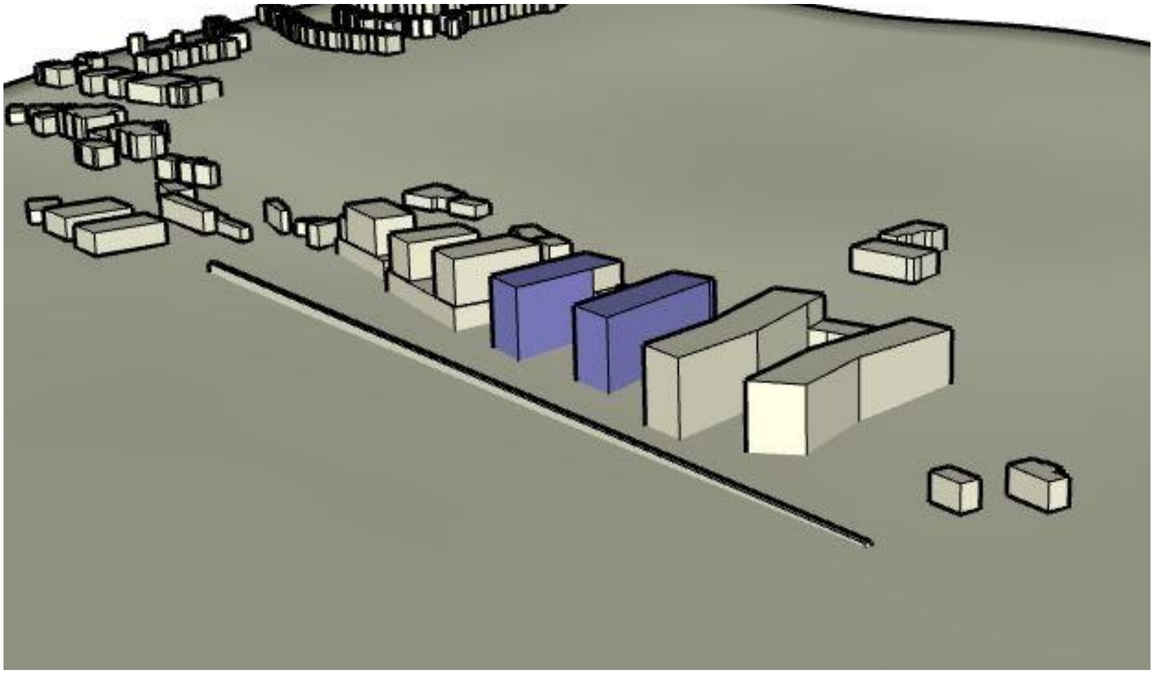


Figure 6.25: Proposed Claremont Development (North-West View)

6.2.3.1 Characteristics of the Proposed Development Relevant to Wind Microclimate

The development consists of four blocks, two of which have a U-shape design. U-shaped buildings might experience recirculation effects. One of the blocks is formed by two close and parallel buildings which might experience funneling effects.

The development is exposed to the sea on the north side and shielded by an hill on the south side.

6.2.4 EXISTING RECEIVING BASELINE ENVIRONMENT ASSESSMENT

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 of 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.

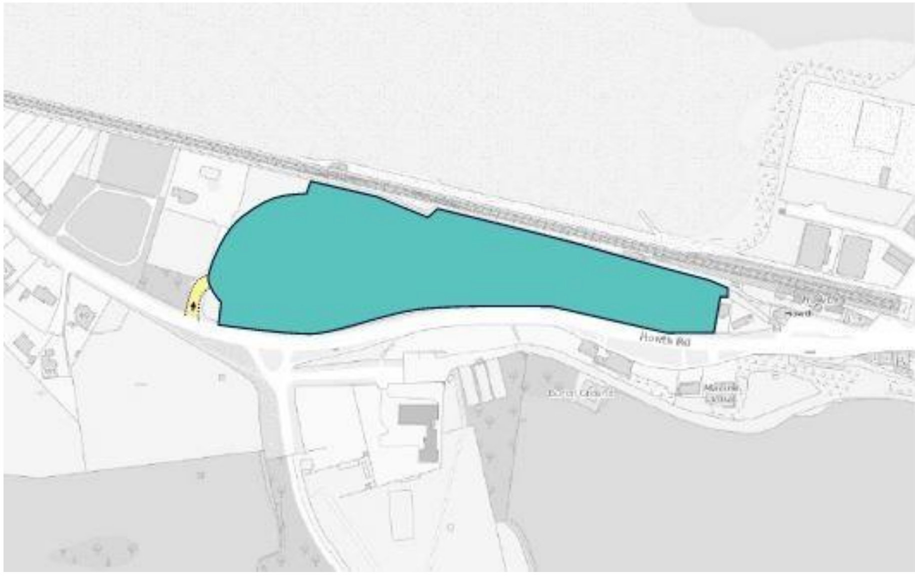


Figure 6.26: Existing Baseline Site Environment

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 10 m above ground level at Dublin Airport.

- 18 different scenarios were selected in order to take into consideration all the different relevant wind directions. In particular, a total of 18 compass directions on the wind rose are selected. For each direction, the reference wind speed is set to the 5% exceedance wind speed for that direction, i.e. the wind speed that is exceeded for over 5% of the time whenever that wind direction occurs.

- The wind profile built using the data from Dublin Airport is also compared with the one obtained using the data collected on-site. Except few differences, both the wind speed daily mean and the wind gust daily mean recorded on site follow the same patterns as the ones recorded at Dublin Airport. Despite the coastal location of the site, the speed levels registered on-site are below those ones registered at Dublin Airport. This is due to the fact that the site is located in the urban environment, thus much more shielded if compared with Dublin Airport. This confirms the fact that using wind data from Dublin Airport ensures a conservative analysis of the wind impact on the development.

- The ground level areas to be mitigated before performing the final CFD analysis have been identified.

6.2.4.1 Site Location And Surrounding Area

The proposed Claremont Development will be situated in Howth, Co. Dublin. The Existing Environment site is shown in Figure 6.26 and Figure 6.27. The area considered for the existing environment and proposed development assessment comprises a $2km^2$ area around the proposed Claremont Development as represented in Figure 6.28.

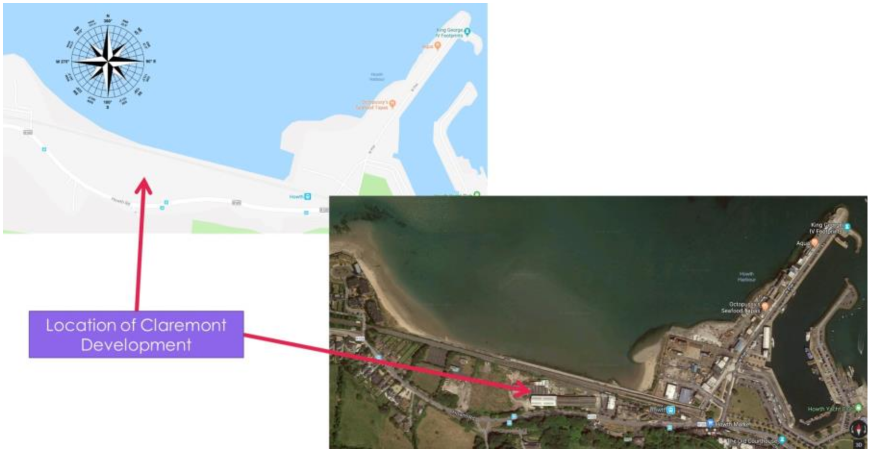


Figure 6.27: Proposed Claremont Development Site Location and Existing Environment

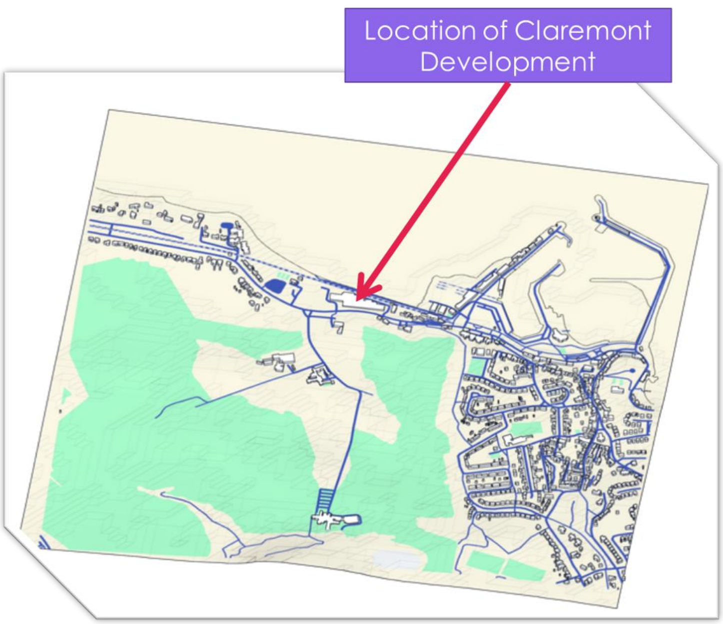


Figure 6.28: Extents of Analysed Existing Environment Around Proposed Claremont Development

6.2.4.2 Topography And Built Environment

Figure 6.29 shows an aerial photograph of the terrain surrounding the site at Proposed Claremont Development.

The property is prominently located between Howth Road (R105) and Claremont Strand. Howth village occupies the majority of the peninsula of Howth Head. The lands which benefit from approximately 325m frontage to Howth Road (to the south), are also bound by Baltray Park to the east, Claremont Strand and the rail line to the north and warehousing and residences to the west. Numerous access points from the site provide direct access to Howth Road. The area surrounding the site can be characterised as coastal environment. The development faces the sea on its north side while the south-west side of it is partially sheltered by the Deer Park Golf Course.

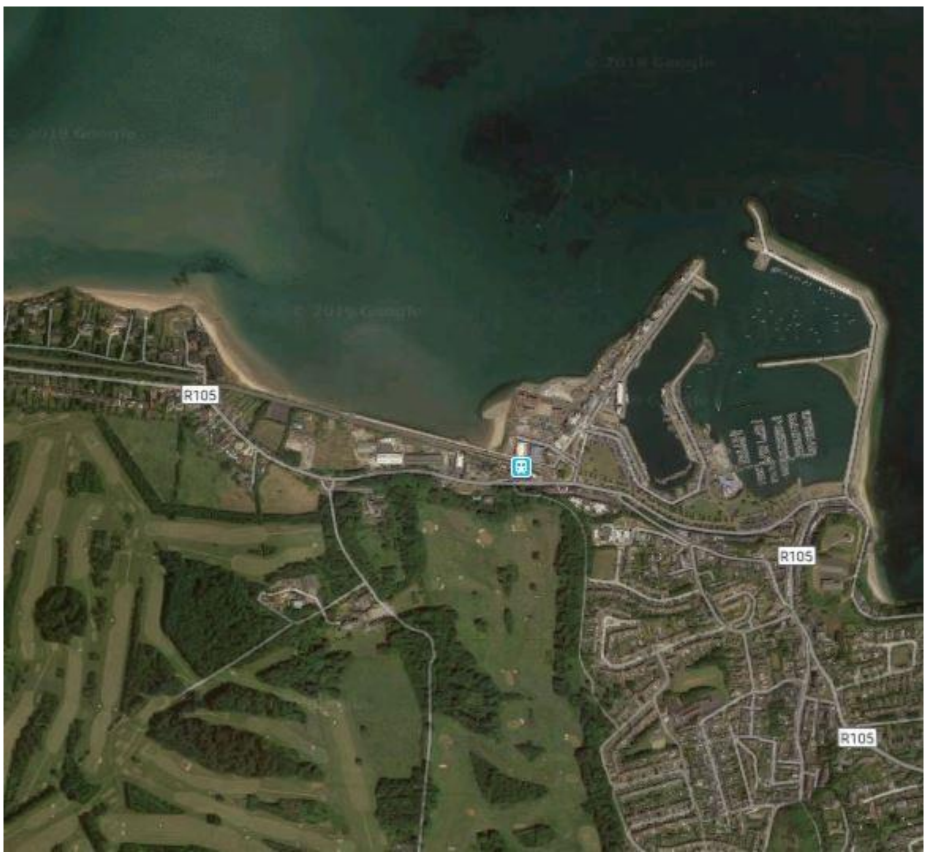


Figure 6.29: Built-in Environment Around Proposed Claremont Development (Source: Google Earth View)

6.2.4.3 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 Dublin Airport Weather Station. Figure 6.30 shows on the map the position of proposed Claremont Development and the position of Dublin Airport.

Figure 6.30: Map showing the position of Proposed Claremont 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 development site is located in urban area with dense built-in structure with buildings of at least 15m height in average.

- **Mean Wind Speeds**: Due to the different terrain environment, the ground-near wind speeds (at pedestrian level) will be lower at the construction site compared to the meteorological station at the airport.

- **Wind Directions**: The landscape around the development site can in principle be characterized as flat terrain. Isolated elevations in the near area of the development should have no influence on the wind speed and wind directions. With respect to the general wind climate no significant influence is expected. Based on the above considerations it can be concluded that the data from the meteorological station at Dublin Airport are applicable for the desktop assessment of the wind comfort at the development site.

6.2.4.4 Wind Conditions

The assessment of the wind comfort conditions at the new 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 analyzed for this assessment as follows:

- The meteorological data associated with the maximum daily wind speeds recorded over a 30 year period between 1985 and 2019 and,
- The mean hourly wind speeds recorded over a 10 year period between 2005 and 2019. The data is recorded at a weather station at the airport, which is located 10m above ground or 71mOD.

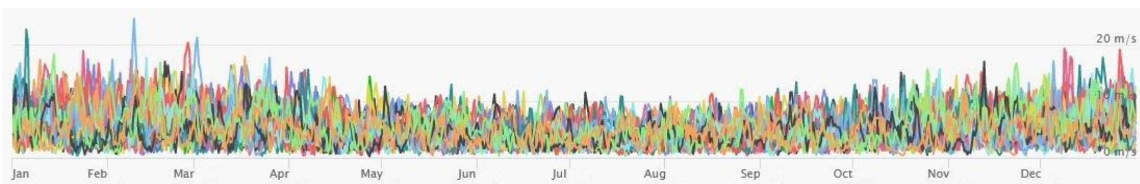


Figure 6.31: Local Wind Conditions - Wind Speed (10m) 1985-2019 (Source: Dublin Airport Weather Station)

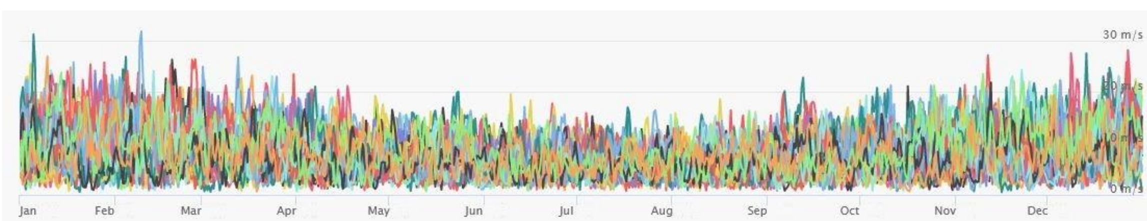


Figure 6.32: Local Wind Conditions - Wind Gust (10m) 1985-2019 (Source: Dublin Airport Weather Station)

Figure 6.33, presenting the wind speed diagram for Dublin, shows the days per month, during which the wind reaches a certain speed. In Figure 6.34, the wind rose for Dublin shows how many hours per year the wind blows from the indicated direction, confirming how the predominant directions are WSW, W, and SW.

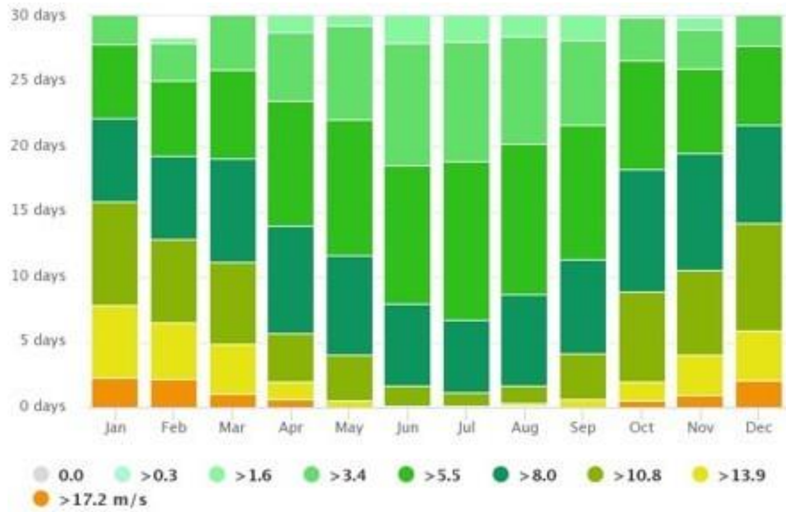


Figure 6.33: Dublin Wind Speed Diagram (Source: Dublin Airport Weather Station)

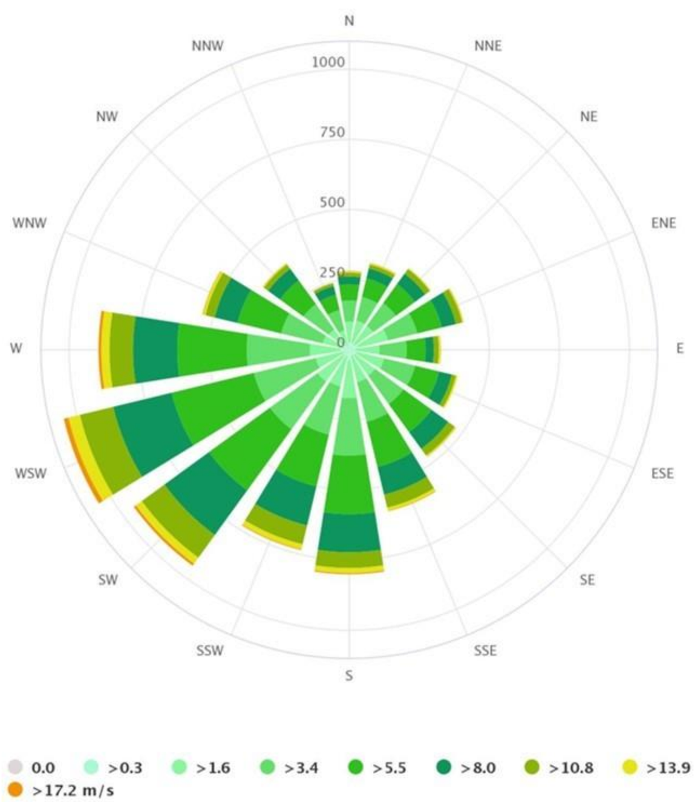


Figure 6.34: Dublin Wind Rose (Source: Dublin Airport Weather Station)

Based on the criterion of occurrence frequency the main wind directions to be considered in pedestrian wind comfort assessment are presented in Figure 6.35 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 6.35: Main Wind Directions Occurrence Frequency (Source: Dublin Airport Weather Station)

6.2.4.5 Mean And Maximum Wind Conditions

Examination of the daily wind data reveals that the wind predominantly blows from West and Southwest directions, however, there is a secondary wind from the Southeast. It is apparent that winds from other directions are rare. Maximum daily wind speeds of nearly 30 m/s were recorded in the past 30 years, however, the maximum daily winds are commonly found between 6 m/s and 15 m/s. The strongest winds arise from the West and Southwest.

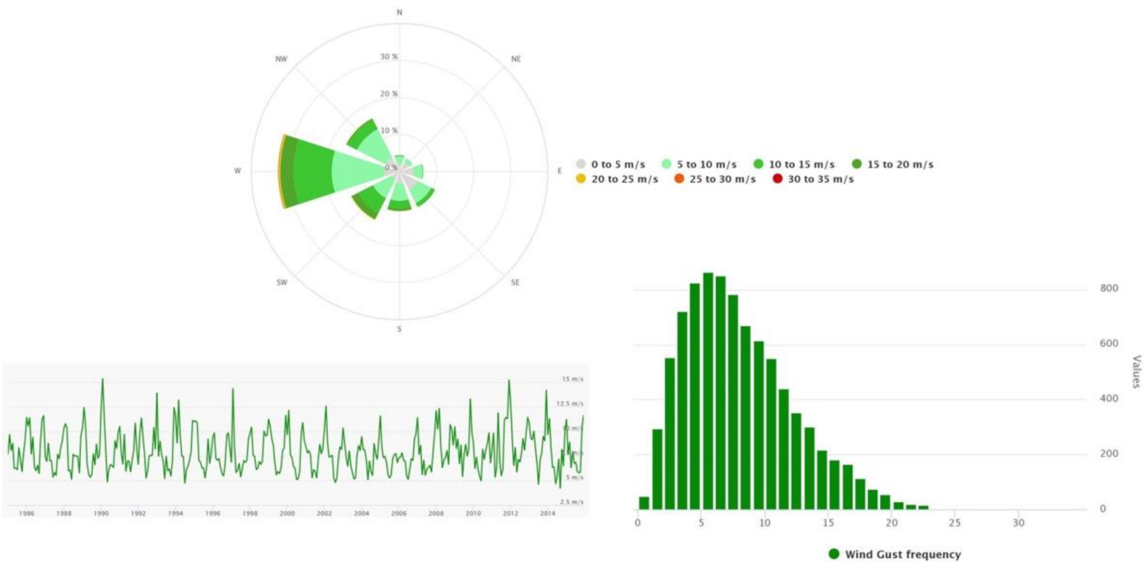


Figure 6.36: Maximum Wind Conditions (Source: Dublin Airport Weather Station)

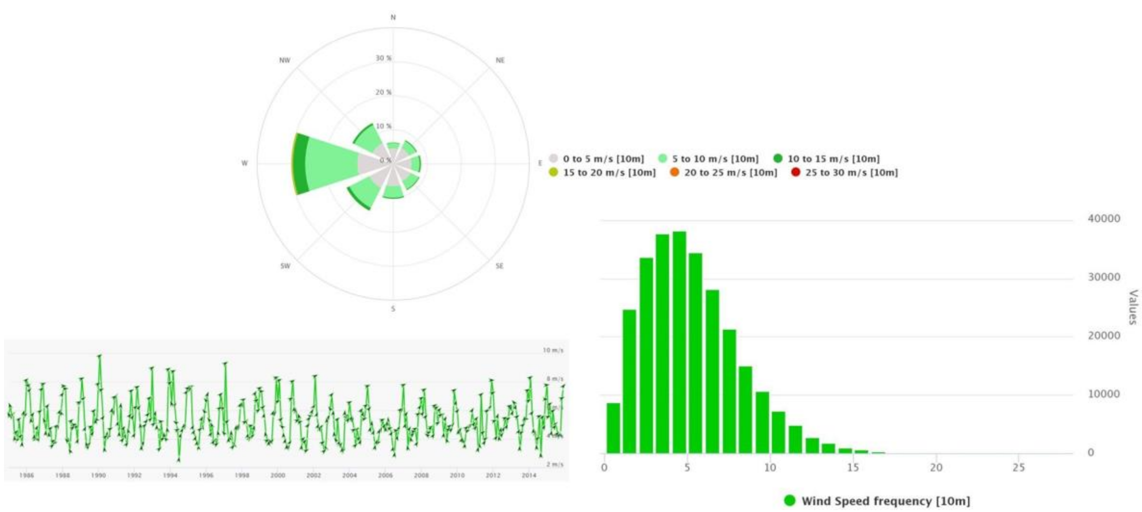


Figure 6.37: Mean Wind Conditions (Source: Dublin Airport Weather Station)

6.2.4.6 Comparison with the on-site weather station

The wind profile built using the data from Dublin Airport, is also compared with the one obtained using the data collected on-site in the period 14th Dec 2018 – 10 Jan 2019 (28 days). Figure 6.38 shows B-Fluid weather station and its characteristics.

- *Model*: Ventus W830
- *Location*: Howth
- *Latitude*: N 53 ° 19 ' 19 ''
- *Longitude*: W 6 ° 16 ' 2 ''
- *Elevation*: 26m
- *Software*: EasyWeatherV1.2.2

Figure 6.38: B-Fluid On-site Weather Station

Figures 6.39 and 6.40 respectively show wind speed and gust and wind direction recorded by the on-site weather station during the 28 days.

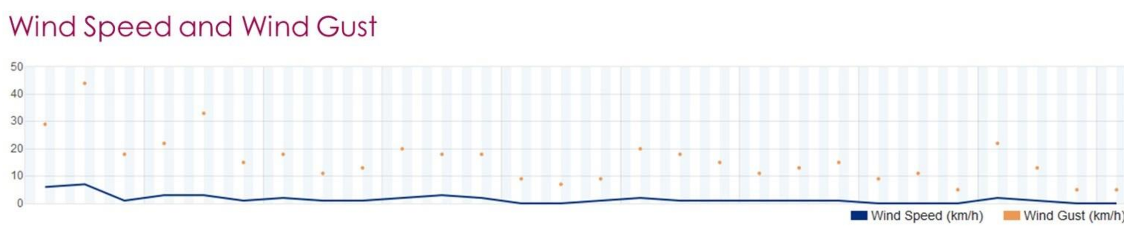


Figure 6.39: Wind speed and Wind Gust recorded by B-Fluid On-site Weather Station

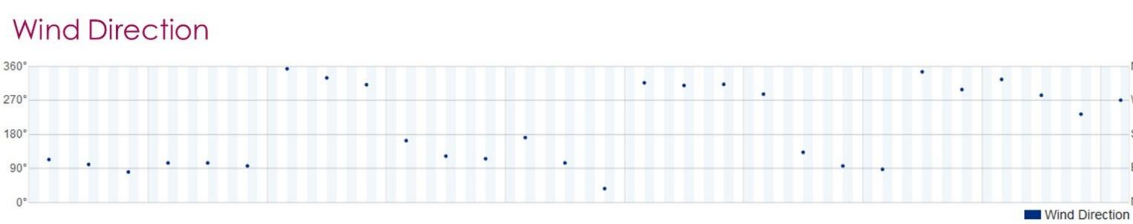


Figure 6.40: Wind direction recorded by B-Fluid On-site Weather Station

As it is possible to assess from the comparison between on-site and airport measurements, presented in Figure 6.41 and 6.42, the wind speed daily mean and the wind gust daily mean recorded on site follow the same pattern as the one recorded at Dublin Airport. However, the wind speed levels and the gust wind speed levels registered on-site are considerably lower. This is due to the fact that the site is located in the urban environment thus much more shielded if compared with Dublin Airport. This confirms that using wind data from Dublin Airport ensures a conservative analysis of the wind impact on Claremont Project despite its coastal location.

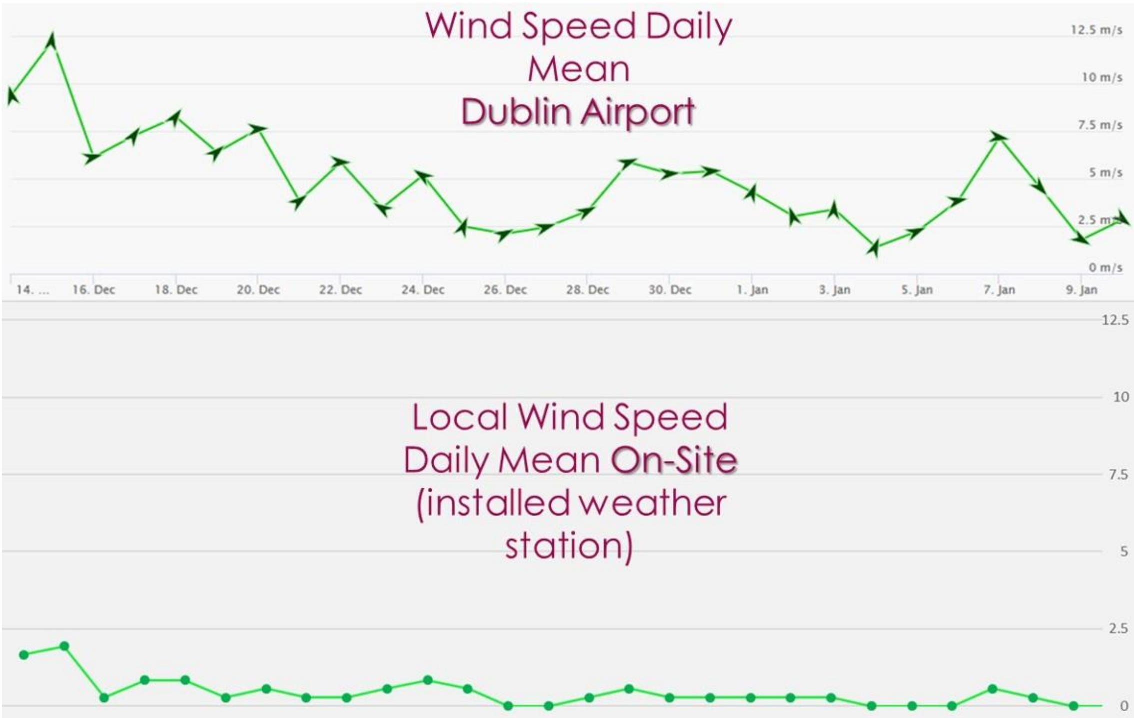


Figure 6.41: Wind Speed Daily Mean Comparison

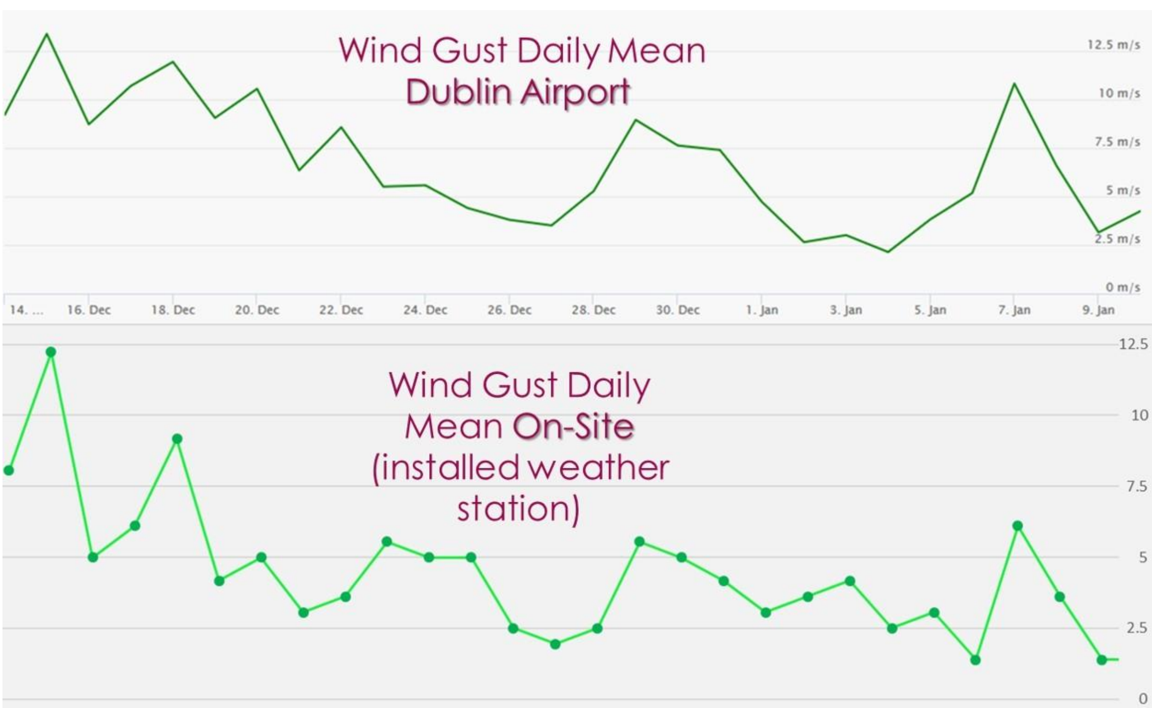


Figure 6.42: Wind Gust Daily Mean Comparison

6.2.5 IMPACTS OF PROPOSED DEVELOPMENT

This section assessed the potential impacts 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.

6.2.5.1 Preliminary Impact of Proposed Development

A preliminary wind desktop study was performed on the proposed development and the final geometry was used for this purpose. Figure 6.43 shows the orientation of the proposed development.

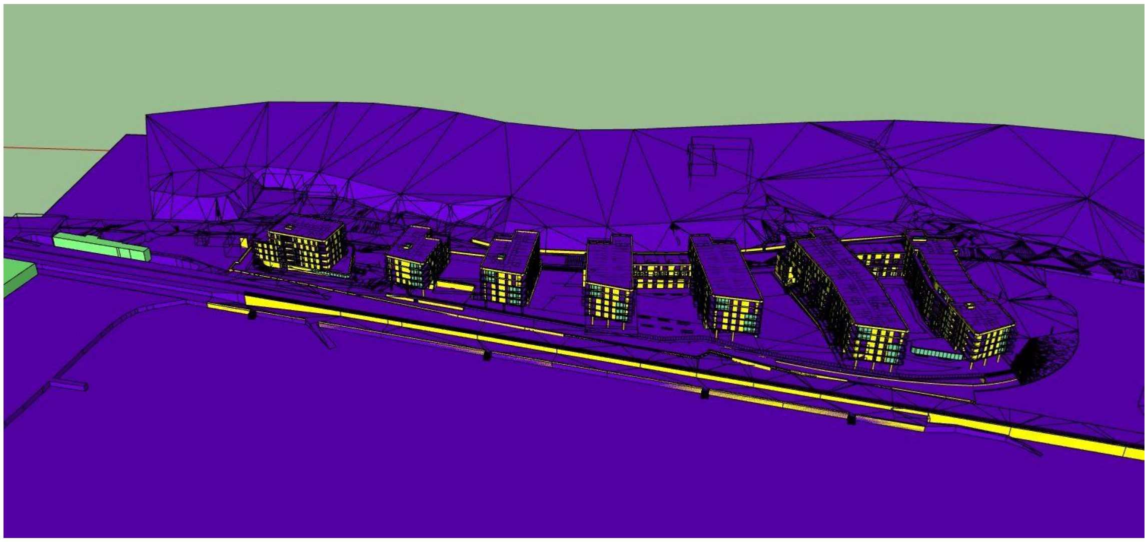


Figure 6.43: Orientation of Claremont Project Development

Wind From South-West

The preliminary results for the different flow features are presented in the next Figures and discussed in the following text. It should be kept in mind that the presented flow pattern is only indicative as it is based on the available preliminary geometry and does not include landscaping.

Figure 6.44 shows the South-West view of the development. As it is possible to see from the results presented in Figures 6.45 and 6.47, with the considered wind direction and velocity, the wind velocities are low, except for some high velocities at the corner of the west building, which results in some accelerated flow that impacts the block on its right. Some slightly higher velocities are found on the south side of the blocks. All these effects can be mitigated using tree planting landscaping on the main roads around the block, with particular attention at the corners.

Under the wind conditions and direction modelled, all the courtyards are well protected.

In this case, wind effects on pedestrian comfort on the ground and on the terraces will be slight, however, some high velocities can be reached at the top corners of these so the use of trellis, pergola structures and planters are suggested to mitigate these effects.

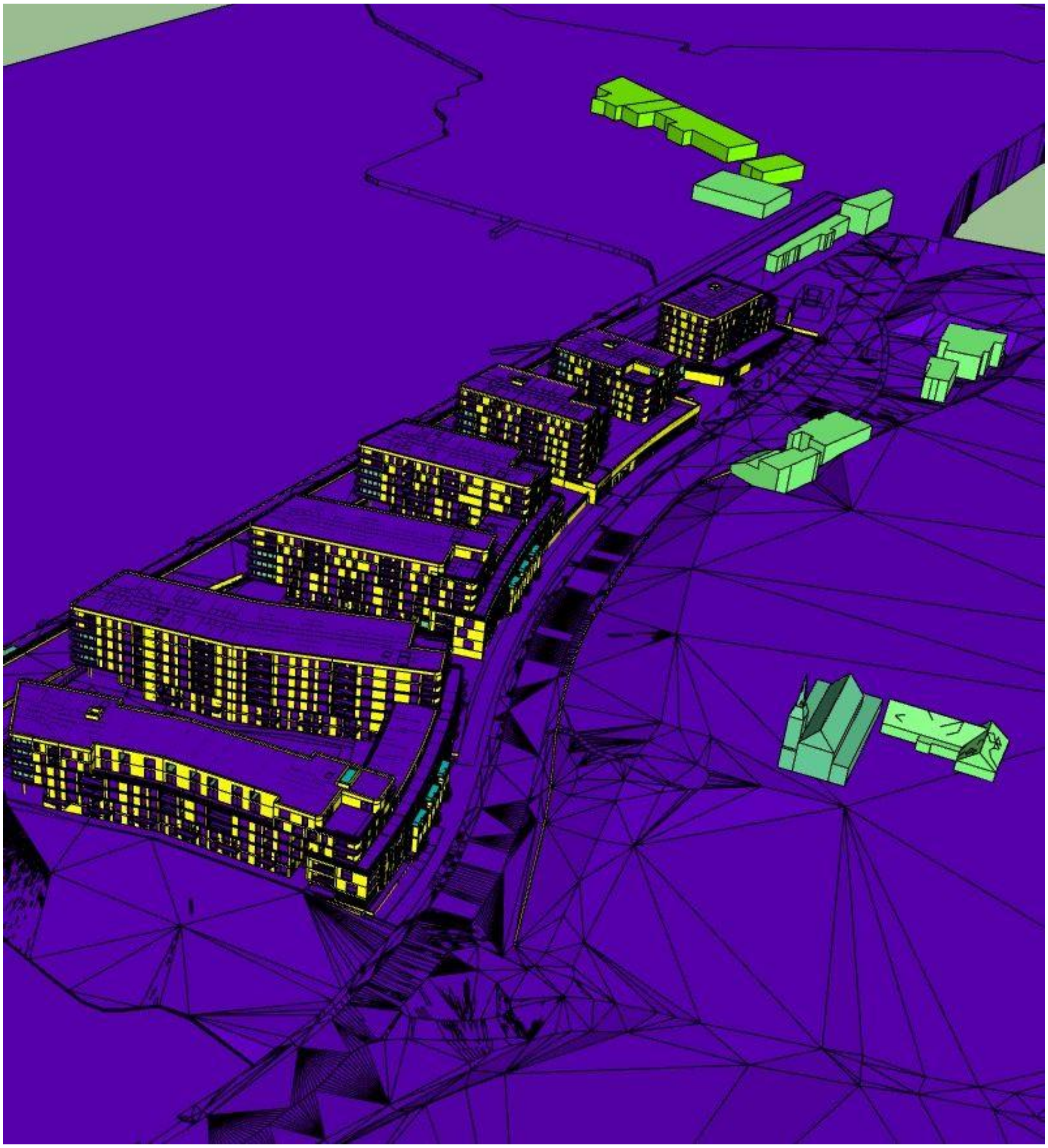


Figure 6.44: South-West View - Claremont Project Development

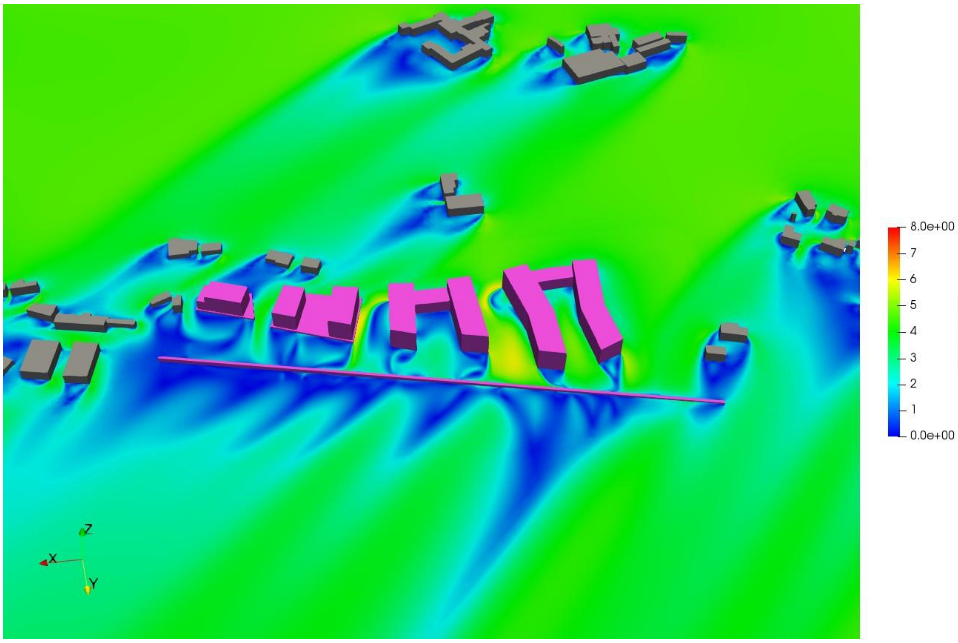


Figure 6.45: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from South-West - Slice at 1.5m

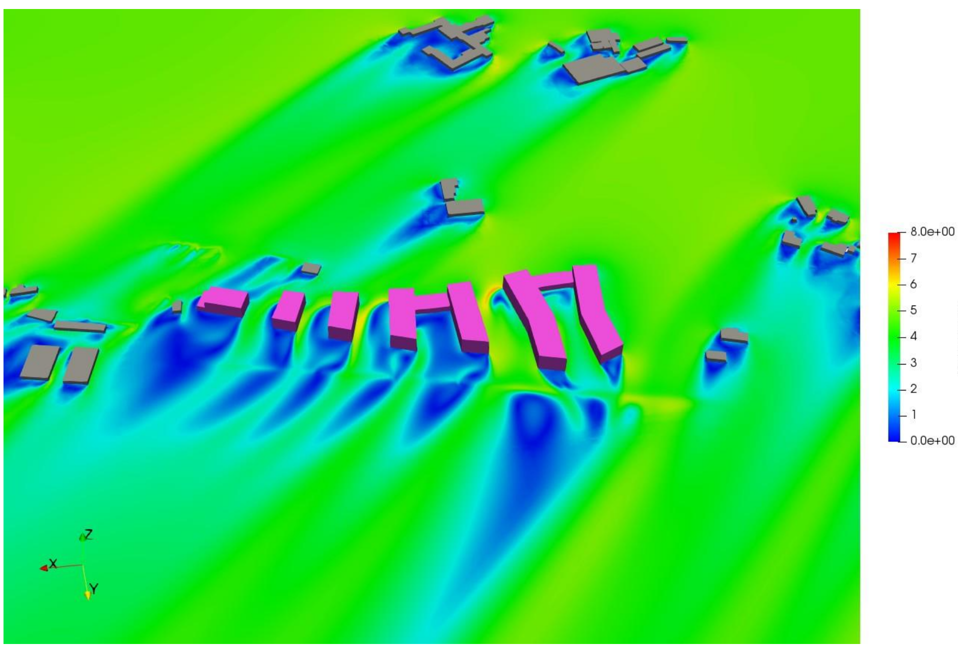


Figure 6.46: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from South-West - Slice at 7m

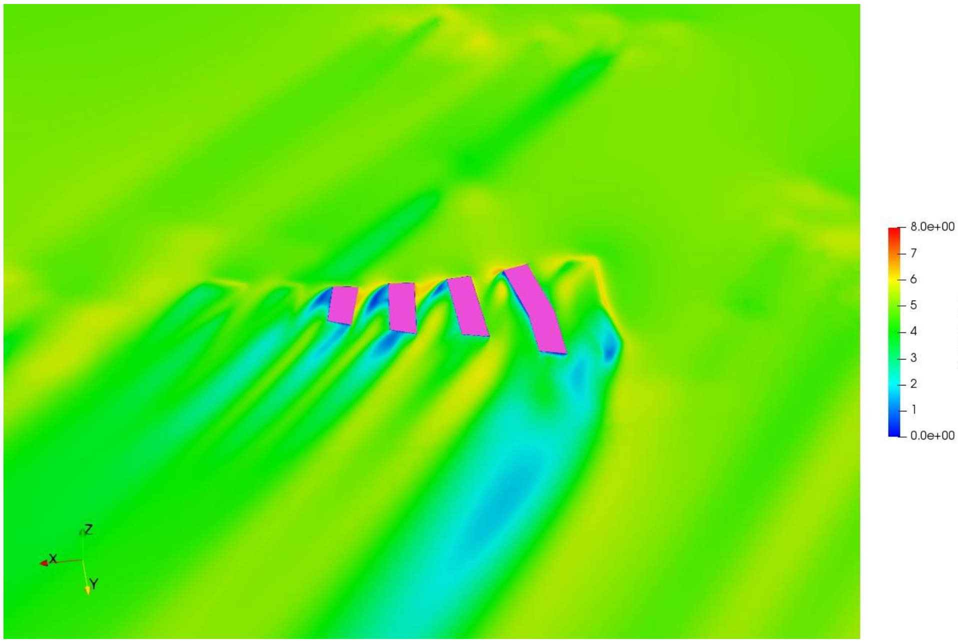


Figure 6.47: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from South-West - Slice at 21m

Wind From South-East

Figure 6.48 shows the South-East view of the development. As it is possible to see from the results presented in Figures 6.49 and 6.51, the wind will flow through the buildings on the east side of the development without having a significant impact. High velocities are expected on the south corners of the west buildings and on the adjacent main roads. This can be mitigated using tree landscaping around the buildings.

Under the wind conditions and direction modelled, all the courtyards are well protected.

In this case, wind effects on pedestrian comfort on the ground and on the terraces will be slight, however, the use of trellis, pergola structures and planters are suggested in this case, to allow the use of the space for sitting purposes.

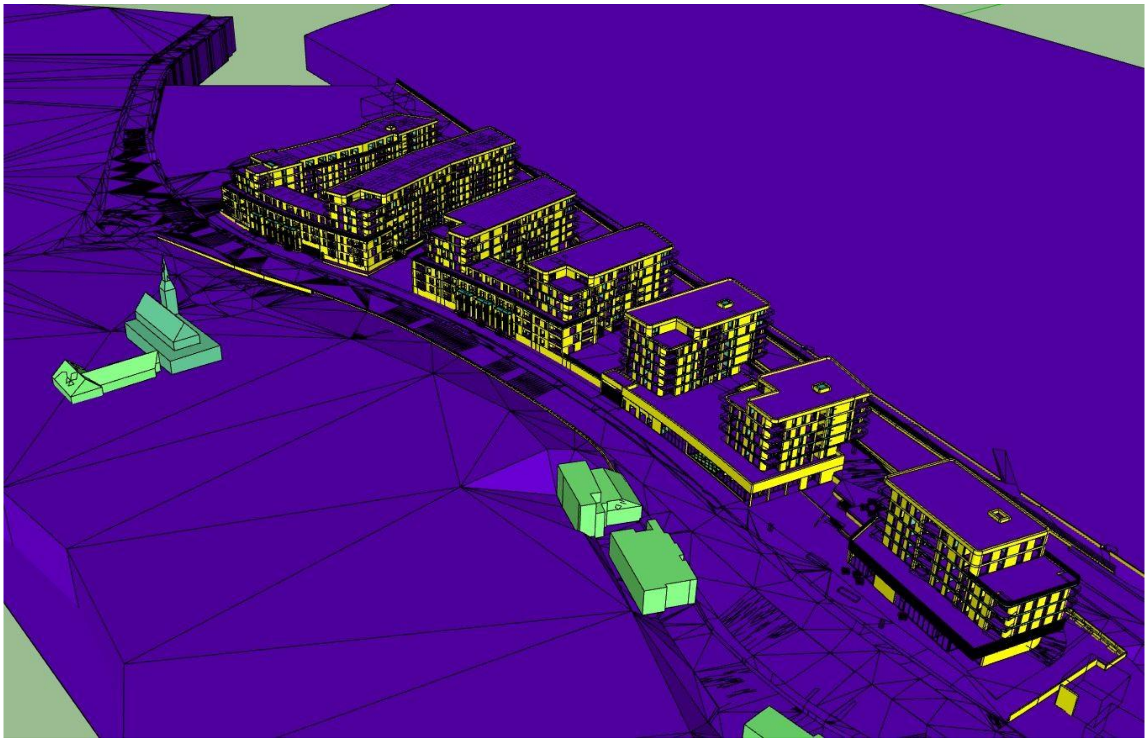


Figure 6.48: South-East View - Claremont Project Development

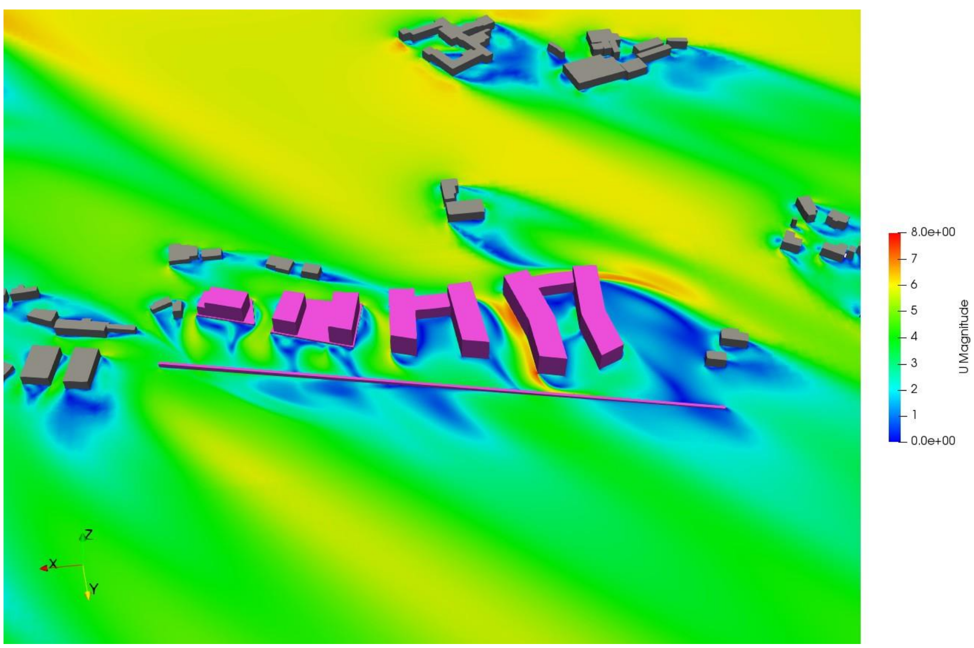


Figure 6.49: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from South-East - Slice at 1.5m

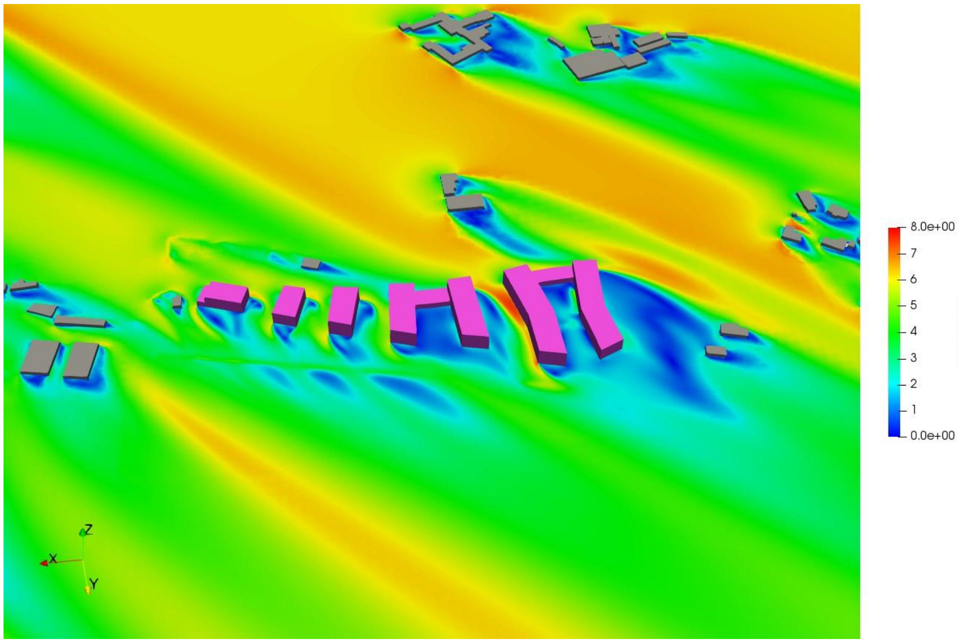


Figure 6.50: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from South-East - Slice at 7m

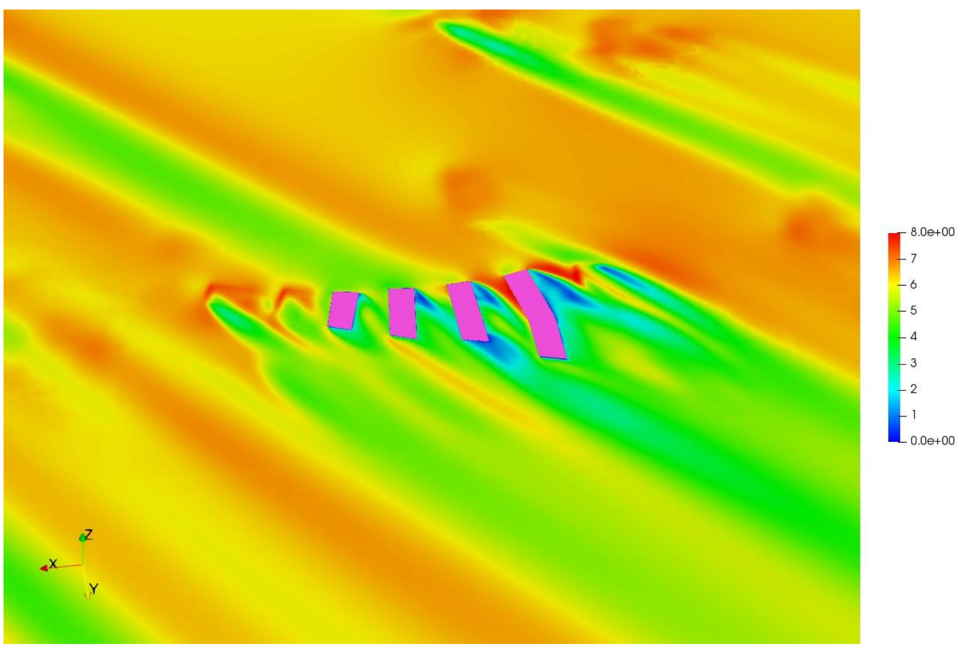


Figure 6.51: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from South-East - Slice at 21m

Wind From West-South-West

Figure 6.52 shows the South-East view of the development. As it is possible to see from the results presented in Figures 6.53 and 6.55, high velocities are expected on the south road. This creates some funneling effects on the major roads around the development. This can be mitigated using tree landscaping around the blocks and corners.

Under the wind conditions and direction modelled, all the courtyards are well protected, except for the east block one, which is affected from the high velocities generated on the south main road. Tree planting is suggested for this courtyard, in order to mitigate the effect of the wind.

In this case, wind effects on pedestrian comfort on the ground and on the terraces will be slight, however, some high velocities are found around the corners so the use of trellis, pergola structures and planters are suggested.

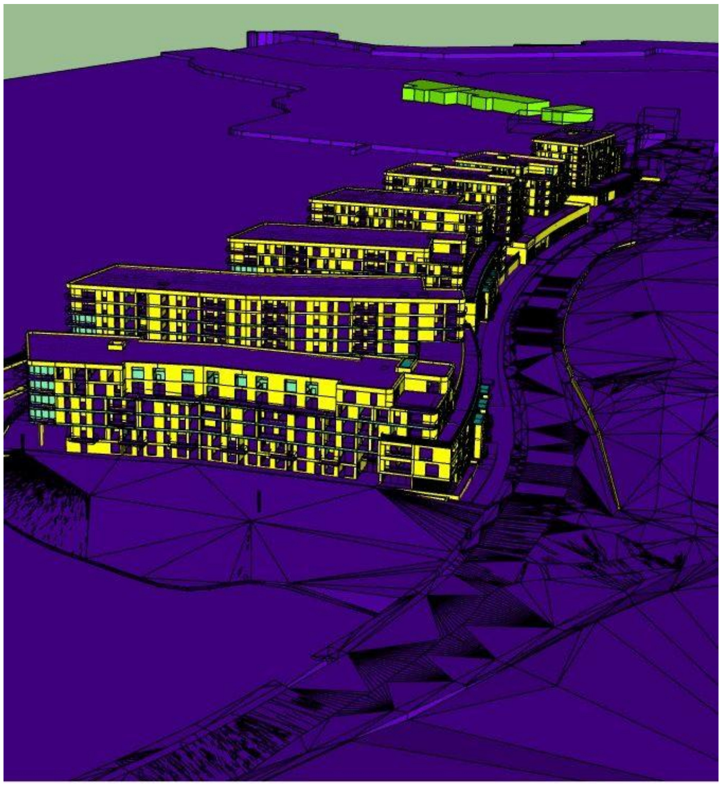


Figure 6.52: West-South-West View - Claremont Project Development

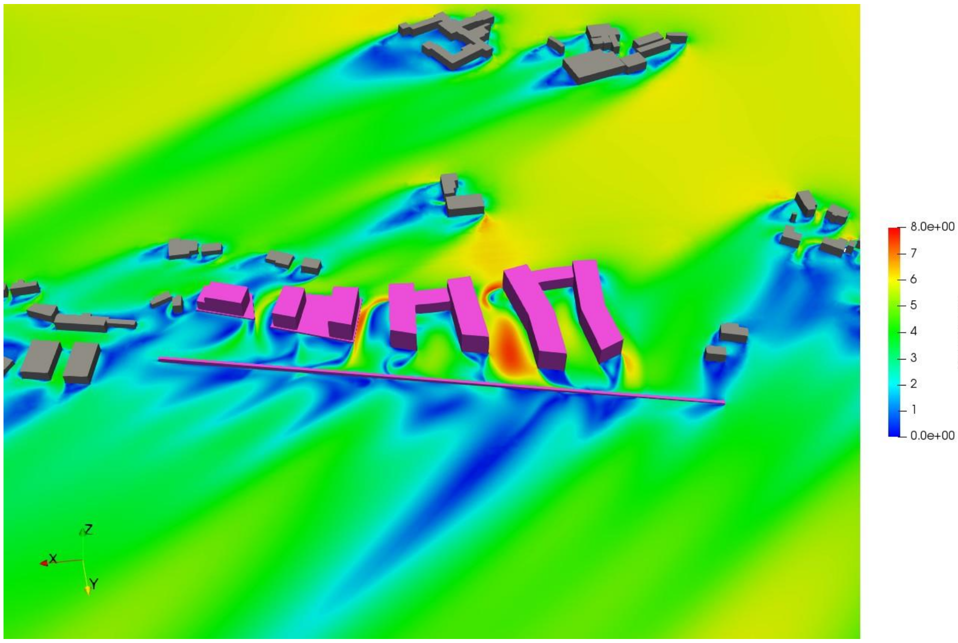


Figure 6.53: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from West-South-West - Slice at 1.5m

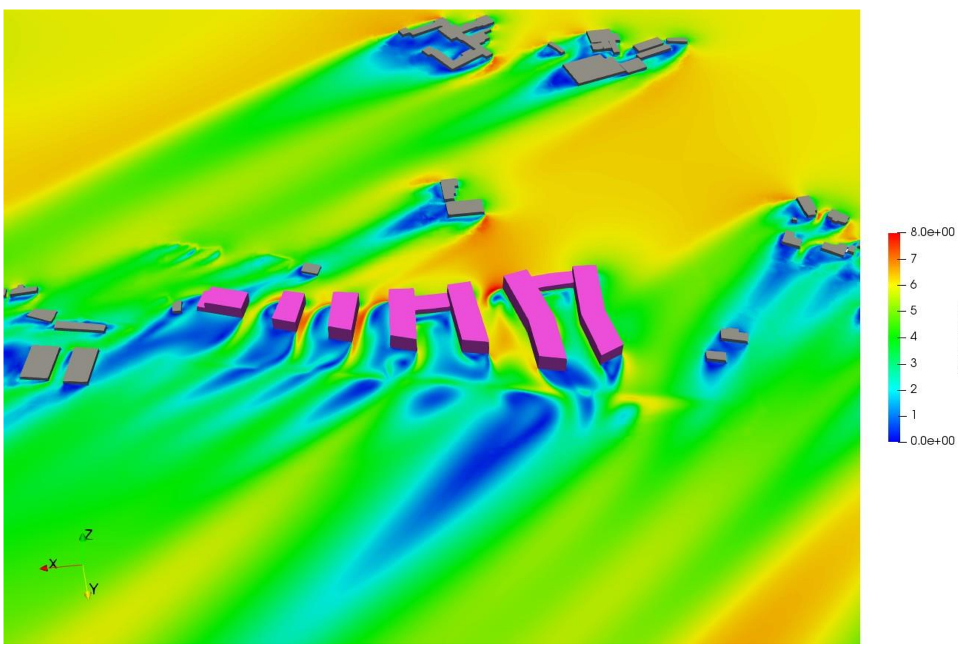


Figure 6.54: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from West-South-West - Slice at 7m

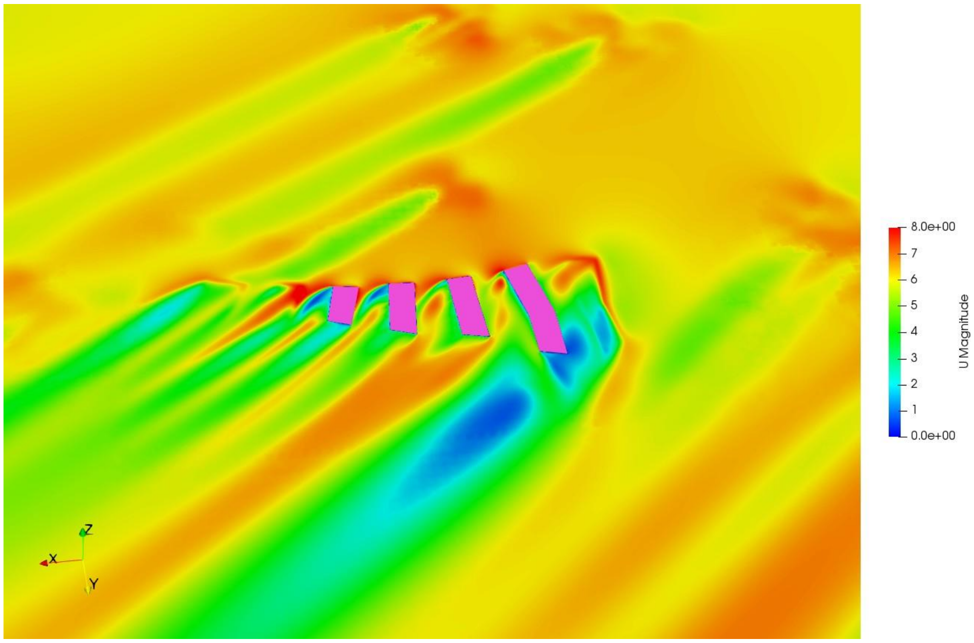


Figure 6.55: Preliminary Results - Flow around the Buildings at Claremont Project Development for Wind from West-South-West - Slice at 21m

6.2.5.2 Construction Phase

The possible effects on wind microclimate at the site during the construction phase of the proposed Claremont Development have 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 the South-West.

As the finalization of the development proceeds, the wind setting at the site would progres- sively conform to those of the completed development. It is possible that in the final stages of construction, implementation of the mitigation measures would be needed in areas that are expected to be windier than others in case some areas of the site are expected to be functional before the construction is finalized.

Due to the fact that windier conditions are acceptable within a construction area (not accessible to the public), and the proposed development would not be the reason for critical wind conditions on-Site (and are slightly calmer when the 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 imperceptible.

In summary, as construction of the proposed Claremont Development progresses, the wind conditions at the site would gradually adjust to those of the completed development. During the construction phase, predicted impacts are classified as imperceptible.

6.2.5.3 Operational Phase

This section shows CFD results of wind microclimate assessment carried out considering the ”Operational Phase” of the proposed Claremont Development. In this case the assessment has considered the impact of wind on the existing area including the proposed Claremont Development. For this scenario, the proposed Claremont Development has been simulated. Wind simulations have been carried out on all the various directions for which the development could show critical areas in terms of pedestrian comfort and safety. For this, the Lawson and Distress Maps have been presented to identify the suitability of each areas to its prescribed level of usage and activity. The results present parameters outlined within the acceptance criteria previously described in section 6.2.3 (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 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 proposed Claremont development. Results of wind flow speeds are collected throughout the simulation and analysed based on the Lawson Discomfort Criteria.

Figure 6.56 shows an example of wind speed results collected at 1.5m height above ground floor level of the development. Red colors generally indicate high velocities while blue colors indicate low velocities.

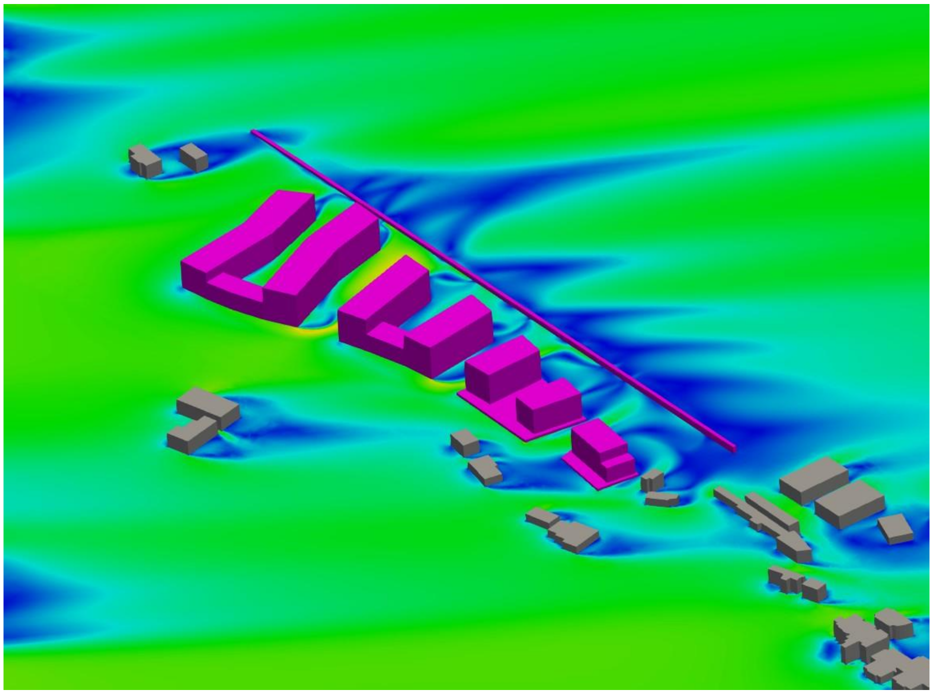


Figure 6.56: Wind Flow Results Collected At 1.5m Height Above Ground Floor

Wind microclimate model assessment of the proposed Claremont Development and its environment was performed utilizing a CFD (Computational Fluid Dynamics) methodology. 9 worst case wind scenarios are selected for presentation in this report, as these scenarios and directions showed to be the most relevant wind speeds.

Flow Velocity Results - Ground Floor Level

Results of wind speeds and their circulations at pedestrian level of 1.5m above the development ground are presented for each wind direction in Figures 6.57 to 6.64 in order to assess wind flows at ground floor level of the proposed Claremont Development. The color in the images identifies the magnitude of the wind as per the values shown in the colorbar. Under the direction and velocities assessed, wind flow speeds are shown to not impact on pedestrian safety.

Therefore, it can be concluded that, considering the velocities and directions analysed and accounting the mitigation measures suggested, wind effects on pedestrian comfort will be slight.

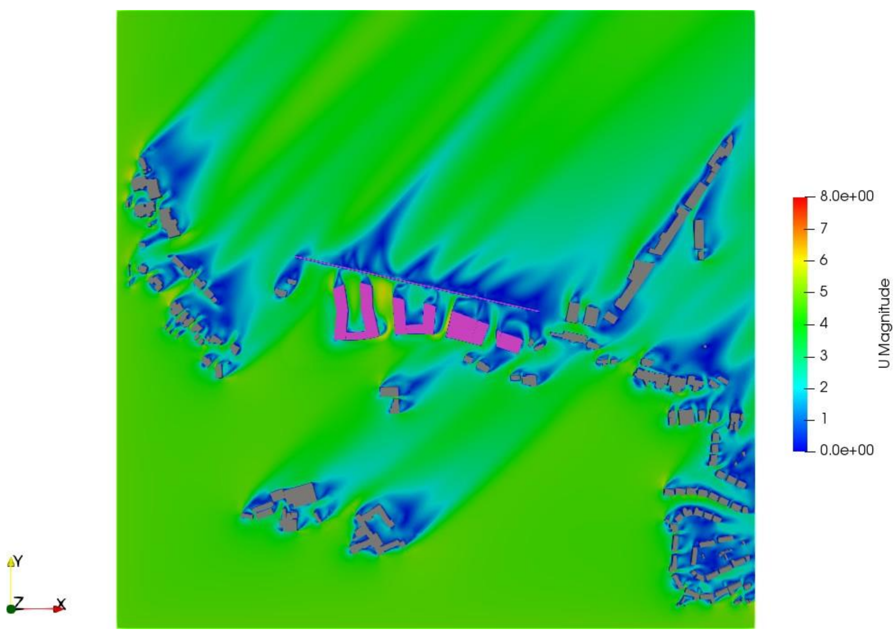


Figure 6.57: Wind Speed Results at 1.5m Above Ground - Top View: 225°

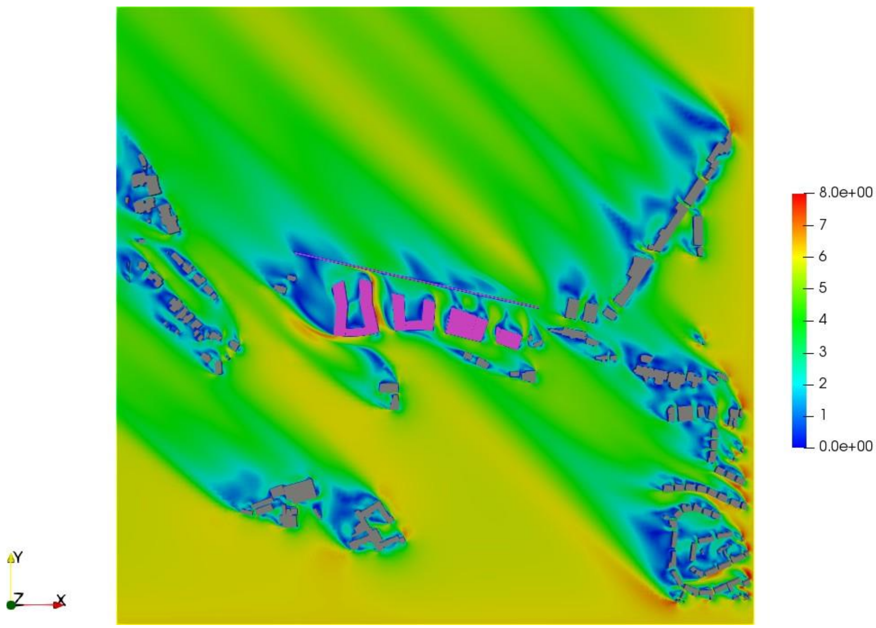


Figure 6.58: Wind Speed Results at 1.5m Above Ground - Top View: 135°

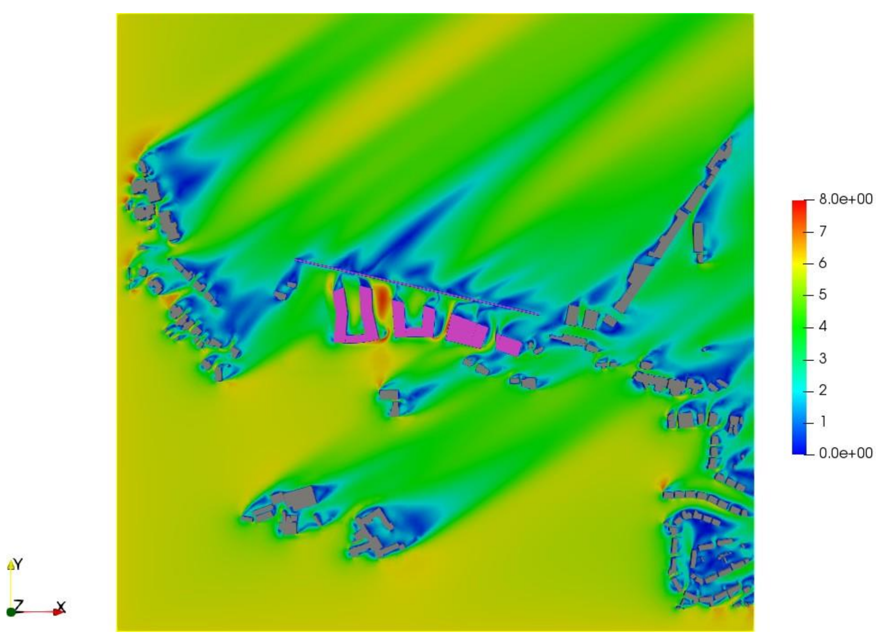


Figure 6.59: Wind Speed Results at 1.5m Above Ground - Top View: 236°

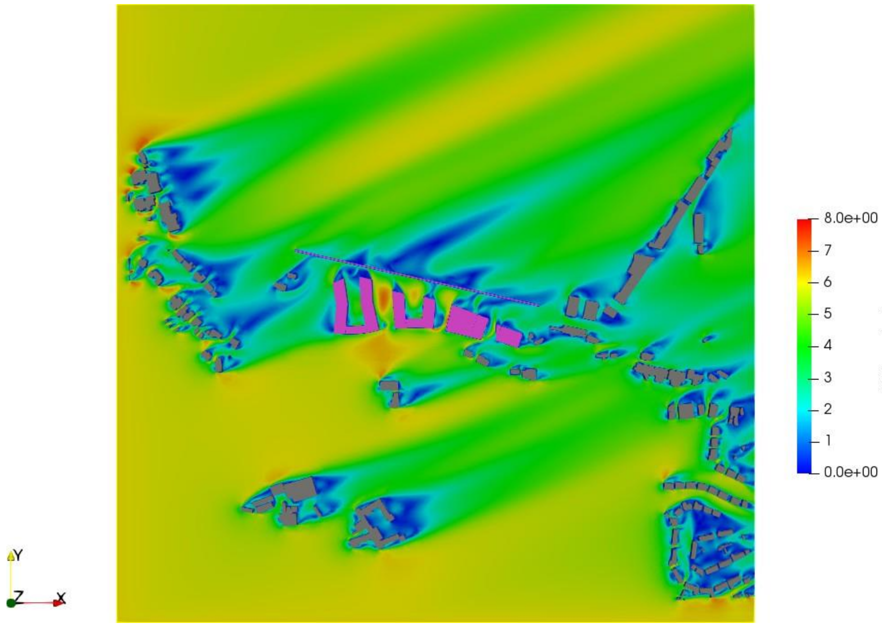


Figure 6.60: Wind Speed Results at 1.5m Above Ground - Top View: 247.5°

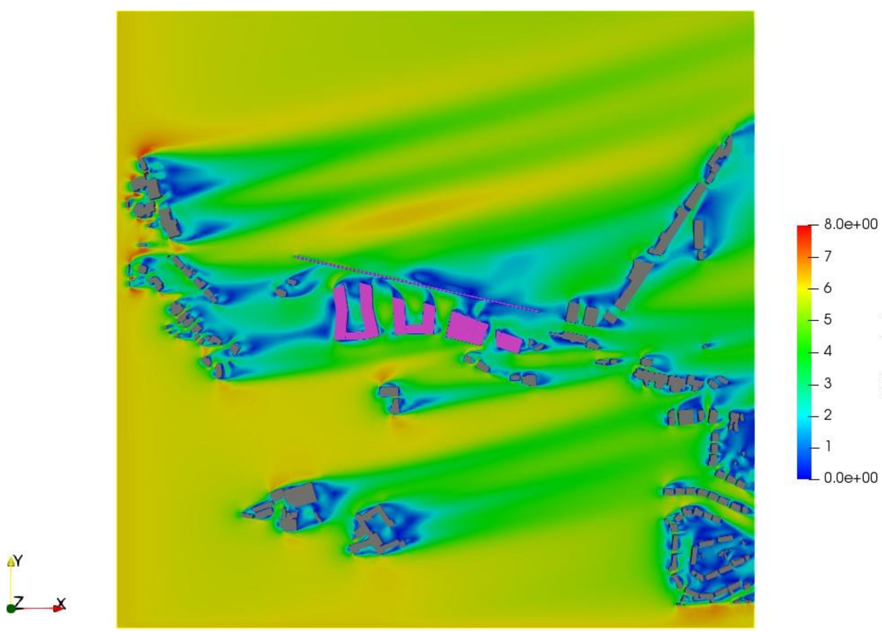


Figure 6.61: Wind Speed Results at 1.5m Above Ground - Top View: 258.75°

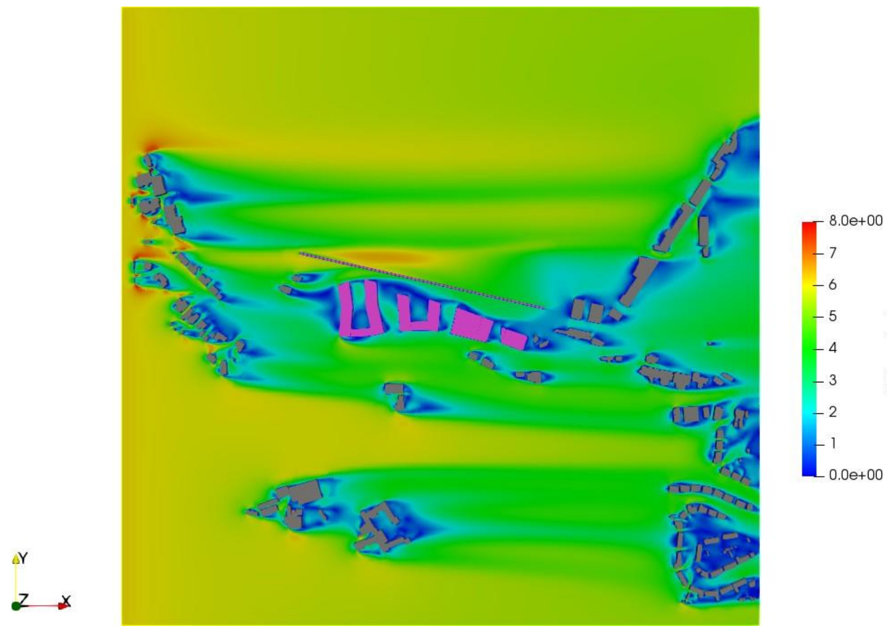


Figure 6.62: Wind Speed Results at 1.5m Above Ground - Top View: 270°

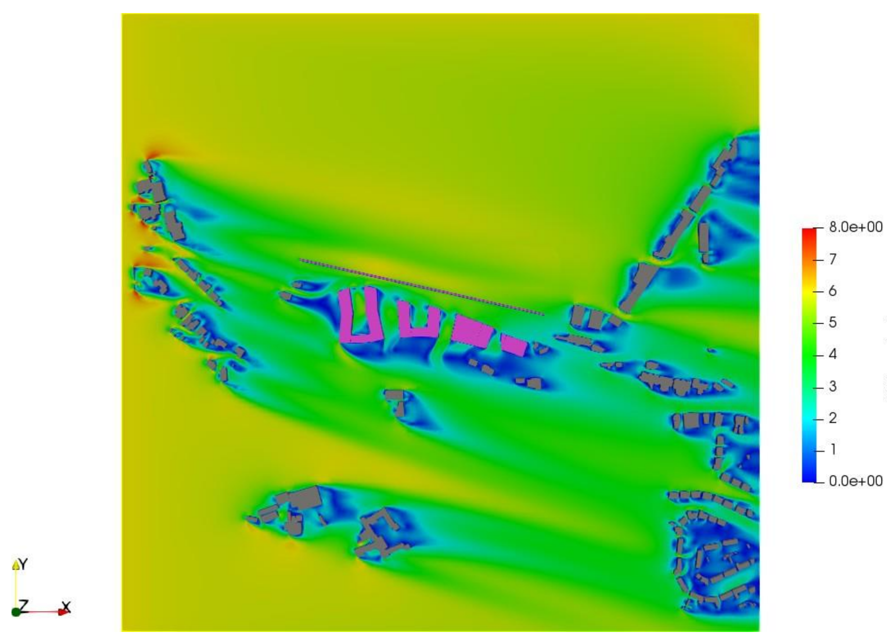


Figure 6.63: Wind Speed Results at 1.5m Above Ground - Top View: 281.25°

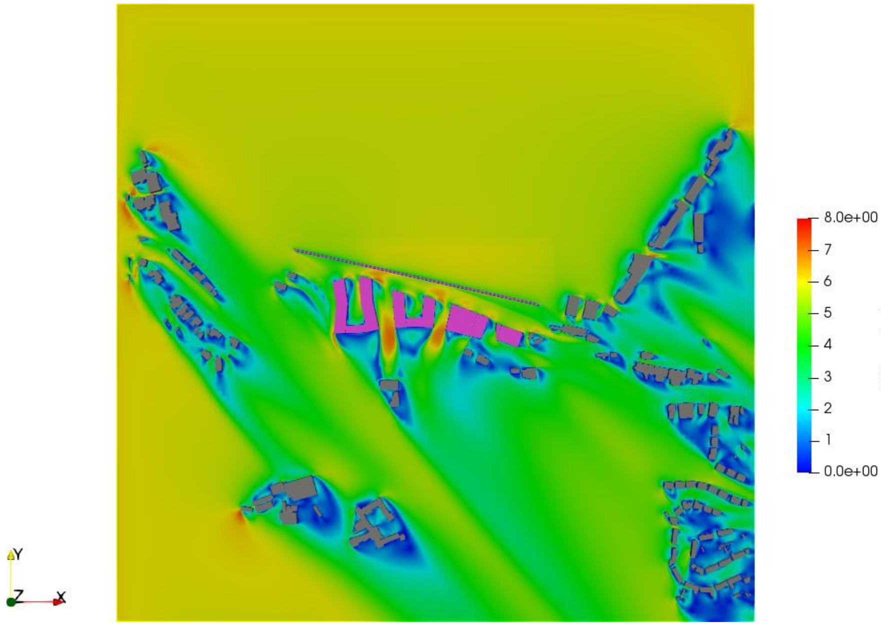


Figure 6.64: Wind Speed Results at 1.5m Above Ground - Top View: 315°

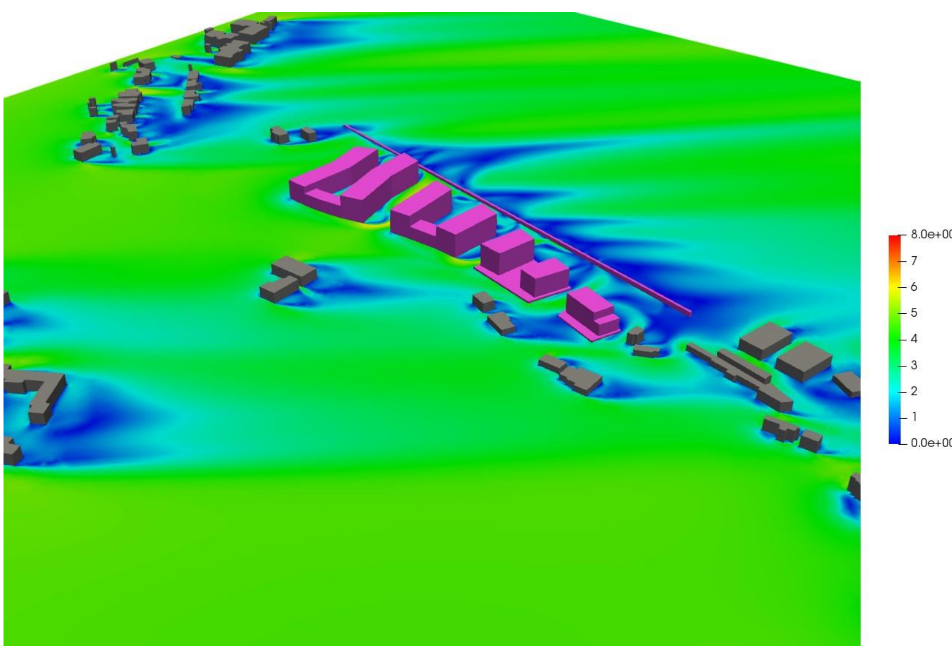


Figure 6.65: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 225°

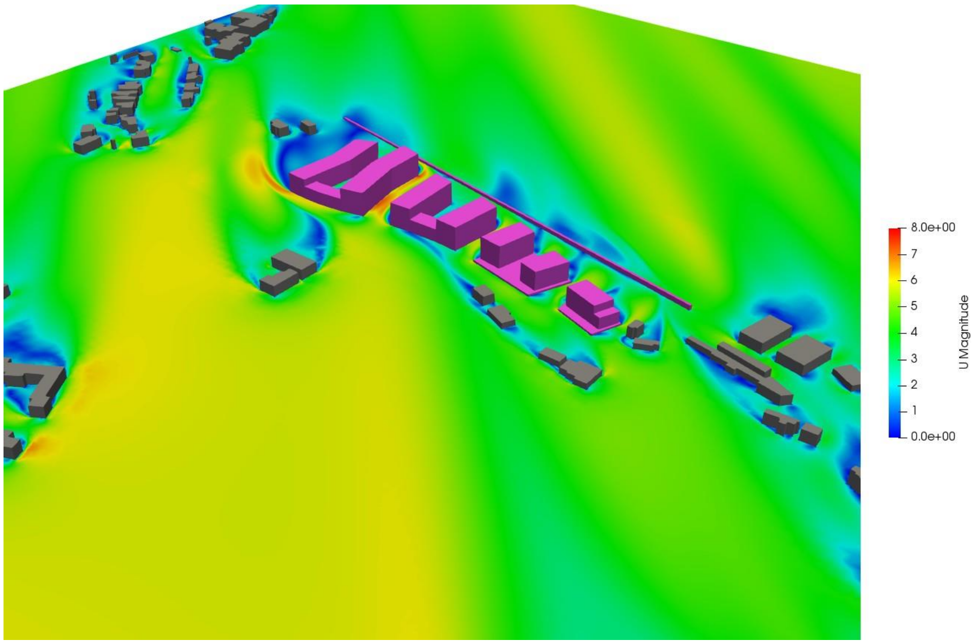


Figure 6.66: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 135°

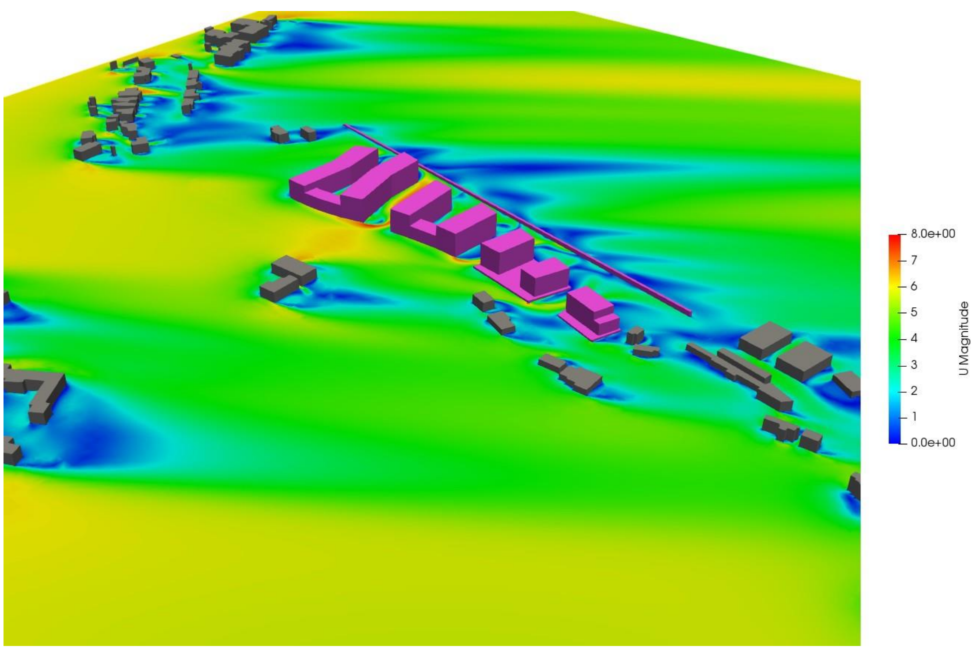


Figure 6.67: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 236°

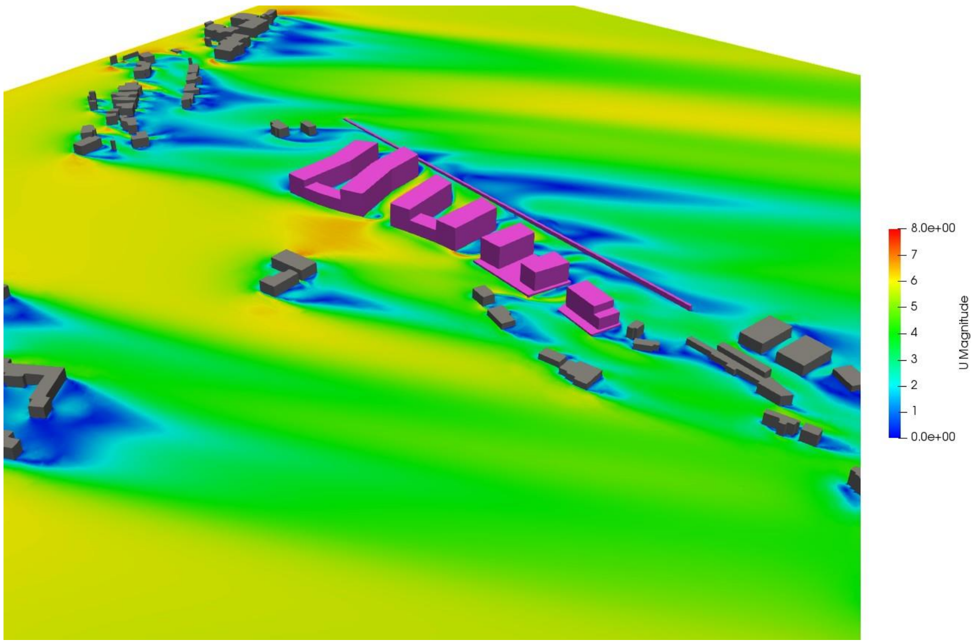


Figure 6.68: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 247.5°

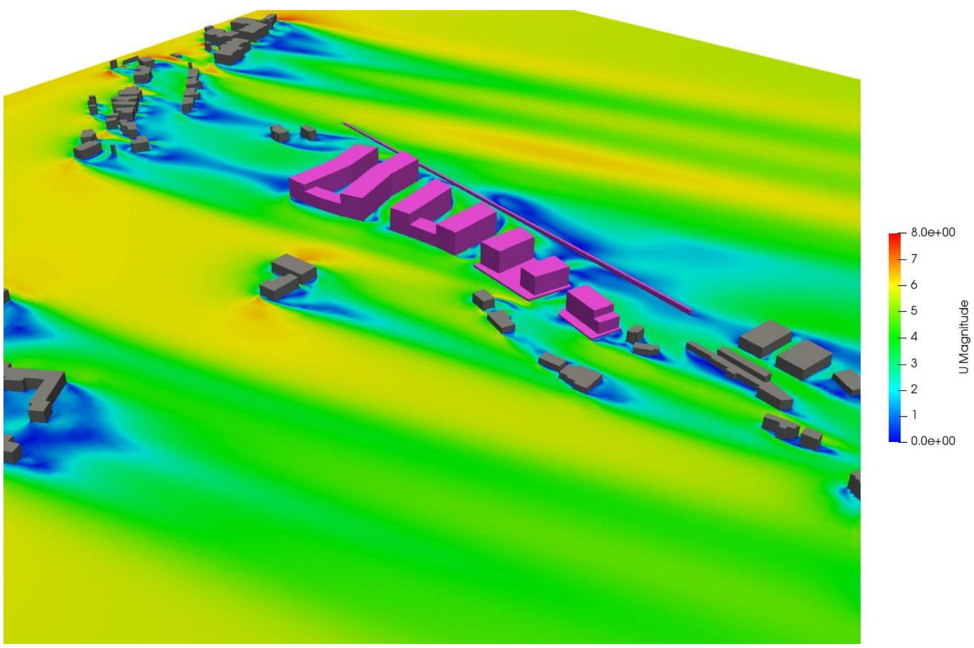


Figure 6.69: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 258.75°

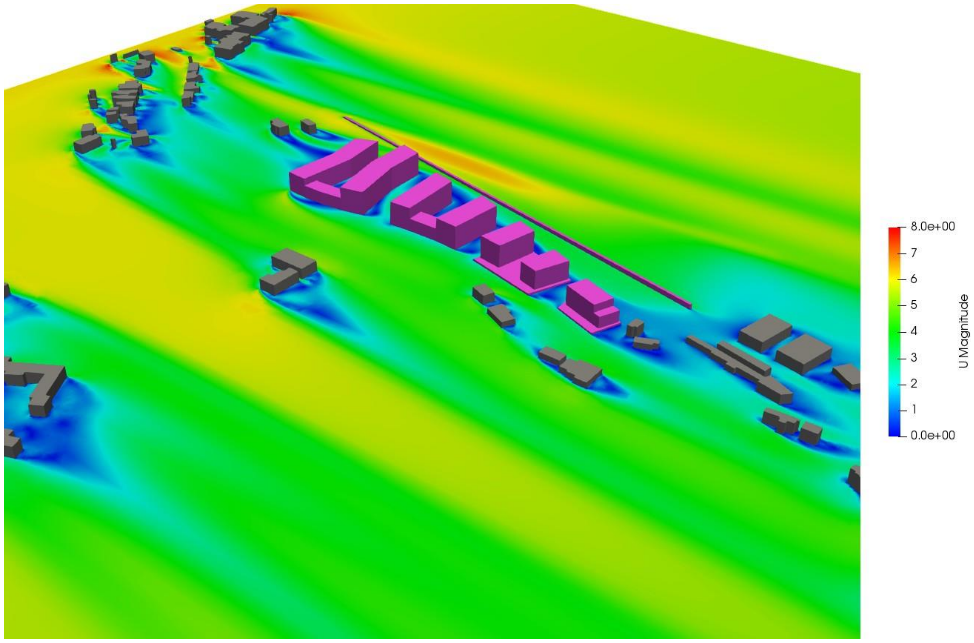


Figure 6.70: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 270°

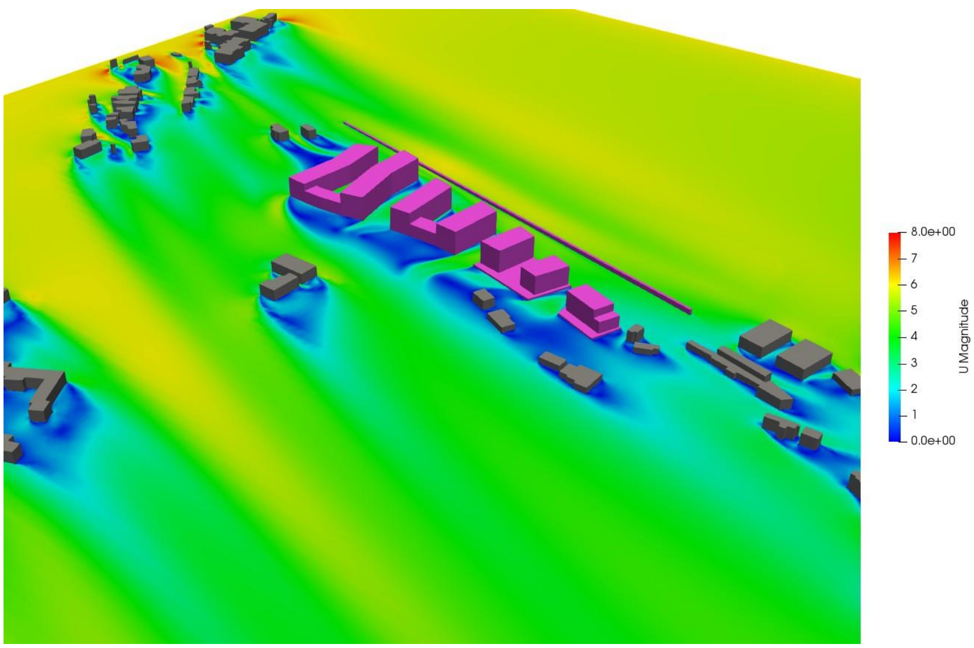


Figure 6.71: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 281.25°

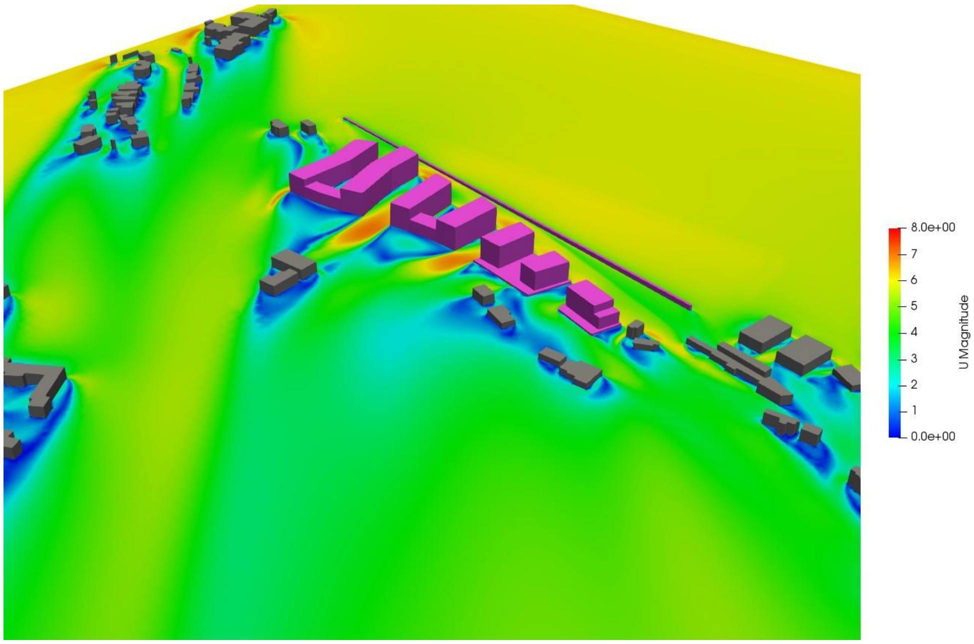


Figure 6.72: Wind Speed Results at 1.5m Above Development Ground-Isometric View: 315°

6.2.6 RISK TO HUMAN HEALTH - DISCOMFORT CRITERIA

This section aims to identify areas of the proposed Claremont Development where pedestrian safety and comfort could be compromised (in accordance with the Lawson Acceptance Criteria). Pedestrian comfort criteria are assessed at 1.5m above ground level.

6.2.6.1 Construction Phase

The possible effects on wind microclimate at the site during the construction phase of the proposed Claremont 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 the South-West.

As the finalization of the development proceeds, the wind setting at the site will progressively conform to those of the completed development. It is possible that in the final stages of construction, implementation of the mitigation measures would be needed in areas that are expected to be windier than others in case some areas of the site are expected to be functional before the construction is finalized.

Due to the fact that windier conditions are acceptable within a construction area (not accessible to the public), and the proposed development would not be the reason for critical wind conditions on-Site (and are slightly calmer when the development is in situ), the impacts evaluated on-Site are considered to be insignificant. Thus, the predicted impacts during the construction phase are identified as not significant or imperceptible.

In summary, as construction of the proposed Claremont Development progresses, the wind conditions at the site will gradually adjust to those of the completed development. During the construction phase, predicted impacts are classified as imperceptible.

6.2.6.2 Operational Phase

Figures 6.74 to 6.81 show the Lawson comfort categories over the ground floor area around proposed Claremont Development during its operational phase. In all cases, the scale used is set out in Figure 6.73.

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. Thus, depending on the wind direction, the suitability of the different areas are 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 really rarely are only suitable for “business walking” or “unacceptable for pedestrian comfort”.

The results shown in these maps show that there are no areas that are unacceptable for pedestrian comfort. The discomfort criteria is satisfied for all the different cases and in all directions. Some light blue area identify zones that are not suitable for long term sitting. However, the mitigation measures proposed will mitigate these effects.

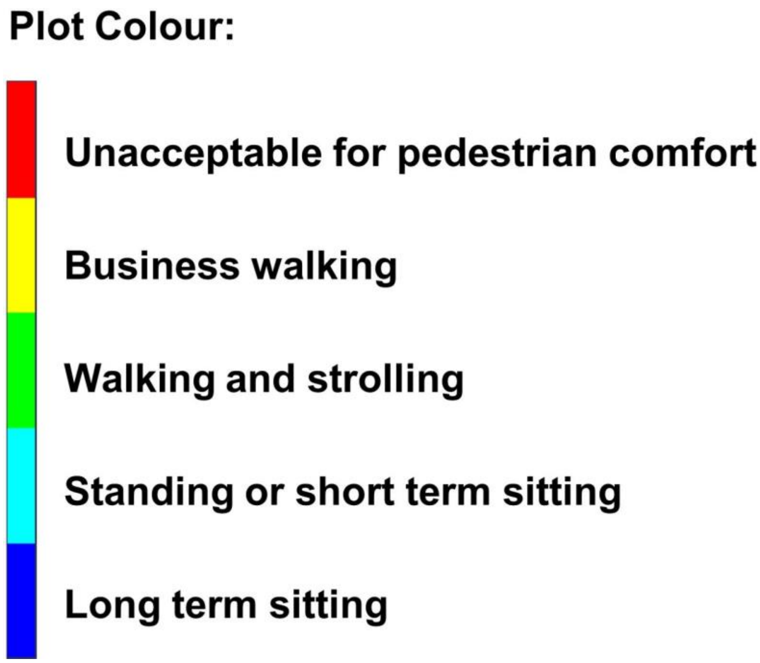


Figure 6.73: Lawson Comfort Categories

Figure 6.74: Ground Floor - Lawson Discomfort Map - 225°

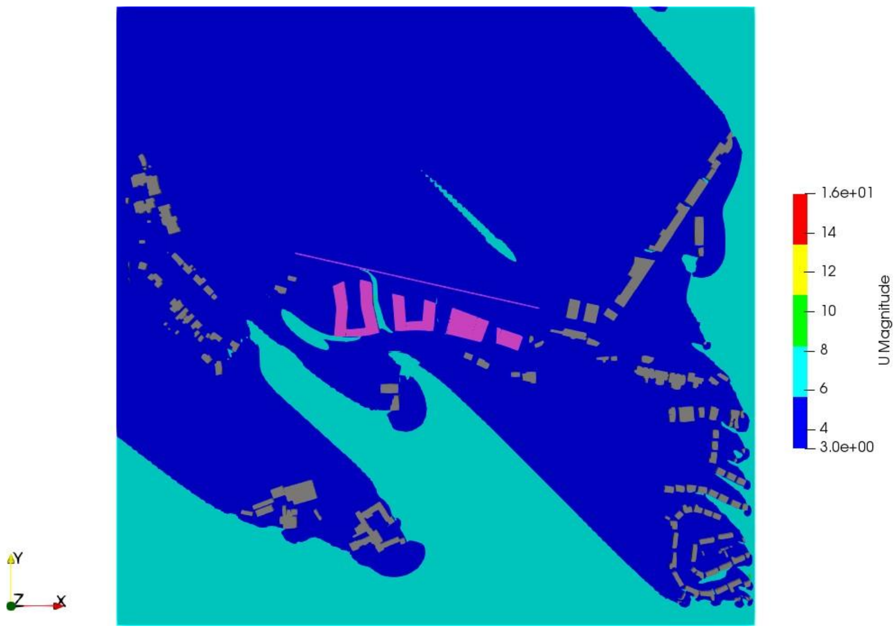


Figure 6.75: Ground Floor - Lawson Discomfort Map - 135°

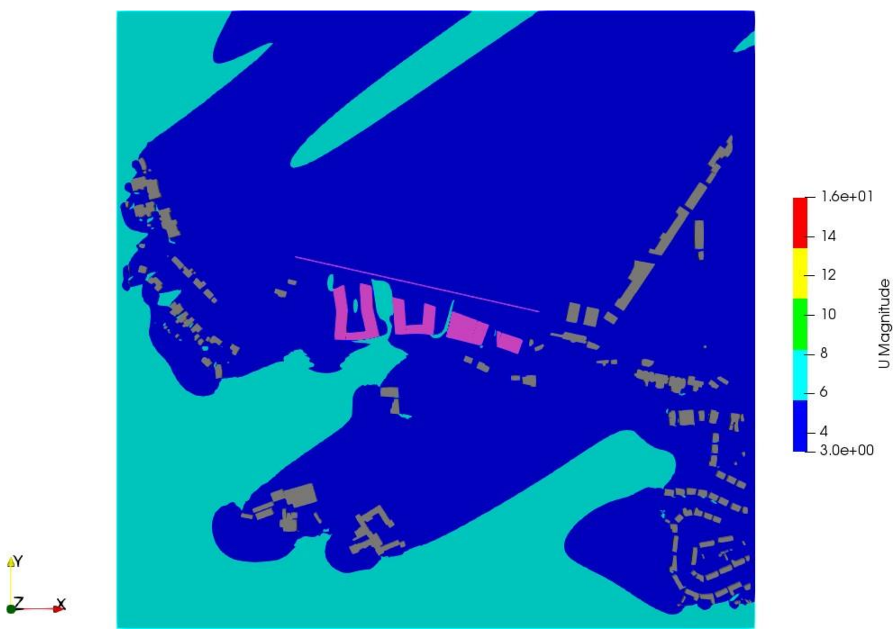


Figure 6.76: Ground Floor - Lawson Discomfort Map - 236°

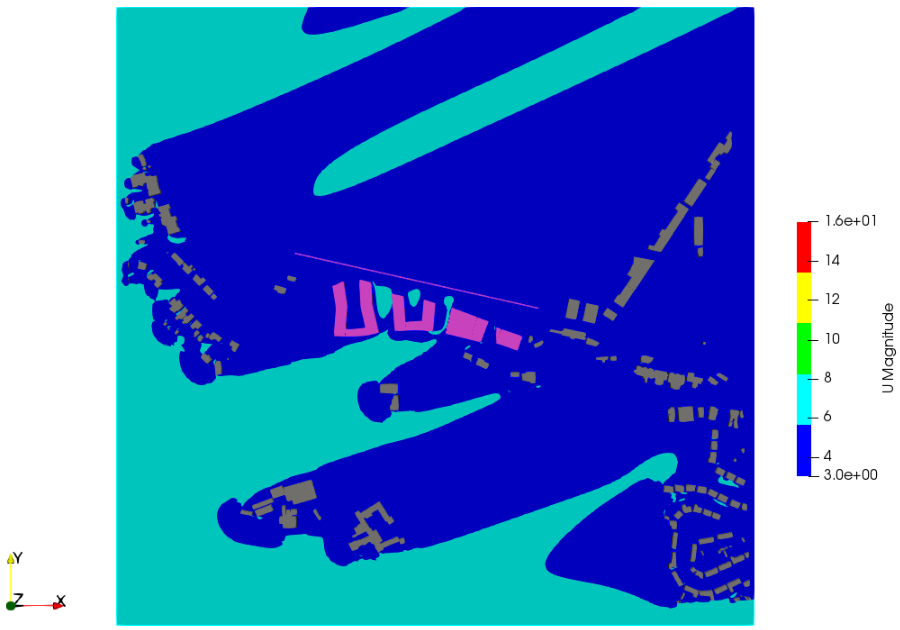


Figure 6.77: Ground Floor - Lawson Discomfort Map - 247.5°

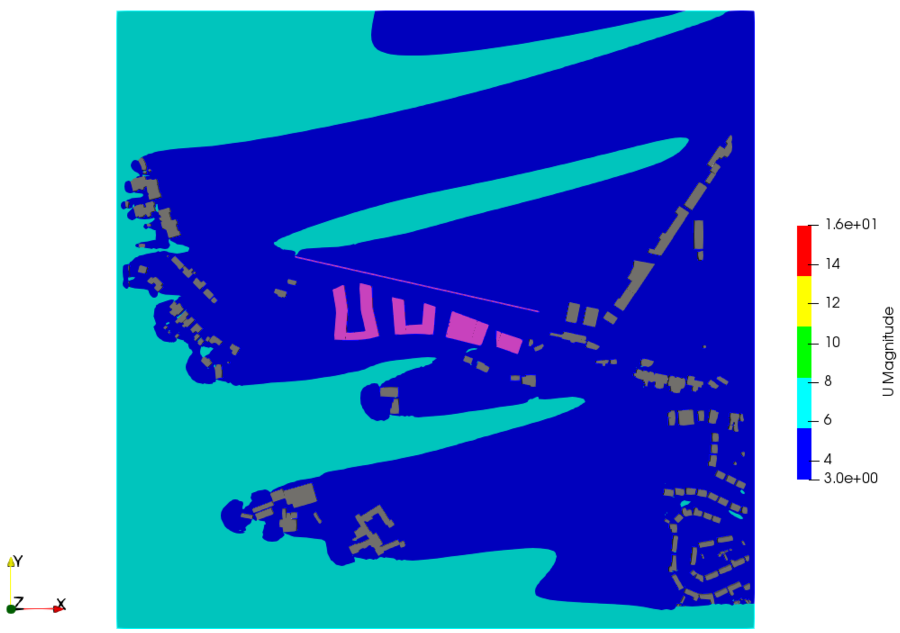


Figure 6.78: Ground Floor - Lawson Discomfort Map - 258.75°

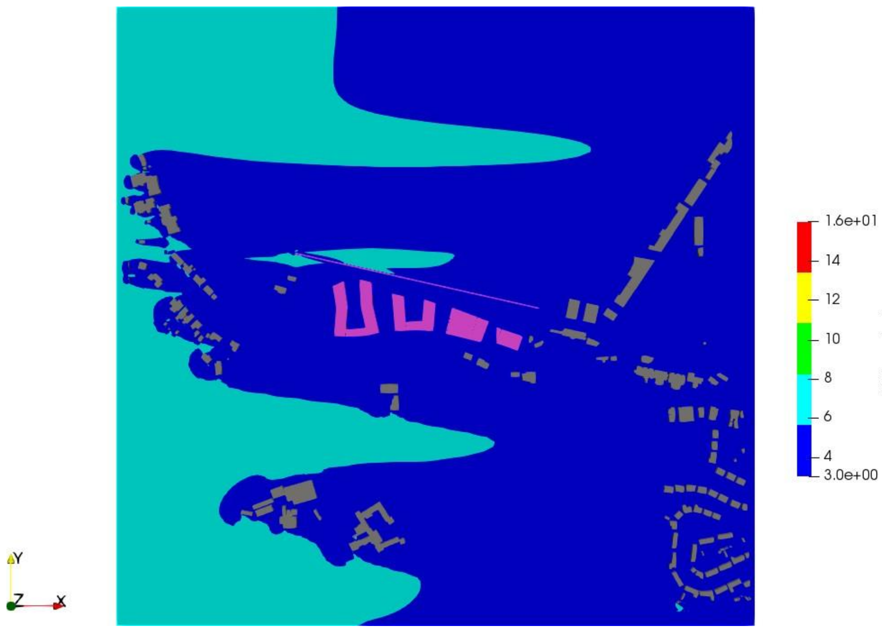


Figure 6.79: Ground Floor - Lawson Discomfort Map - 270°

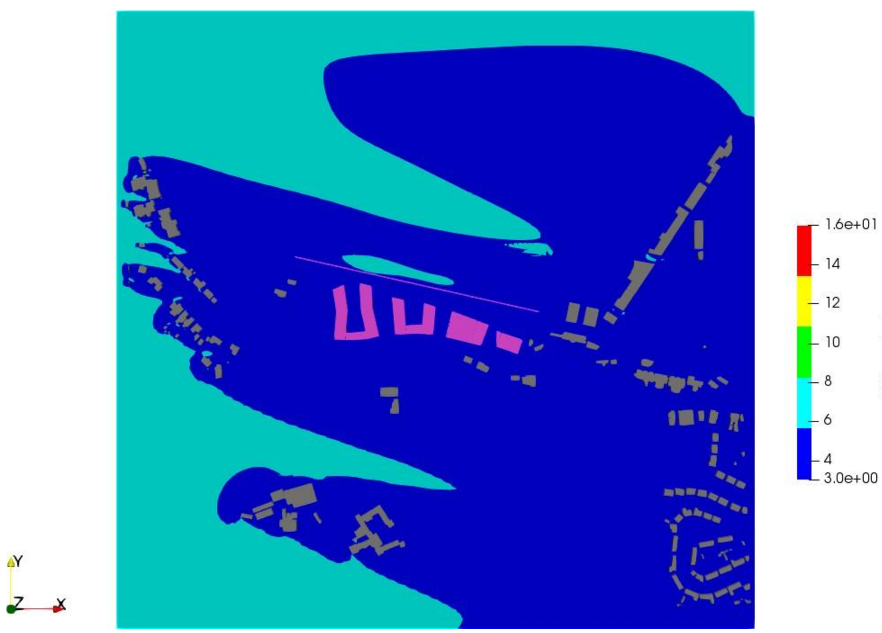


Figure 6.80: Ground Floor - Lawson Discomfort Map - 281.25°

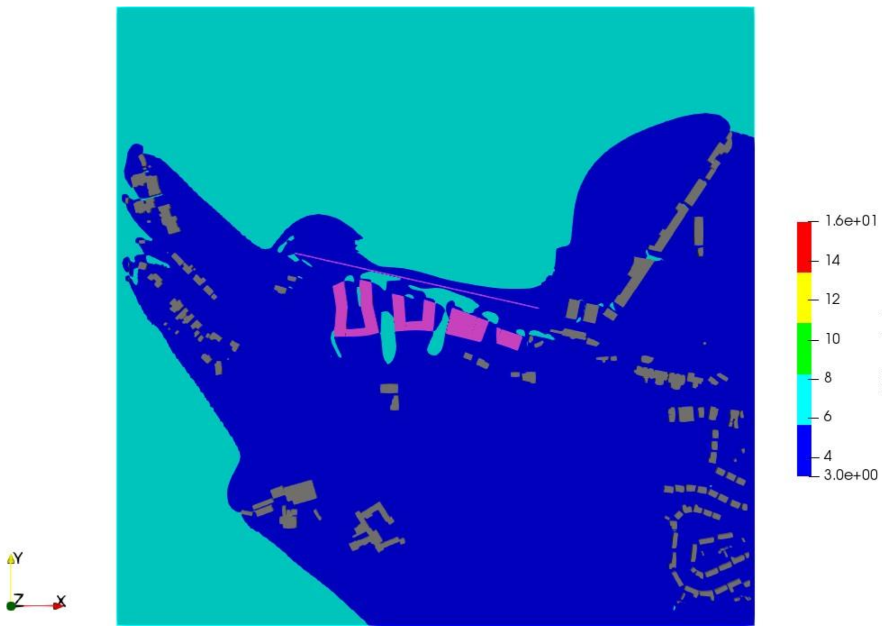


Figure 6.81: Ground Floor - Lawson Discomfort Map - 315°

Figures from 6.83 to 6.90 below show the areas where the measured wind speeds are potentially above 15 m/s in all directions. Figure 6.82 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.

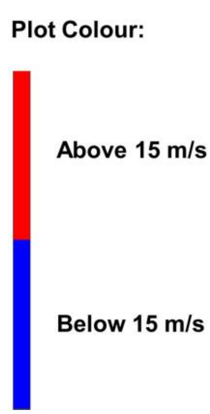


Figure 6.82: Lawson Distress Categories - Frail Person or Cyclist

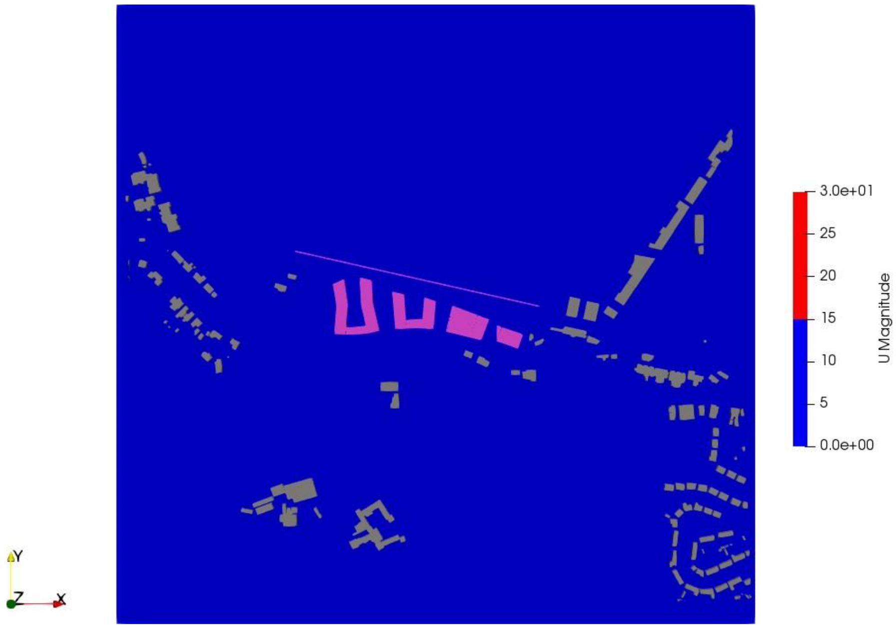


Figure 6.83: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 225°

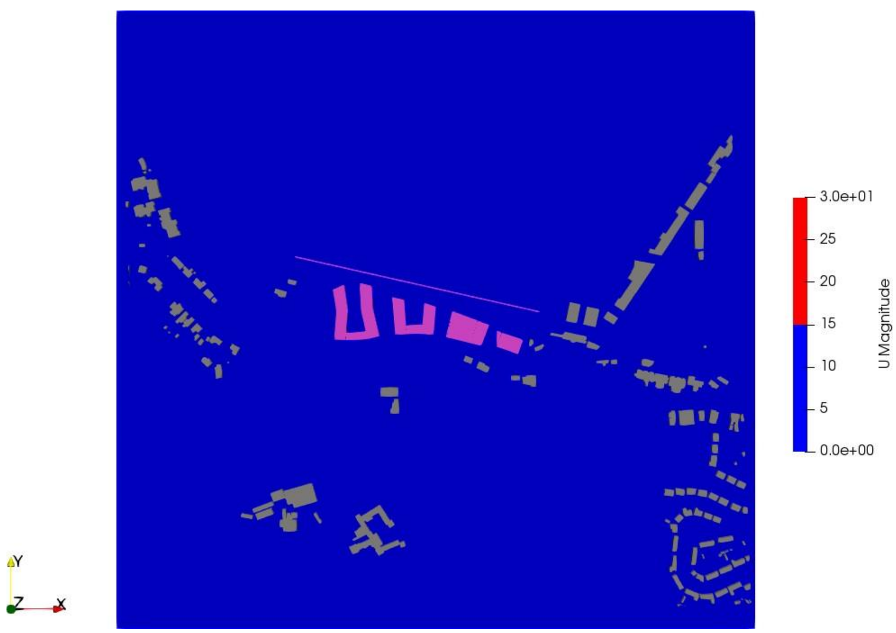


Figure 6.84: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 135°

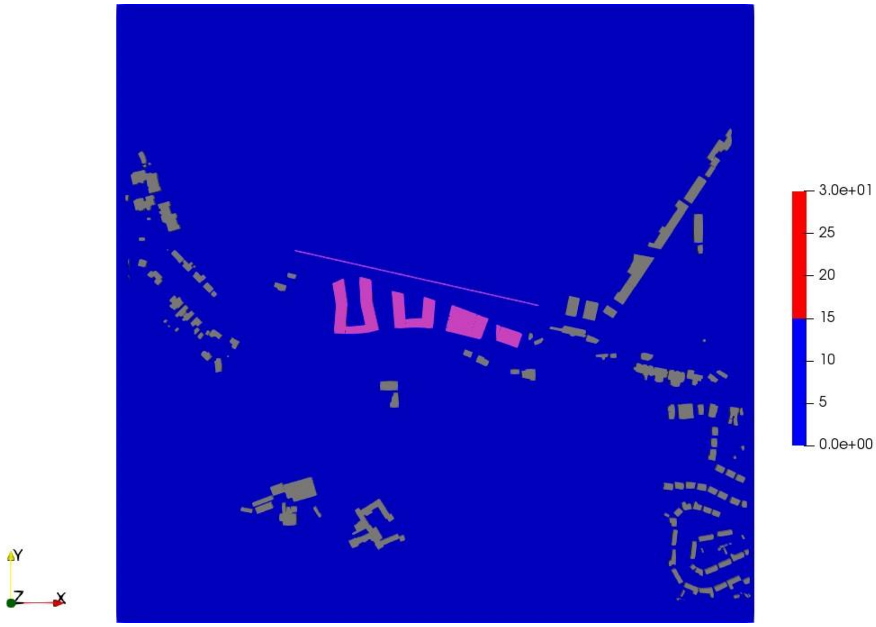


Figure 6.85: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 236°

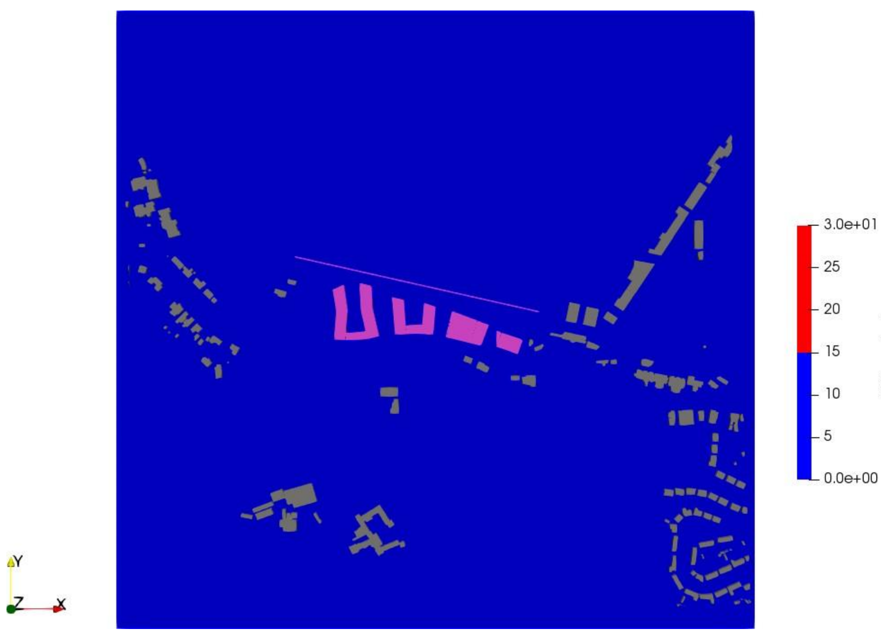


Figure 6.86: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 247.5°

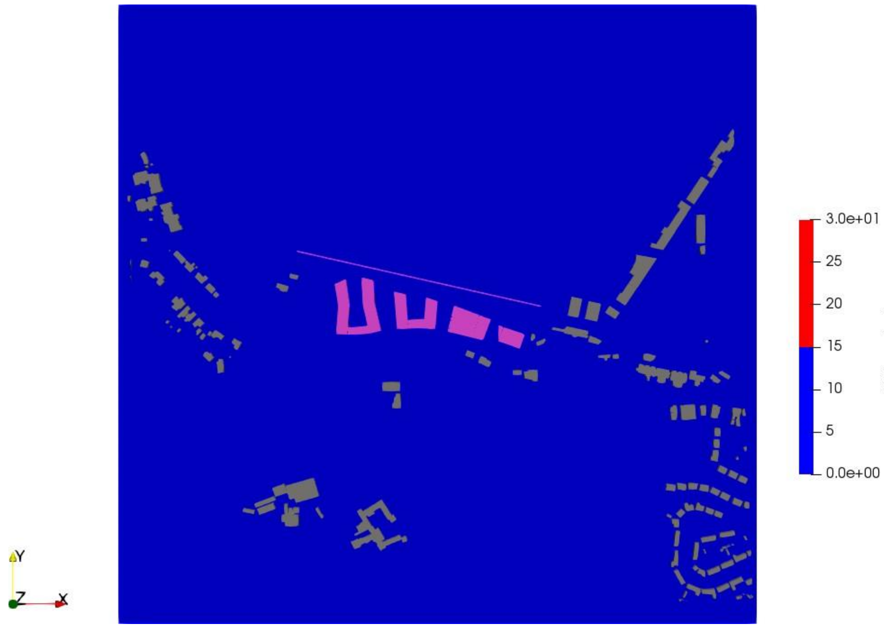


Figure 6.87: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 258.75°

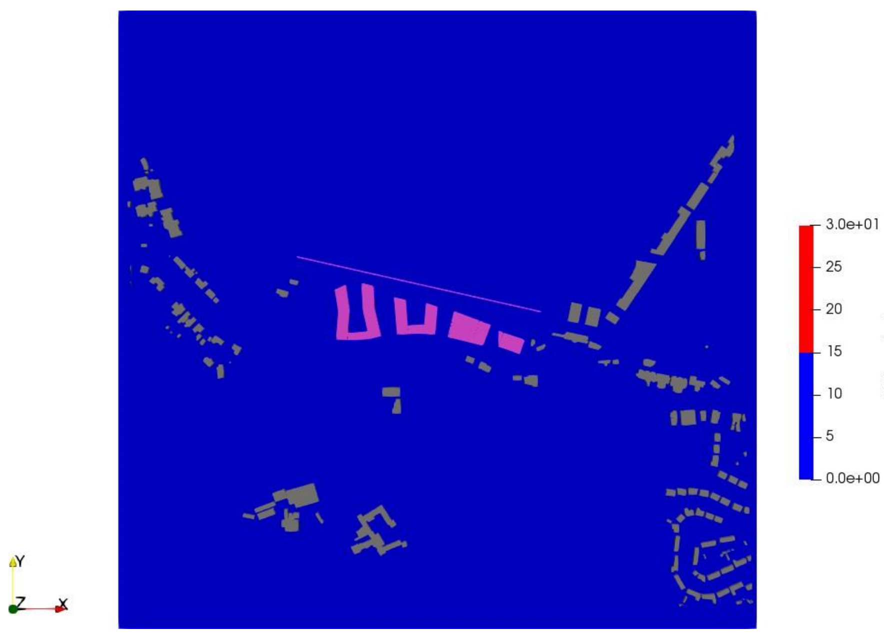


Figure 6.88: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 270°

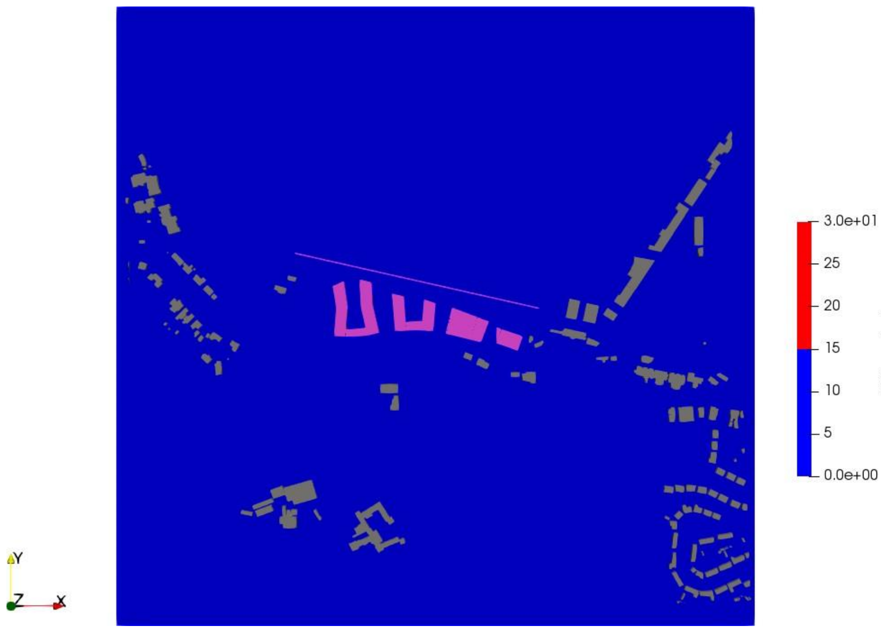


Figure 6.89: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 281.25°

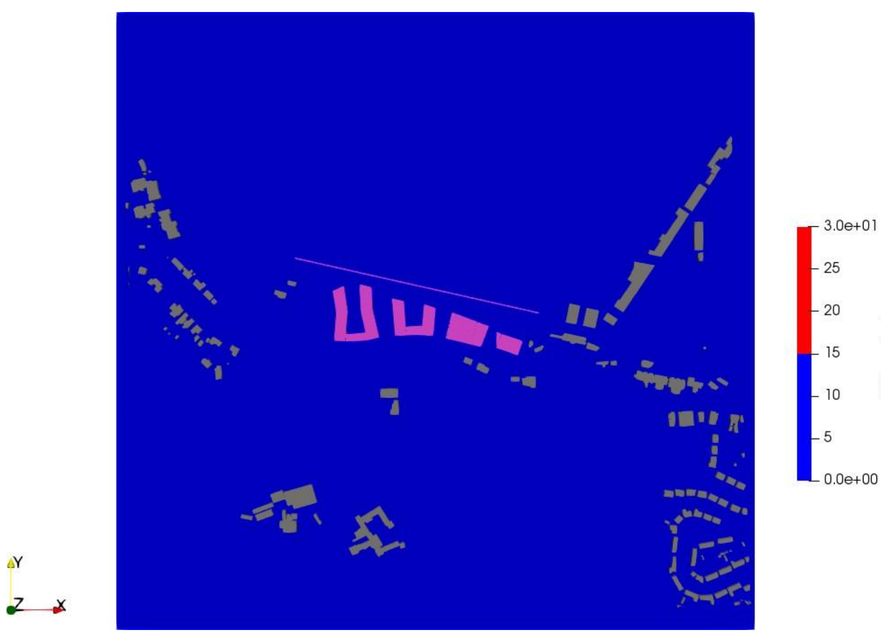


Figure 6.90: Ground Floor Level - Lawson Distress Map - Frail Person or Cyclist - 315°

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, either at pedestrian ground floor level, or at terraces level for more than 2 hours per year. Therefore there are not distress conditions for the general public.

6.2.6.3 Potential Cumulative Impacts

The wind microclimate assessment performed in this EIAR Chapter has included for developments in the vicinity (up to 2 km) and included cumulative impacts of these in the modelling.

From the wind modelling results shown in section 6.5.3, the proposed Claremont Development will introduce no negative wind effects on adjacent, nearby developments within its vicinity. All adverse wind impacts have been considered and this shows the potential cumulative impact to be not significant.

6.2.6.4 'Do Nothing' Impact

In case the development will not be constructed, the local microclimate will remain as outlined in the existing baseline receiving environment assessment (Section 6.4).

6.2.7 MITIGATION MEASURES

6.2.7.1 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 will gradually adjust to those of the completed development, and the proposed mitigation measures described below are suggested to be implemented before completion and operation.

6.2.7.2 Operational Phase

The proposed mitigation measures for this development is landscaping using tree plantings as shown in Figure 6.91, 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 6.92. These introduce a pressure drop in the model and therefore causes the wind to reduce its speed when passing through the trees, as expected in reality. The CFD plot shown in Figure 6.92 demonstrate this effect.

The use of trees landscaping is suggested to mitigate the wind around the development, with particular attention to the corners.

The use of trellis, pergola structures and planters are suggested to mitigate the wind impact on the terraces.

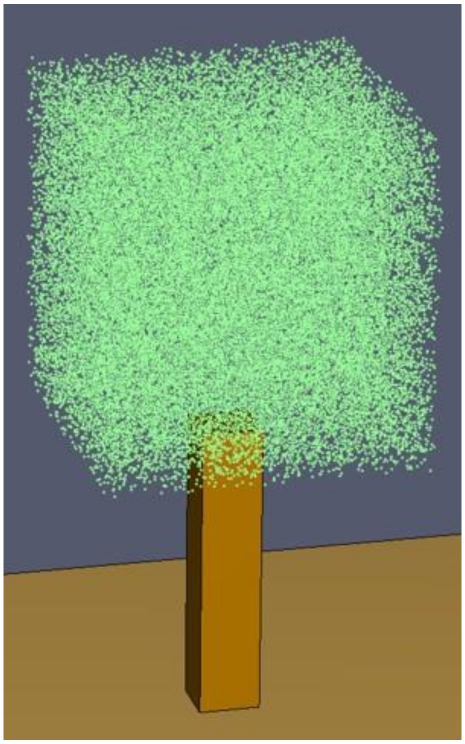


Figure 6.91: CFD Modelling of a tree

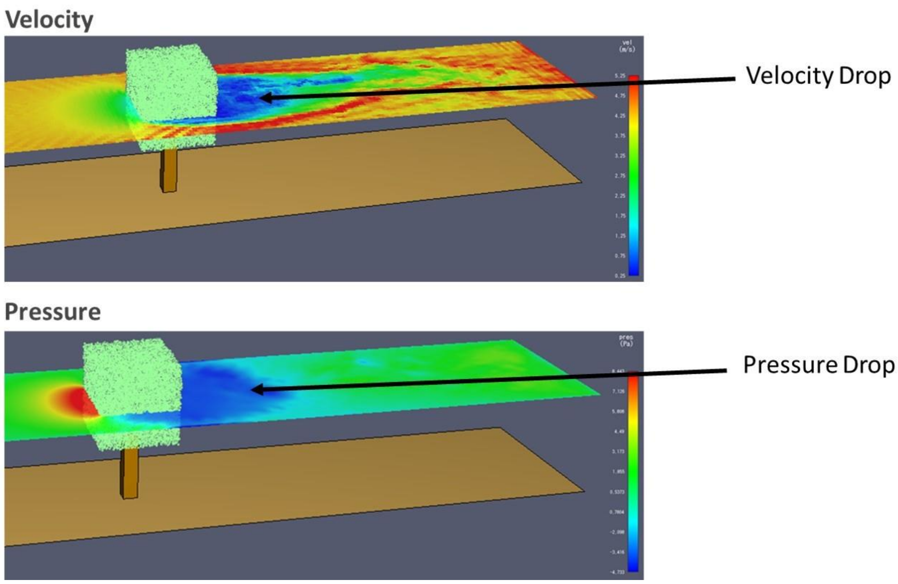


Figure 6.92: Generic Result of Wind Impacting on a Tree

6.2.8 RESIDUAL IMPACTS

No further residual impacts are expected in terms of wind microclimate in accordance with the conditions simulated and the results shown in this report.

The impacts of implementing mitigation measures such as tree planting will result in further shielding of public spaces and pedestrian footpaths from wind. This impact is a positive effect.

6.2.9 MONITORING

6.2.9.1 Construction Phase

There is no particular requirement to monitor wind impacts during the construction phase as the designated amenity areas will not be in use during this phase of the project. The CMP or CEMP do not particularly require monitoring of wind during construction.

6.2.9.2 Operational Phase

There is no requirement to monitor wind impacts during the operational phase of the Proposed Development.

6.2.10 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 Howth.

6.2.11 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered during the assessment of wind microclimate impacts on the proposed Claremont Development or its existing environments.

6.2.12 REFERENCES

Lawson, T.V., 2001, 'Building Aerodynamics', Imperial College Press, London

Simiu, E., 2011, 'Design of buildings for wind: a guide for ASCE 7-10 Standard users and designers of special structures', 2nd Edition, John Wiley and Sons, Inc., Hoboken, New Jersey, U.S.A.

Building Aerodynamics, Tom Lawson FREng. Imperial College Press, 2001

Blocken, B., 2015. Computational Fluid Dynamics for Urban Physics: Importance, scales, possibilities, limitations and ten tips and tricks towards accurate and reliable simulations. Building and Environment.

Blocken, B., Janssen, W.D. and van Hooff, T., 2012. CFD simulation for pedestrian wind comfort and wind safety in urban areas: General decision framework and case study for the Eindhoven University campus. Environmental Modelling and Software, 30, pp.15–34.

Franke, J., Hellsten, A., Schlunzen, H., Carissimo, B, Ed. (2007); Best Practice Guidelines for the CFD Simulation of Flows in the Urban Environment, University of Hamburg.

6.3.1 INTRODUCTION

J.V.Tierney & Co. were commissioned to undertake a daylight and suncast shadow study for the proposed Claremont development in Howth Co. Dublin. This section was written as part of the submission for the Environmental Impact Assessment Report. The Daylight and Suncast report is available as part of the planning submission.

In general, the design meets with the principles of the BRE guide - “Site Layout Planning for Daylight and Sunlight” (i) and the latest guidelines for new apartments as issued by the Department of Housing with good quality daylight available across a substantial portion of the development. Good levels of sunlight will also be available in the development’s amenity areas. In addition, the development will have little or imperceptible impact on the surrounding beaches or surrounding houses in terms of overshadowing.

6.3.1.1 Description of Proposed Development

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff’s Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents’ amenities to include a gym, residents’ lounge, residents’ support office, and 2 no. residents’ multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents’ lounge, residents’ multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

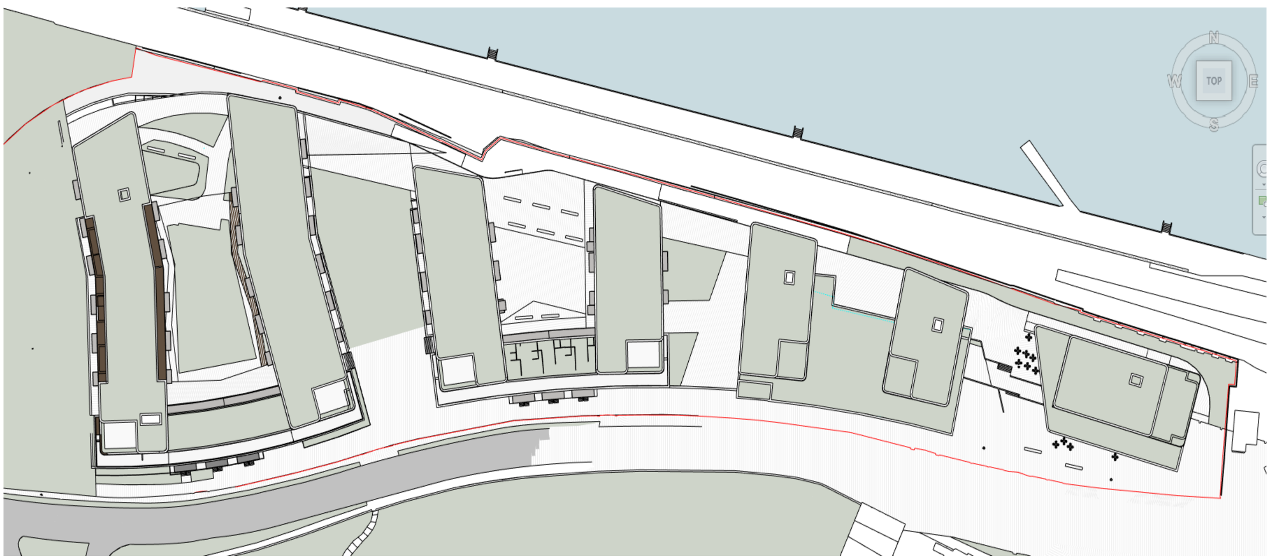


Figure 6.3.1 - Site Plan of Development

6.3.1.2 Characteristics of Development Relevant to this Chapter

The proposal, which is subject of this EIAR, comprises the provision of a mixed-use development of residential, retail/non-retail uses and a childcare facility at Howth, County Dublin. This chapter examines only the impact on the development and the surrounding adjacent beach area and other adjacent buildings with regard to daylight and sunlight as per the guidance contained in the BRE guide - “Site Layout Planning for Daylight and Sunlight

Surrounding houses have been tested in line with “Site Layout Planning for Daylight and Sunlight” and the analysis concluded that the houses to the east of the proposed development (A) will not be impacted by it. Houses towards the southerly end of the site (B) have also been analysed. No shadows will fall onto the southern side of the Howth Road, so as the residential amenity of these houses (B) are not affected by shadowing (See Figure 6.3.2).

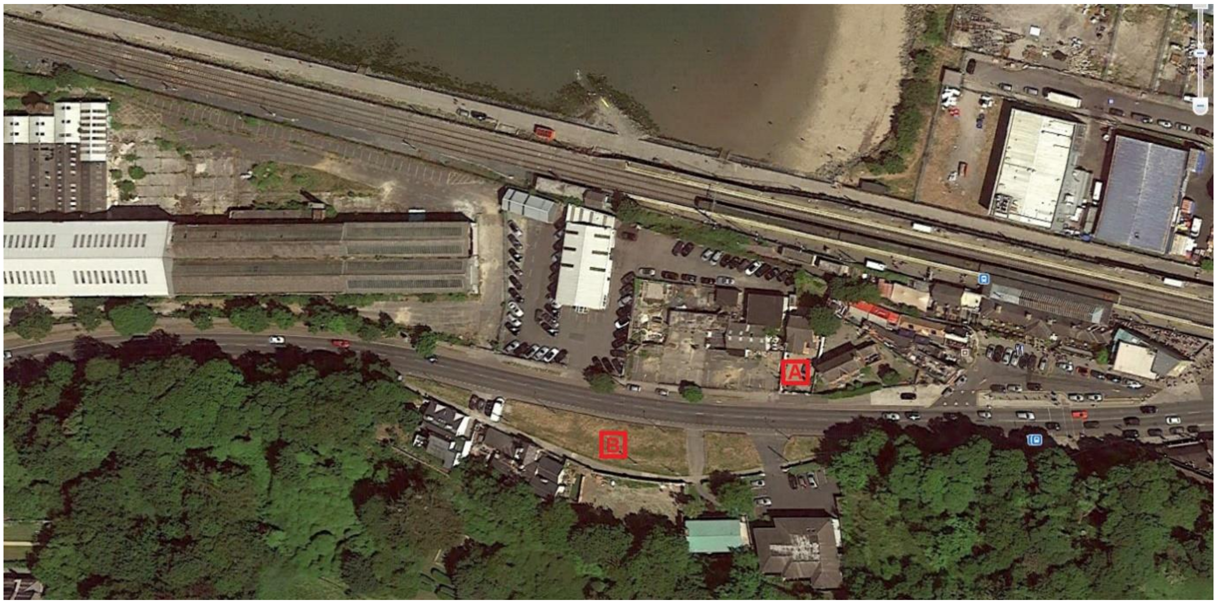


Figure 6.3.2 - Site Layout of Assessed Surrounding Houses

As an example, the window highlighted below, situated at "Site A" achieves a VSC result of 28.58% which is in excess of the requirements as stipulated in *"Site Layout Planning for Daylight and Sunlight".*

6.3.2 METHODOLOGY

A 3-D digital model of the proposed development and of existing buildings in the area was constructed by JV Tierney and Company (JVT) based on drawings and 3-D models supplied by the Design Team, on drawings and information available from the Fingal County Council online planning register; and with reference to on-site, satellite and aerial photography. The analysis procedure takes into account the following daylighting and sun lighting calculation methodologies; (A) Suncast Shadow Analysis, (B) Average Daylight Factor (ADF), (C) Garden and Open Spaces Sunlight and (D) Light from the Sky.

These methodologies are outlined further in the Daylight and Suncast Report submitted as part of the planning submission but were carried out in line with the guidance outlined in the 'Site Layout Planning for Daylight and Sunlight 2011: A Guide to Good Practice, Second Edition by Paul Littlefair'.

JVT used the 3-D model of the proposed development and of the existing buildings surrounding the development site using proprietary daylight analysis software[1] in order to quantify the likely impact of the proposed development on the living and bedroom spaces within the development and spaces adjacent to it, which had a reasonable expectation of daylight.

Additionally, shadows were cast by JVT at several times of the day at the equinox and presented on shadow study diagrams submitted in the Daylight & Suncast Report. JVT also analysed the 3-D models of the proposed development and of the existing buildings surrounding the development site using proprietary sunlight analysis software in order to quantify the likely impact of the proposed development on the gardens and open spaces which could have a reasonable expectation of sunlight.

Assessment Criteria for Daylight and Sunlight

It should be noted that the guidance in the 'Site Layout Planning for Daylight and Sunlight 2011: A Guide to Good Practice, Second Edition by Paul Littlefair' document should be seen as advice only and it should not constrain the design, "*The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design"* (i).

The guidance from *"Site Layout Planning for Daylight and Sunlight"* (i) should be seen as not being suitable for rigid application to all developments in the context of national and local policies for the consolidation and densification of urban areas.

The *"Urban Design Manual, A Best Practice Guide, 2009"* (iii) states that it may not always be possible to meet the criteria within *"Site Layout Planning for Daylight and Sunlight"* (i) for urban areas. *"Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths"* (iii).

The *"Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, March 2018"* (iv), also reiterates the point mentioned above and states that, *"High density apartment schemes in urban locations should include shadow analysis diagrams at application stage. While overshadowing is clearly not generally desirable, it must be accepted that there may inevitably be some element of overshadowing at certain times of the day and/or year, subject to orientation, layout etc., in order to achieve urban development. In assessing development proposals, planning authorities must weigh up the overall quality of the design and layout of the scheme and measures undertaken to avoid overshadowing, with the location of the site and the need to ensure an appropriate scale or urban residential development"* (iv)

The *Height Guidelines* (v) have been prepared in response to the publication of "*Project Ireland 2040"* and the "*National Planning Framework"*. The *Height Guidelines* (v) state that *appropriate and reasonable* regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's '*Site Layout Planning for Daylight and Sunlight' (2nd edition)*(i) or *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'*(vi).

In line with the provisions of the Apartment Guidelines as discussed above, the *Height Guidelines* (v) make allowances for where a proposal may not fully meet all requirements of daylight provisions. This discretion should be applied where it is desired that a scheme meets wider planning objectives such as comprehensive urban regeneration. This is applicable to the subject scheme whereby the requirement to provide for a sustainable level of development results in a need for some discretion to be applied in terms of completely meeting performance standards.

Comments in relation to overshadowing from the *"Site Layout Planning for Daylight and Sunlight"* (i) guide also state that some degree of overshadowing is to be expected. The guide states that, *"It must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected"* (i).

6.3.3 BASELINE ENVIRONMENT

The site comprises a brownfield site known as the Techcrete Site in Howth County Dublin. The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

Given the vacant character of the site and the relatively large area of low-density development surrounding the site, the shadow environment of the existing site and its immediate surroundings is inconsistent with what would be normally expected in an urban area.

6.3.4 IMPACT OF PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

6.3.4.1 Direct

The potential of the construction phase of the proposed development on daylight and sunlight access is likely to be, initially, lesser than the impact of the completed development. As the proposed development nears completion, the impact of the emerging structure is likely to be similar in all material respects to that of the completed structure. During construction the daylight and sunlight may be impacted by the cranes, etc. on the site but this impact will be imperceptible.

6.3.4.2 Indirect

It is noted that temporary structures and machinery (e.g. hoarding, scaffolding, cranes, etc.) may also result in a change to the existing daylight and sunlight environment, although any additional impacts arising from temporary structures or machinery are likely to be temporary, imperceptible and minor.

6.3.4.3 Worst Case Scenario

As the proposed development nears completion, the impact of the emerging structure coupled with temporary structures, cranes, etc is likely to be similar in all material respects to that of the completed structure which when analysed under the BRE Guide, demonstrates that the development will have good levels of sunlight available in the development’s amenity areas will have imperceptible impact on the surrounding beaches or surrounding houses in terms of overshadowing.

6.3.4.4 Secondary

Refer to Indirect Section 10.4.2

6.3.4.5 Cumulative

There are no cumulative impacts envisaged and therefore remedial measures during the construction stage in relation to daylight and sunlight are not considered to be required.

6.3.5 IMPACT OF PROPOSED DEVELOPMENT – OPERATIONAL PHASE

6.3.5.1 Direct

JVT’s suncast analysis indicates that the potential of the proposed development to result in overshadowing of lands outside the application site is negligible and will have imperceptible impact on the surrounding beaches or surrounding houses in terms of overshadowing during the assessed period on the 21st March at 12 noon and 4pm (See Figures 6.3.3 & 6.3.4). This is due to the distance from the proposed development to the receptors outlined.

The impact of daylight on existing buildings is imperceptible due to their distance from the site or the spaces adjacent are not impacted as per the BRE guidance.

The design meets with the principles of the BRE guide - "Site Layout Planning for Daylight and Sunlight" (i) and the latest guidelines for new apartments as issued by the Department of Housing with good quality daylight available across a substantial portion of the development (See Table 6.3.1). In addition, good levels of sunlight will also be available in the development's amenity areas (See Figure 6.3.5 and Table 6.3.2)

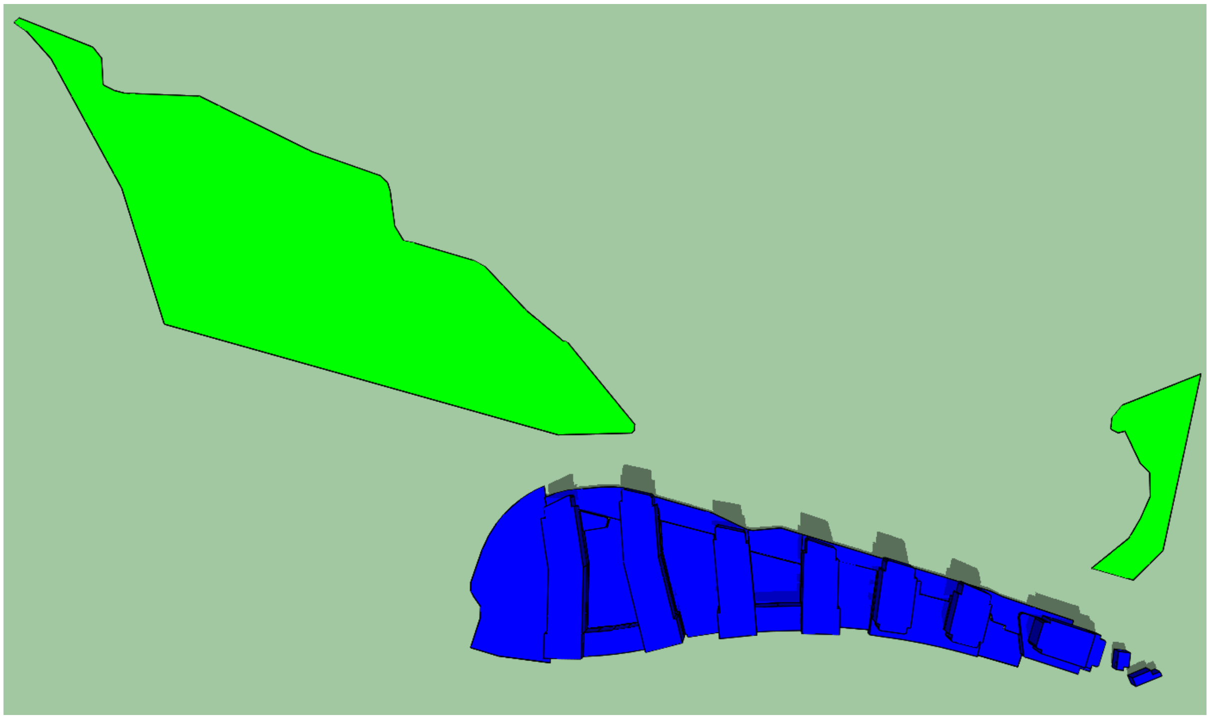


Figure 6.3.3 - March 21st 12.00 Noon Suncast Analysis (Blue -Development; Green -Beach)

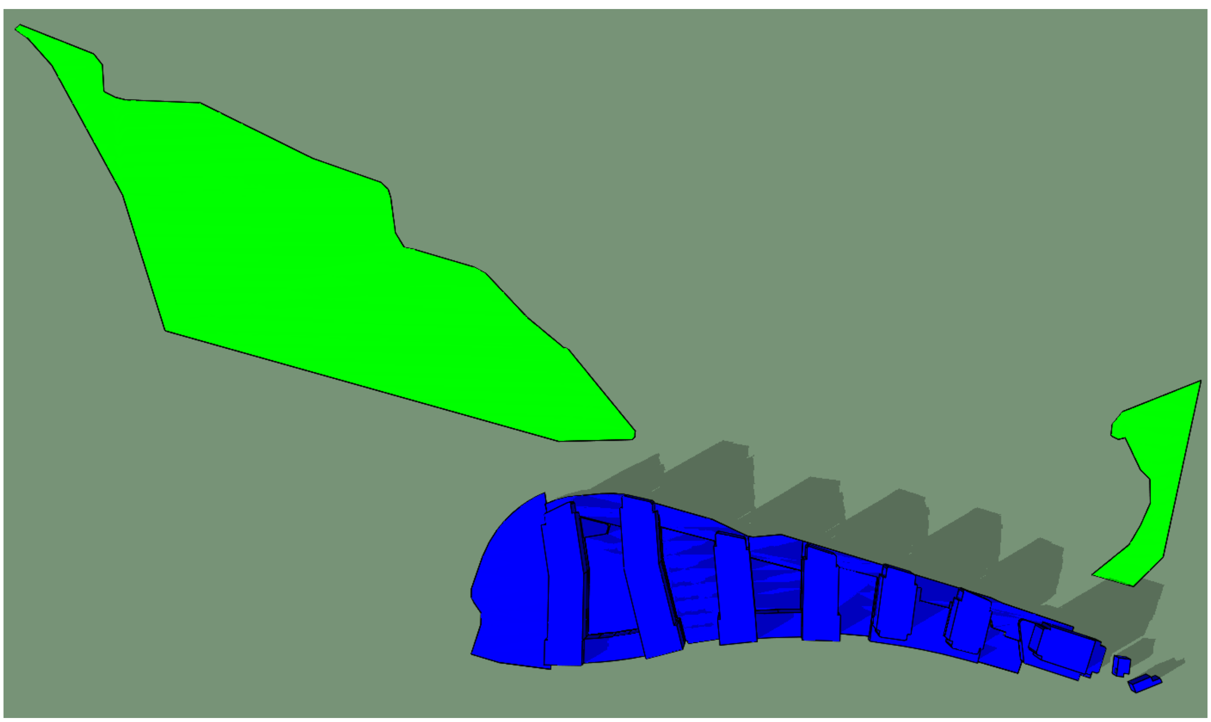


Figure 6.3.4 - March 21st 16.00 Suncast Analysis (Blue -Development; Green -Beach)

Block A, B, C and D		
Floor	Criteria	
	Above	Below
0	55	65
1	163	41
2	178	63
3	191	49
4	190	14
5	179	14
6	106	8
Total	1062	254

Table 6.3.1 - Average Daylight Factor (ADF) Results for All Blocks Combined

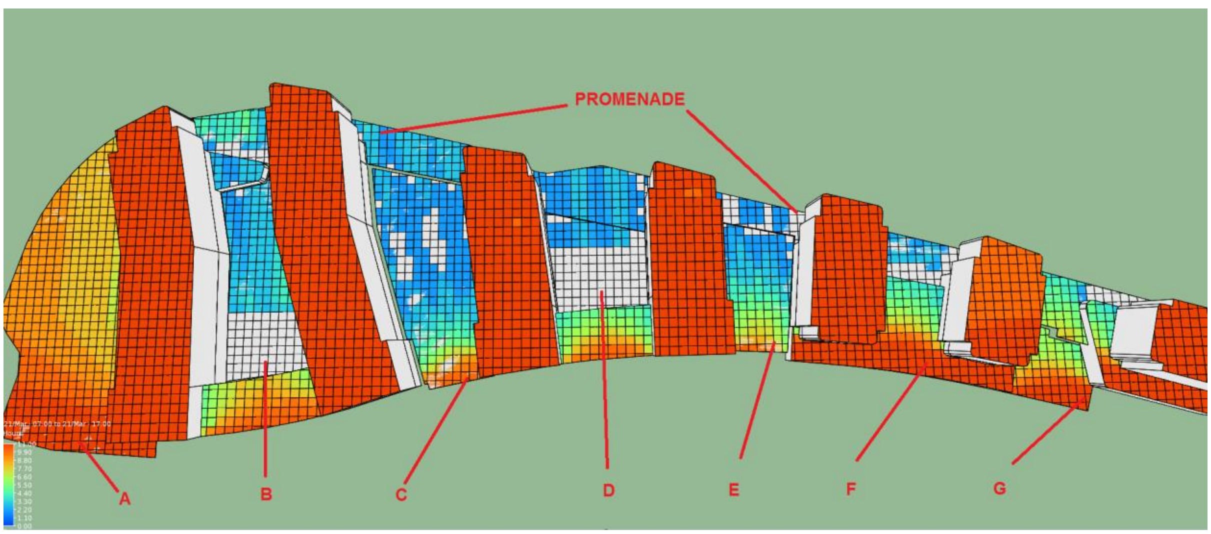


Figure 6.3.5 -Sunlight received results for the 21st of March

General Information	Criteria				
Amenity Area	BRE Garden & Open Spaces Target [%]	Total Amenity Area [m2]	Total Amenity Area Receiving More Than 2 Hours [m2]	Percentage of Amenity Area Receiving 2 Hours [%]	Status
A	50	3736	3736	100.00	Meets Criteria
B	50	1541	991	64.31	Meets Criteria
C	50	1753	1459	83.23	Meets Criteria
D	50	1241	668.75	53.89	Meets Criteria
E	50	812	762	93.84	Meets Criteria
F	50	1032	1032	100.00	Meets Criteria
G	50	524	524	100.00	Meets Criteria
Promenade	50	3567	2206	61.84	Meets Criteria

Table 6.3.2 - Garden and Open Spaces Results for the 21st of March

6.3.5.2 Indirect

In large scale developments such as Claremont, it is common to see ground floor apartments receive lower amounts of daylight when compared to the upper levels. In order to combat this design constraint, the lower level apartments have included for the maximum amount of glazing that is feasible to ensure that the development still receives good levels of light penetration. It is also important to note that while the lower level units have less access to daylight generally, this is compensated for in having direct access to terraces and the communal gardens. Balconies act as an overhang and cause indirect blockage of daylight/ sunlight but a design trade-off has been applied to allow users access to the outside via a balcony while still allowing some level of daylight penetration.

6.3.5.3 Worst Case Scenario

From a daylight perspective, the lower level apartments in the development have the lower daylight factors given the shadow cast by the opposing Blocks. To combat this design constraint, the lower level apartments have included for the maximum amount of glazing that is feasible to ensure that the development still receives good levels of light penetration. From a suncast perspective, Block D has the lowest level of sunlight penetration due to its design but still exceeds the criteria required by the BRE Guide (See Table 6.3.2) and would be deemed to be a slight impact.

6.3.5.4 Secondary

Refer to Indirect Section 10.5.3

6.3.5.5 Cumulative

Imperceptible impacts are expected in relation to daylight and sunlight experienced by future inhabitants of the proposed development and to existing inhabitants of the adjoining sites.

6.3.6 'DO NOTHING' IMPACT

In a 'Do-nothing scenario' the existing shadow and daylight access to existing buildings will remain unchanged and is outside scope as per the BRE guidance.

6.3.7 MITIGATION MEASURES

6.3.7.1 Construction Phase

The subject application proposes the major re-development of a brownfield site situated in an urban environment characterised by medium and high-density development. In these circumstances, during the construction phase scope for mitigation measures, which would preserve a sustainable level of density, is not necessary.

6.3.7.2 Operational Phase

Early stage testing concluded that the “developed design” maintained good Average Daylight Factors while optimizing the largest balcony area for living spaces. Furthermore, in large scale developments it is common to see ground floor apartments receive lower amounts of daylight when compared to the upper levels. In order to mitigate this design constraint, the lower level apartments are designed for the maximum amount of glazing that is feasible to ensure that the development still receives good levels of light penetration.

Due to the orientation of the development the potential for impacting on surrounding areas has been minimised due to the East – West axis of the development and the u-shape of the buildings which allows for the sunlight to be maximised within the development and surrounding areas.

6.3.8 RESIDUAL IMPACTS

The proposed development will have imperceptible impact on the surrounding beaches or surrounding houses in terms of overshadowing and is unlikely to result in any undue adverse effects on daylight access within buildings in the wider surrounding area and therefore it is considered there will be no residual impacts during the operational stage in respect of daylight and sunlight.

6.3.9 INTERACTIONS

6.3.9.1 Public Health

The operational stage of the development is unlikely to precipitate any significant impacts in terms of health. As outlined in Section 6.3.8, the proposed development is unlikely to result in any undue adverse effects on daylight access within buildings in the wider surrounding area and will deliver good levels of daylight and sunlight to the proposed development.

6.3.10 DIFFICULTIES ENCOUNTERED IN COMPILING REQUIRED INFORMATION

None

6.3.11 REFERENCES

(i) Site Layout Planning for Daylight and Sunlight 2011: A Guide to Good Practice, Second Edition by Paul Littlefair

(ii) Site Layout Planning for Daylight and Sunlight 1991: A Guide to Good Practice by Paul Littlefair

(iii) Urban Design Manual, A Best Practice Guide, May 2009 as issued by Environment, Heritage and Local Government

(iv) Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, March 2018

(v) Urban Development and Building Heights: Guidelines for Planning Authorities (March 2019)

(vi) BS 8206-2 2008 Code of Practice for Daylighting

(vii) EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, (Draft August 2017).

Chapter 7

Noise and Vibration

7.1 INTRODUCTION

This section of the EIAR has been prepared by AWN Consulting Limited to identify and assess the potential noise and vibrational impacts associated with a proposed mixed use development at the former Techrete site, Claremont, Howth. 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 subject site, an assessment of the potential noise and vibration impact associated with the proposed mixed use development during both the short-term construction phase and the long term operational phase on its surrounding environment.

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.

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
- *EPA Advice Notes for Preparing Environmental Impact Statements*, (Draft, September 2015)

7.1.1 DESCRIPTION OF DEVELOPMENT

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

7.1.2 Characteristics of Development Relevant to this Chapter

When considering a development of this nature, the potential noise and vibration impacts on the surroundings are considered for each of two distinct stages, 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, basement excavation, 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 development, the primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network, operational plant or fixed installation noise used to serve the ancillary elements within the development buildings and any potential operational noise sources from retail, amenity and creche areas. Due to the nature of the proposed development, there are no sources of vibration in the operational context.

Each phase is discussed in turn in the following sections

7.2 METHODOLOGY

7.2.1 ASSESSMENT OVERVIEW

The following methodology has been prepared based on the requirements of the EPA document *Guidelines on the information to be contained in Environmental Impact Assessment Reports DRAFT August 2017* and on our experience of preparing the noise & vibration chapters for similar developments. The following approach has been used for this assessment:

- Baseline noise monitoring has been undertaken at the development site in order to characterise the existing noise environment;
- A review of the most applicable standards and guidelines has been reviewed 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 has been undertaken at the nearest sensitive locations to the development site;
- Potential noise impacts associated with the operational phase of the development at the most sensitive locations surrounding the proposed development have been determined as assessed, and;
- A schedule of mitigation measures has been included to reduce, where necessary, identified potential outward impacts relating to noise and vibration from the proposed development.

7.2.2 CRITERIA FOR RATING OF IMPACTS

The significance of noise and vibration impacts has been assessed in accordance with the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015 (see Tables 7.1 to 7.3 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 7.1 Quality of Potential Effects

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 as follows:

Table 7.2 Significance of Effects

Significance of Effects on the Receiving Environment	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:

Table 7.3 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

Relevant Criteria

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. In lieu of statutory guidance, an assessment of significance has been undertaken as per British Standard *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise.*

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 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;*
- *75dB in urban areas near main roads in heavy industrial areas.*

Given the suburban location of the facility, a limit value of 70dB LAeq,T for construction is considered to be reasonable in order to avoid significant impacts.

The noise criteria referred to above are also in agreement with those set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[1], which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 7.4 sets out these levels.

Table 7.4 Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Days and Times	Noise Levels (dB re. 2x10^{-5} Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

1 *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland

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 12.5 mm/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 7.5 are recommended.

Table 7.5 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 0.3 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin 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.

Operational Phase - Noise

The main potential source of outward noise impact associated with the proposed development relates to additional traffic flows on the surrounding road network. Potential noise impacts also relate to operational plant and fixed installations (e.g. sub stations) serving the apartment buildings, commercial, retail and creche facilities. Other potential sources include internal traffic movements/ car parking and on-site activities associated with the non-residential elements of the proposed development. Relevant criteria used to assess these potential impacts are discussed below.

Road Traffic Noise Assessment Criteria

Given that traffic from the 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 development.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 7.6 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 7.6 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 7.6 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 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

Mechanical and Electrical Sources

In relation to external services plant noise to off-site noise sensitive locations, reference is made to *BS 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound*. This document describes methods for rating and assessing sound of an industrial and/or commercial nature to a residential receptor. The methods described in this standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The results of baseline surveys will define the prevailing background sound level at the nearest noise sensitive locations. This will allow for the noise impact associated with proposed new external plant items to be assessed. With reference to BS 4142:2014, it is noted that, depending on context, adverse impacts are likely to occur when rated plant sound level exceeds the prevailing background sound level by +5dB, with a significant adverse impact occurring at +10dB or more. Where the rating level does not exceed the background sound level, BS 4142 comments that this is an indication of the specific sound source having a low impact, again depending on the context.

Noise Sources Generally

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 7.7.

Table 7.7 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 7.7 above.

- Daytime / Evening (07:00 to 23:00 hours) 50 - 55dB LAeq,1hr
- Night-time (23:00 to 07:00 hours) 45dB LAeq,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 draft 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 7.8 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 7.8 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
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 levels

7.3 Baseline Environment

The proposed development is located off the R105 Howth Road, Co. Dublin on an existing brownfield site. The site is bound to the north by the DART rail line and the coast beyond, by the R105 Howth Road to the south with residential dwellings beyond and to the east and west by residential dwellings. The principal receptors external to the proposed development are those located along the eastern boundary ("Ashbury" residential property), dwelling houses and Marine Villas apartments buildings along the south-eastern boundary off the Howth Road.

The main noise sources in the area are from road traffic, passing DART trains, and general sub urban noise sources including rustling foliage, birdsong and pedestrians.

7.3.1 Noise Surveys

An attended survey was conducted over the course of a typical weekday in order to quantify the existing noise environment. In addition, an unattended noise survey was undertaken along the northern site boundary in proximity to the DART railway line to inform the assessment of rail noise across the site. The surveys were 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 measurement locations were selected as shown in Figure 7.1 and described below.

Location N1 is located to the south west of the development site at a distance of approximately 30m from the road edge. The location was chosen to represent noise levels at adjacent residential properties at similar distances from the road and to determine noise levels within the site along this boundary.

Location N2 is located within the mid-section of the development site at a distance of approximately 60m from the road edge. The location was chosen to determine noise levels within this area of the site between the rail line and the Howth road. The location is also representative of existing properties set back at similar distances from the Howth Road to the south of the development site.

Location N3 is located along the south east of the development site at a distance of approximately 10m from the road edge. The location was chosen to represent noise levels at adjacent residential properties at similar distances from the road and to determine noise levels within the site along this boundary.

Location N4 is located along the northern site boundary of the development site along the immediate boundary line with the DART railway line. An unattended noise meter was installed at this position for a period of 4 days. The location was chosen to determine noise levels along this boundary within the site.

Figure 7.1 Baseline Noise Monitoring Locations

Survey Periods and Instrumentation

Attended noise measurements were conducted at Locations N1 to N3 between 13:00 to 15:42 hours on 19 March 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.

Unattended noise measurements were conducted at Location N4 between 8 and 11 March 2019.

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 monitoring locations are summarised below.

Location N1

Table 7.9 below presents the noise survey data recorded at Location N1.

Table 7.9 Noise Survey Results at Location N1

Start Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
	L_{Aeq}	L_{AFmax}	L_{AF10}	L_{AF90}
13:00	53	62	56	49
13:55	54	64	56	50
14:51	54	66	55	50

During the noise survey, the dominant noise sources were noted to be from road traffic along the R105 Howth Road, birdsong and passing DART train. The waste water treatment plant (WWTP) to the north of this monitoring position was not audible during the survey. Ambient noise levels were measured in the range of 53 to 54dB L_{Aeq}. The background noise was measured in the range of 49 to 50dB L_{A90} with coastal sources and distant traffic being the dominant sources noted.

Location N2

Table 7.10 presents a summary of noise levels measured at Location N2.

Table 7.10 Noise Survey Results at Location N2

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
13:18	54	65	56	49
14:14	54	73	57	51
15:08	54	66	56	50

During the noise survey, the dominant noise sources were noted to be from road traffic along the R105 Howth Road, birdsong, passing DART trains and pedestrians conversing nearby. Ambient noise levels were measured 54dB LAeq during all survey rounds. The background noise was measured in the range of 49 to 51dB L_{A90} with coastal sources and distant traffic being the dominant sources noted.

Location N3

Table 7.11 below presents a summary of noise levels measured at Location N3.

Table 7.11 Noise Survey Results at Location N3

Start Time	Measured Noise Levels (dB re. 2x10^{-5} Pa)			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
13:36	61	76	64	56
14:32	61	72	63	55
15:27	61	77	63	54

During the noise survey, the dominant noise source were noted to be from road traffic along the R105 Howth Road. Other sources were noted to be from passing DART trains (including horn sounding), pedestrians conversing and bird song. Ambient noise levels were measured 61dB L_{Aeq} during all survey rounds. The background noise was measured in the range of 54 to 56dB L_{A90} with road traffic being the dominant background source noted. The L_{AFmax} noise levels were governed by vehicles passing along the Howth Road and a Dart Horn sounding during the second monitoring round.

Location N4

Table 7.11 below presents a summary of daytime (07:00 to 23:00hrs) noise levels measured at Location N4.

Table 7.12 Daytime Noise Survey Results at Location N4

Date	Measured Noise Levels $L_{Aeq,T}$, dB			
	Daytime $L_{Aeq,16hr}$			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
08/03/2019	67	93	55	49
09/03/2019	67	94	54	48
10/03/2019	65	93	56	50
11/03/2019	69	94	68	48
Average/ Range	66	94	55	49

Measured daytime noise levels at Location N4 were dominated by road passing rail traffic along the DART line when passing and occasional sounding of train horns. Noise levels during the remainder of monitoring period were dominated by traffic along Howth Road and seascape noise. The waste water treatment plant (WWTP) to the north of this monitoring position was not audible during the survey. Average ambient noise levels during daytime periods were in the range of 65 to 69dB L_{Aeq},16hr with an average value of 66dB L_{Aeq},16hr being recorded. Background noise levels were measured in the range of 48 to 50dB L_{A90} which were influenced by road traffic along the Howth Road and background seascape noise. Maximum noise level relate to individual DART trains passing by the monitoring location, measured in the range of 93 to 94dB L_{AFmax}.

Table 7.13 below presents a summary of night-time (23:00 to 07:00hrs) noise levels measured at Location N4.

Table 7.13 Night-time Noise Survey Results at Location N4

Date	Measured Noise Levels $L_{Aeq,T}$, dB			
	Night-time $L_{Aeq,16hr}$			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
09/03/2019	60	91	53	43
10/03/2019	58	94	49	40
11/03/2019	60	92	51	42
Average/ Range	59	94	51	42

Measured night-time noise levels at Location N4 were dominated by road passing DART along the rail line between the hours of 23:00 to 01:30 and 05:45 to 07:00hrs. Noise levels during the remainder of monitoring period were dominated by traffic along Howth Road and seascape noise. Average ambient noise levels during the 8 hours night-time period were in the range of 58 to 60dB L_{Aeq},8hr with an average value of 59dB L_{Aeq},8hr being recorded. Background noise levels were measured in the range of 40 to 43dB L_{A90} with an average value of 42dB L_{A90} being recorded. Maximum noise level relate to individual DART trains passing by the monitoring location, measured in the range of 91 to 94dB LAFmax. During lulls in DART movements, maximum values were of the order of 55 to 60dB L_{AFmax}.

Baseline Summary

The baseline environment within the development site is found to be typical of a suburban environment where road traffic, passing DART trains, pedestrian activities and environmental sources including bird song and coastal sources are the main contributors to the noise environment

7.4 Impact of Proposed Development – Construction Phase

7.4.1 Construction Noise

The construction phase will be undertaken over a number of phases from site preparation through to building construction and internal fit out. The overall construction period will take place over an approximate 3 year period. The sequence of proposed construction works is outlined in the Construction Management Plan (CMP). In terms of the potential noise and vibration impacts, the key phases are considered to be:

- Site clearance including demolition of existing structures;
- Basement Excavations;
- Foundations Piling, and
- Superstructure of main buildings

The impact at nearby noise sensitive buildings will depend upon a number of variables, the most notable of which are:

- the amount of noise generated by plant and equipment being used at any one time, expressed in terms of sound pressure or sound power;
- the periods of operation of the plant at the development site, known as the “on-time”;
- the distance between the noise source and the receptor, and;
- the attenuation due to ground absorption or barrier screening effects from walls, buildings, site hoarding etc.

The construction phase will be controlled through the use of construction noise limits (Table 7.4) which the contractor will be required to work within. In this regard, the choice of plant, scheduling of works on site, provision of localised screening and other best practice control measures will be employed in order to ensure noise limits are not exceeded. Given the construction phase is highly transient in nature and involves a number of various phases which will encompass a range of different activities on a day to day and week to week basis, it is not possible to calculate with a high degree of accuracy the specific levels of noise associated with each phase.

It is possible, however, to determine a range of likely scenarios which represent the key construction phases. These can be used to identify potential phases which will require noise mitigation.

Source data for operating construction plant items have been obtained from *BS 5228-1: Noise. 2009+A1:2014*. This document provides sound power data per octave band which can be used for individual source items.

Reference to *BS 5288-1* indicates that highest noise levels are associated with activities likely to be required during the initial stages of the construction phase including building demolition, ground surface and rock breaking and secant piling works. Ground breaking will be required as part of the demolition phase during the clearance of existing hardstanding areas. Rock breaking will be required at lower depths of the basement excavations (at approximately 4m below ground level). Seacant piled walls will be required as part of the basement construction. Noise levels from these activity types are typically in the range of 85 to 95dB L_{Aeq} at 10m. These activities generate the highest noise levels but are limited to specific periods, normally during the earlier site preparation and foundation stages.

For construction works associated with activities such as site clearance, excavation and fill, including excavators, loaders, dozers, cranes, generators, concreting works etc. noise levels are typically in the range of 70 to 80dB L_{Aeq} at 10m.

For construction work areas with lower noise levels such as site compounds (for storage, offices and material handling, generators etc.), smaller items of mobile plant (excavators, cranes, dozers), landscaping and concreting works with lower noise emissions, construction noise levels of 70 to 75dB L_{Aeq} at 10m are typical .

The closest noise sensitive properties to the proposed development are at distances of approximately 20m along the eastern site boundary. Other noise sensitive properties are located at distances of 30 to 70m to the south of the site at residential properties and St Mary’s Church along the Howth Road.

In order to assess potential noise impacts during the construction phase at the closest noise sensitive locations to the construction works, noise levels have been calculated at a range of distances from on-site activities associated with the different work phases.

For the purposes of a “worst case” assessment, the following plant items and their related on-time have been assumed for each of the key construction phases as set out in Table 7.14.

Table 7.14 Construction Activity Assumed for Various Phases of the Construction Programme

Construction Programme Phase Note 1	Plant Item	No of items	BS 5228 Ref	% On time	Sound Pressure, L_p dB(A) at 10m
Phase A: Site Clearance & Demolition	Hand-held pneumatic breaker	2	C1.6	66%	83
	Breaking up brick foundations Breaker mounted	2	C1.9	66%	90
	Dumping brick rubble tracked excavator (loading)	2	C1.10	66%	85
	Dozer/track excavator	2	C2.1	66%	75
	Crushing concrete/rubble tracked crusher	1	C1.14	50%	82
Combined Sound Pressure at 10m					92
Phase B Basement excavations	Dozer	2	C2.10	66%	80
	Tracked excavator	4	C2.15	66%	76
	Breaker mounted on wheeled backhoe	3	C1.1	66%	92
	Crushing concrete/rubble tracked crusher	2	C1.14	45%	82
	Ground Anchors	2	C.9.4	20%	87
Combined Sound Pressure at 10m					94
Phase C Piled Foundations	Crane mounted auger	2	C3.16	50%	79
	Tracked excavator	2	C3.23	66%	68
	Concrete pump	2	C3.25	50%	78
	Tracked mobile crane	2	C3.28	66%	67
	Concrete mixer truck	2	C4.20	66%	80
Combined Sound Pressure at 10m					84

Construction Programme Phase Note 1	Plant Item	No of items	BS 5228 Ref	% On time	Sound Pressure, L_p dB(A) at 10m
Phase D Piling and Basement Foundation Slab Construction	Crane mounted auger	2	C3.16	50%	79
	Tracked mobile crane	2	C3.28	66%	67
	Concrete pump	2	C3.25	66%	78
	Concrete mixer truck	2	C4.20	40%	80
	Tower crane	2	C4.48	66%	76
Combined Sound Pressure at 10m					85
Phase E Building Construction	Tracked mobile crane	2	C3.28	40%	78
	Concrete pump	2	C3.25	50%	67
	Concrete mixer truck	2	C4.20	50%	80
	Tower crane	2	C4.48	66%	76
	Wheeled loader	2	C9.7	50%	76
Combined Sound Pressure at 10m					84

Note 1: Construction Phases A to E in Table 9.14 are for reference only within this chapter. Please refer to the CMP for specific phase information and identification.

For each of the individual phases, the total sound pressure noise level assumed ranges between 84 to 94dB L_{Aeq} at 10m. This assumes that all of the items of plant listed for each phase are operating simultaneously and is therefore considered to represent a worst case scenario.

Construction noise levels associated with each of the key phases have been calculated at three locations (NSL1 to NSL 3) representative of the closest noise and vibration sensitive locations to the proposed development illustrated in Figure 7.2.

Figure 7.2 Noise and Vibration Assessment locations

Table 7.15 presents the calculated noise levels at the three assessment locations. The calculations take account of the assumed construction plant items and scenarios in Table 7.13 and also take into account the proposed 2.4m high construction site hoarding that will form the site boundary as part of the initial enabling works. All works are assumed to occur along the closest site boundaries to these properties.

Table 7.15 Construction Activity Assumed for Various Phases of the Construction Programme

Location	Predicted Construction Noise Levels, dB $L_{Aeq,1hr}$				
	Phase A	Phase B	Phase C	Phase D	Phase E
NSL 1	80	81	73	72	71
NSL 2	79	80	71	80	76
NSL 3	71	72	64	64	68

Highest noise levels are calculated during the initial works phase where site clearance, demolition and excavation works are taking place along the closest site boundaries. During all scenarios the recommended construction noise level of 70dB L_{Aeq},1hr is likely to be exceeded at the noise sensitive locations along the eastern boundary when activities are working along the immediate site boundary in proximity to these dwellings.

Given the variations of on-site activities and number of plant items during any one phase and the location of works only operating along the closest boundaries for a limited duration of the works, the calculated noise levels presented are considered to present a worst-case temporary scenario.

When works are occurring further within the site away from the immediate boundary of NSL1, noise levels will be more in line with those calculated for Locations NSL2 and NSL3 representing distances of 30 to 70m from the construction activities. At these distances, construction noise levels have the potential to just exceed the construction noise criterion of 70dB L_{Aeq},1hr during the initial work phases where high noise activities will occur. This is likely to occur when construction activities are occurring along the immediate southern site boundaries in closest proximity to these dwellings. For the remaining phases, construction noise levels are calculated to reduce sufficiently to within the relevant adopted criterion.

The results of the initial assessment indicate that under the 'worst case' assessment scenarios construction activities are likely to exceed the recommended noise threshold levels at the closest noise sensitive locations when occurring along the closest boundaries. Noise mitigation measures will therefore be required to reduce potential impacts at these residential properties to avoid significant impacts. Further discussion on mitigation measures are included in Section 7.7.1.

7.4.2 CONSTRUCTION VIBRATION

The main potential source of vibration during the construction programme is associated with piling and ground excavation / rock breaking activities depending on the methodologies used. The piling methodology will depend on the ground conditions and the elements under construction (e.g. secant walls, building foundations). In terms of piling, low vibration methods involving bored or augured piles will be used where possible to minimises the vibration levels generated as it is a non-percussive piling technique. Where impact driven piling is required for certain constructions, higher noise and vibration levels will be generated.

For the purposes of this assessment, vibration levels associated with driven piles are assessed in order to determine potential worst-case impacts. British Standard *BS 5228 – Part 2: Vibration*, includes measured magnitude of vibration associated with different piling types. Table 7.16 reproduces those associated with steel sheet piling.

Table 7.16: Vibration Magnitudes associated with Sheet Steel Piling

Soil Conditions	Pile Dimensions	Distance, m	PPV, mm/s
Very soft to soft (0 – 10m), soft to medium clay (10 – 20m)	U-shaped LX 16 sheet piles	4.8 – 24	4.3 – 0.5
(not provided)	U-shaped piles	7.1	0.3 – 0.7
Made ground 0 – 3m, loose and very dense sand and silt 3 – 17m, firm to stiff clay 17 – 25m	244mm diameter driven tubular steel piles	5 – 20	13.9 – 4.3

Soil Conditions	Pile Dimensions	Distance, m	PPV, mm/s
Made ground 0 – 3m, loose and very dense sand and silt 3 – 17m, firm to stiff clay 17 – 25m	275mm driven square piles	5 – 20	11.4 – 4.3

The vibration magnitudes outlined in Table 7.15 indicate that at distances beyond 20m, vibration magnitudes are significantly reduced to well below those associated with any form of cosmetic damage for both structurally sound or more vulnerable buildings. Considering the vibration levels beyond the immediate site works, vibration levels at the nearest buildings will remain below vibration limit values included in Table 7.5 to avoid any form of cosmetic or structural damage to buildings.

The range of vibration levels for driven steel piles have the potential, however, to be perceptible to occupants of nearby buildings at distances of 20 to 25m which relate to the closest dwellings to the site.

For comparison, typical level of vibration during augured piling have been determined also through reference to published empirical data within BS 5228 – Part 2. The following vibration magnitudes associated with rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock are summarised below:

- 0.54mm/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 augured piling rigs, vibration levels at the nearest buildings are unlikely to pose any significance in terms of cosmetic or structural damage. In addition, the range of vibration levels is typically 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 below the limits set out in Table 7.5 to avoid any cosmetic damage to buildings.

During ground breaking during the excavation phase, vibration will be generated through the ground. Empirical data for this activity is not provided in the *BS 5228- 2:2009+A1:2014* standard, however the likely levels of vibration from this activity will be significantly below the vibration criteria for building damage on experience from other sites. AWN Consulting have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator
- 6 tonne hydraulic breaker on large Liebherr tracked excavator

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged between 0.48 and 0.25 PPV (mm/s) at distances of 10 to 50m respectively from breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 and 0.24 PPV (mm/s) at distances of 10 to 50m respectively.

The range of values recorded provides some context in relation typical ranges of vibration generated by construction breaking activity likely required on the proposed site. The range of vibration magnitudes indicate vibration levels at the closest neighbouring buildings are likely to be orders of magnitude below the limits set out in Table 9.5 to avoid any cosmetic damage to buildings. Vibration levels have the potential, however, to be perceptible within residential dwellings immediately along the site boundary if works are taking place at the distances discussed above.

Demolition of existing structures will involve careful deconstruction using controlled techniques. There may be a requirement for breaking ground as part of specific demolition procedures, depending on the structure. Vibration levels associated with this activity will be of similar or lower magnitude to ground breaking discussed above.

Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration criteria set out in Table 9.5 during all activities. Further discussion on mitigation measures during this phase are discussed in Section 7.7.1.

7.4.3 SECONDARY

There are no likely secondary potential impacts over and above those discussed in Section 7.4.2 above.

7.4.4 CUMULATIVE

There are three development sites with planning permission granted for development nearby to the proposed development.

- F18A/0267, granted in November 2018 to the Department of Agriculture, Food and Marine, relates to 2 no. ground level industrial buildings at West Pier, Howth. The units will be used for light industrial activities such as repair and maintenance of maritime and fishing equipment and ancillary storage. This development is some 140m from the proposed development site.
- F17A/0553, granted in December 2017 to Oceanpath Ltd for development at existing food processing facility within Claremont Industrial Estate, West Pier, Howth. The permitted development consists of a two-storey extension of existing premises for food processing, its storage and distribution and a factory retail outlet. This development is some 100m from the proposed development site.
- F18A/0074, granted in August 2018 to the Department of Agriculture, Food and the Marine relates to the provision of 130m long quay wall; associated deck area, road access, hard standing; localised dredging to facilitate works, dredging to -4m Chart Datum along the front of new quay wall to provide berthing depth and land reclamation of approximate 0.30 Ha on the east side of middle pier. This development is some 500m from the proposed development site.

A planning application for 3 no. apartment blocks and ancillary uses including commercial and retail space off Balscadden Road is being sought by Crevak Trading GP Ltd. The location of this application site is approximately 800m from the proposed development.

In the event that construction activities are taking place at the above mentioned sites concurrently with the construction of the proposed development, there is potential for cumulative noise impacts to occur. Due to the proximity and nature of construction works associated with the proposed development, however, noise levels from this site will dominate the noise environment when occurring in proximity to the noise sensitive locations along its immediate boundary. The contribution from other sites will therefore have slight impact (i.e. will be at least 10dB below those associated with the proposed development) such that the construction noise levels discussed in Table 7.14 remain a representation of a worst case analysis.

7.5 IMPACT OF PROPOSED DEVELOPMENT – OPERATIONAL PHASE

During the operational phase of the development, the primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network, mechanical and electrical services used to service the various retail, amenity, creche and gym buildings in addition to any potential noise breakout from the day to day operation of the non-residential elements of the proposed development as listed above.

Due to the nature of the proposed development, there are no sources of vibration in the operational context.

7.5.1 ADDITIONAL TRAFFIC ALONG SURROUNDING ROAD NETWORK

Traffic flows associated with the operational phase of the proposed development have been provided by Barrett Mahony (BM) Consulting Engineers. Information on development related traffic onto the existing road network has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding the proposed development for the opening year of 2022 and design year of 2037. The information is provided for both the Do Nothing scenario (i.e. the proposed development is not built) and the Do Something scenario which assumes the full development is constructed and operational.

Table 7.17 summarises the calculated change in noise levels along the assessed road links associated with the addition of development related traffic.

Table 7.17: Calculated Increase in Traffic Noise Along Surrounding Roads

Location	2022 Do Nothing	2022 Base Plus Development	Calculated Change in Noise Levels, dB
	Total Vehicles (AADT)	Total Vehicles (AADT)	
Howth Road (west)	9,222	10,256	+0.5
Carrickbrak Road	8,406	8,923	+0.3

Church Road	1,722	1,722	+0.0
Howth Road (east)	7,940	8,974	+0.5
Location	2037 Do Nothing	2037 Base Plus Development	Calculated Change in Noise Levels, dB
Howth Road (west)	10,628	11,716	+0.4
Carrickbrak Road	9,737	10,254	+0.2
Church Road	1,995	1,995	+0.0
Howth Road (east)	9197	10,232	+0.5

The assessment has indicated that traffic volume increases are negligible when added to the existing road network. The calculated change in traffic noise less than 1dB(A) along all link roads in the immediate vicinity of the development site.

Reference to Table 7.6 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 development related traffic along the surrounding road network is an imperceptible impact of long-term, neutral effect.

7.5.2 Mechanical and Electrical Services

The principal items of building mechanical and electrical services plant will be associated with the retail, café, restaurants, units proposed as part of the overall development in Blocks C and D in addition to communal areas, gym and creche in Blocks A and B. The specific requirements for mechanical and electrical plant items for each element of these units has not yet been progressed at this stage of the design. The layout plans for these development buildings, however, illustrates the location of plant areas within basement and lower ground floor plant rooms which are significantly screened from the nearest noise sensitive locations. Depending on the operational plant requirements, however, basement or other plant rooms will likely require ventilation to atmosphere via louvered areas and or ground or wall ventilation. These items have the potential to operate over day and night-time periods, depending on the operational phasing, there will be a requirement for operational items of plant to operate over specifics of the units.

The closest off-site noise sensitive locations to potential operational plant noise sources is the residential property to the east of Block D. The site layout and selection of plant will be designed so that there is no negative impact on noise sensitive locations within the development itself and at the closest noise sensitive locations external to the site. Operational plant noise levels at the residential dwellings within the development itself will be controlled to ensure the internal noise levels from BS8233 (2014) for residential dwellings are not exceeded. These are included in Table 7.7 and are reproduced below.

- Daytime: 40dB L_{Aeq} within living rooms/ kitchen areas
  35dB L_{Aeq} within bedrooms
- Night-time 30dB L_{Aeq} within bedrooms

Noise levels associated with mechanical and electrical services plant at the existing noise sensitive locations outside the development boundary will therefore also be well controlled. Operational noise limits relating to fixed plant items at existing noise sensitive locations will be designed to ensure compliance with BS 4142 (2014) such that adverse impacts are avoided. The results of baseline surveys of the prevailing background sound level will be used to set appropriate operational limit values. Based on the survey results undertaken at Location N3 (Refer to Section 7.3.1) cumulative noise levels associated with mechanical and electrical services at the nearest noise sensitive location will be controlled to not exceed a total noise level of 50dB $L_{Aeq,T}$ during daytime periods and 40dB $L_{Aeq,T}$ during night-time periods at the façade of the closest noise sensitive locations.

Taking account of the site layout, location of plant areas below ground level and distance to nearest noise sensitive locations, the potential noise impact from these sources are expected to be well controlled and the adopted criteria readily achieved.

7.5.3 Service Areas to Retail Units

Vehicular traffic service the retail units for loading and unloading of goods will access the site adjacent to Block C and access the basement parking and service area for retail units. Service areas for the anchor retail and smaller retail units within the site will therefore be substantially enclosed and hence screened from residential dwellings within the site and those external to the site such that resultant noise impacts will be negligible.

7.5.4 Noise from General On-Site Activities

The residential tenant amenity spaces will be located within the apartment buildings at ground floor level which include concierge areas (Blocks A, B and C), a communal function room (Block A), lounge areas (Blocks A and B), gymnasium (Block A) and creche (Block B). The retail elements of the development are located within Blocks C and D.

For the gymnasium, amenity function and lounge areas, 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 development buildings, the low noise sources associated with these spaces and screening provided by development buildings to off-site noise sensitive locations.

The key consideration relating noise impacts from amenity, commercial and creche areas relates to controlling airborne and structure borne noise transfer to residential apartments located above. In line with Building Regulations (TGD Part E), suitable noise control measures are required between residential and non-residential parts of new buildings. A higher standard of sound insulation will be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations, the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. The specifics of the required sound insulation for these spaces will be progressed at the building detailed design stage.

The nearest noise sensitive locations to the retail/café/restaurant areas in Blocks C and D are residential apartments within the development itself. Outside the site boundary, the closest off-site noise sensitive properties are located to the east and south (NSL's 1 to 3 in Figure 7.2) . There are no significant operational noise levels associated with these areas assuming typical day to day activities associated with a retail/restaurant/ café as majority of activities will be housed internally. Potential impacts are associated with noise breakout from any amplified music or external seating areas, particularly during late evening or night-time periods, where relevant. Music noise from within the units will be limited to achieve a level of inaudibility inside the nearest off-site residences, particularly during night-time operational hours, where relevant. Noise breakout should typically be limited to an external level of 35dB LAeq,5min at the façade of any nearby noise sensitive location. In addition, there should be no clearly audible tonal or impulsive component to the noise build-up at nearby noise sensitive location.

An external play area associated with the creche area (Block B2) is located to the mid north portion of the site. This area is located along the boundary of the site with highest ambient noise levels dominated by rail traffic noise and is well separated from off-site noise sensitive locations. There are no significant perceptible noise impacts associated with this area outside the development boundary.

Taking into account the above considerations, the likely impact associated with on-site activities serving the proposed development will be not significant, with long term, neutral effects.

7.5.5 Cumulative

There are no likely cumulative noise impacts associated with the proposed development and other developments in the areas. The noise limits set for off-site noise sensitive locations are designed to avoid any significant increase in the prevailing background noise environment. Operational noise limits included in this report refer to cumulative noise from all fixed installations on site. The design of plant and other fixed installations will be progressed during the design stage to ensure the noise limits at off site noise sensitive locations are not exceeded.

7.6 'Do Nothing' Impact

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain unchanged. The noise levels recorded during the baseline noise environment are considered representative of the Do-Nothing scenario.

7.7 Mitigation Measures

7.7.1 Construction Phase

Noise

The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations,* 2001. These measures will ensure that:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;

- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen;

BS 5228 -1:2009+A1 2014 includes guidance on several aspects of construction site practices, which include, but are not limited to:

- Selection of quiet plant
- Control of noise sources
- Screening
- Hours of work
- Liaison with the public

Further comment is offered on these items in the following paragraphs, however specific control measures relating to construction activities undertaken by the contractor will be set out within the Construction Environmental Management Plan (CEMP) to be prepared in advance of the works. An Outline Construction Environmental Management Plan (OCEMP) has been prepared as part of this application to address the key environmental impacts and sets out the key environmental controls. In relation to noise and vibration control the OCEMP includes outline best practice measures from BS 5228 (2009 +A1 2014). These are also discussed in the following sections.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location.

Selection of Quiet Plant

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 of plant will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether or not said item can be replaced with a quieter alternative.

For static plant such as compressors and generators used at work areas such as construction compounds etc., the units will be supplied with manufacturers' proprietary acoustic enclosures where possible.

In order to reduce noise levels during the works phases with highest noise levels (site clearance, demolition, ground breaking etc.) when occurring along the closest boundaries, the contractor will evaluate the choice of excavation, breaking or other working method taking into account various ground conditions and site constraints. Where possible, where alternative lower noise generating equipment that would economically achieve, in the given ground conditions, equivalent structural / excavation / breaking results, these will be selected to minimise potential disturbance.

The decision regarding the excavation techniques, rock breaking, crushing etc. to be used on a site will normally be governed by other engineering, environmental constraints. In these instances, it may not be possible for technical reasons to replace a noisy process by a quieter alternative. Even if it is possible, the adoption of a quieter method may prolong the overall process, the net result being that the overall disturbance to the community will not necessarily be reduced.

General Comments on 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 or the best practice use of equipment and materials handling to reduce noise.

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant will be switched off when not in use and not left idling;
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it is possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover;
- For percussive tools such as pneumatic concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker ‘tool’ and ensuring any leaks in the air lines are sealed. Erection of localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries are other suitable forms of noise reduction;
- For all materials handling, the contractor will ensure that best practice site noise control measures are implemented including ensuring that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials, where relevant.
- Where compressors, generators and pumps are located in areas in close proximity to noise sensitive properties/ areas and have potential to exceed noise criterion, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation;
- Resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can be controlled by fixing resilient materials in between the surfaces in contact;
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically, screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source. BS 5228 -1:2009+A1 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice, screens constructed of materials with a mass per unit of surface area greater than 10kg/m2 will give adequate sound insulation performance.

Construction noise calculations have assumed a partial line of sight (-5dB) is achieved using a solid 2.4m high standard construction site hoarding. It will be a requirement for works occurring in proximity to the closest noise sensitive locations (NSL1) that the line of sight is further blocked such that a reduction of at least 10dB is achieved between the noise sensitive façade and construction activities. A reduction of this order can be achieved using a higher perimeter screen or using localised screening around specific items of plant.

Annex B of BS 5228-1:2009+A1:2014 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials.

In addition, careful planning of the site layout will also be considered. The placement of temporary site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening during the phasing of works.

Hours of Work

Construction noise impacts will be controlled through strict working hours. Construction activity will take place during daytime hours Monday to Friday and Saturdays. It may be necessary to work outside of these hours for example during service diversion works, concrete finishing and fit out works etc.

Consideration will be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity will be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Liaison with the Public

Clear forms of communication will be established between the contractor and noise sensitive areas in proximity so that residents or building occupants are aware of the likely duration of activities likely to generate higher noise or vibration.

The duration of piling, excavation, breaking and other high noise or vibration activities works is usually short in relation to the length of construction work as a whole, and the amount of time spent working near to sensitive areas can represent only a part of the overall period. Subjective impacts during these phases can be significantly reduced if timelines and potential impacts are known in advance.

A designated noise liaison officer will be appointed to site during construction works. All noise complaints will be logged and followed up in a prompt fashion by the liaison officer.

Construction Noise MM CP 1
All construction works will be required to operate within the Construction Noise Limits Outlined in Table 7.4 of the EIAR. The contractor will be required to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014

Vibration

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the proposed development will not give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period:

- A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars;
- Alternative less intensive working methods and/or plant items shall be employed, where feasible;
- Appropriate vibration isolation shall be applied to plant, where feasible;
- Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

Construction Noise MM CP 2
All construction works will be required to operate within the Construction Vibration Limits Outlined in Table 7.5 of the EIAR.

7.7.2 OPERATIONAL PHASE

Mechanical and Electrical Services

The development will be designed to ensure that the design goals outlined in Table 7.7 are achieved for occupants of the dwelling units within the proposed development.

The following forms of noise control techniques may need to be employed as part of the detailed design stage to ensure these limits are not exceeded:

- duct mounted attenuators on the atmosphere side of air moving plant;
- splitter attenuators or acoustic louvres providing free ventilation to internal plant areas;
- solid barriers screening any external plant;
- anti-vibration mounts on reciprocating plant.

In addition to the above, we propose that the following practices are adopted to minimise potential adverse noise impacts.

- All mechanical plant items e.g. motors, pumps etc. shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised;
- Any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document.

Control of Noise from On-Site Activities

At this stage it is not possible to definitively state what mitigation measures are required to ensure control of noise breakout from non-residential areas, however, the following issues, amongst others, may be considered during the detailed design stage:

Appropriate Linings	Proposed constructions (e.g. separating walls and floors) will be reviewed in order to determine whether additional measures are required in order to control noise transfer within residential buildings and also to control breakout noise to atmosphere.
Glazing	Where glazing is proposed in the design, the installed elements will offer an appropriate sound insulation performance in order to minimise noise break out to the environment.
Doors	Access to noisy internal areas (e.g. music noise from gyms or function areas) from external locations may require acoustic lobbies with double doors separated by an appropriate distance. Access to areas from other locations within the demise should be via doors offering good acoustic performance. All doors required to offer good acoustic performance should be a thick solid core timber construction and should have proprietary acoustic seals on head, jambs and meeting stiles.
Ventilation	Ventilation should be supplied by suitably attenuated mechanical means. Once details of the proposed building services installation are known, consideration should be given to the potential for any music or other potential high noise sources breakout to atmosphere via ductwork; the potential for services noise transfer to both external and internal areas.

Noise MM OP 1
The operation of all fixed plant installations will be designed to achieve the internal noise criteria included in Table 7.7 of the EIAR.

7.8 RESIDUAL IMPACTS

7.8.1 CONSTRUCTION PHASE

During the construction phase, the assessment has determined that noise impacts will be negative moderate short-term and, in some instances, negative significant and temporary depending on the activities involved at the closest noise sensitive locations. The use of best practice noise control measures, hours of operation, scheduling of works within appropriate time periods, strict construction noise limits and noise monitoring during this phase will ensure impacts are controlled to within the adopted criteria. Similarly, vibration impacts during the construction phase will be well controlled through the use of low impact equipment and adherence to strict limit values which will be subject to monitoring at the nearest sensitive buildings.

7.8.2 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.

The likely impact from mechanical and electrical services serving the proposed development will be not significant with long-term neutral effects.

The likely impact residential amenity, retail, creche and restaurant areas serving the proposed development will be not significant with long term slight effects.

7.9 INTERACTIONS

In compiling this impact assessment, reference has been made to the project description provided by the project co-ordinators, project drawings provided by the project architects, construction sequencing and phasing provided by the project engineers, and traffic flow projections associated with the development provided by the traffic consultants.
The material assets chapter has considered the impacts of human health including noise taking into account the various potential sources and effects set out in this EIAR chapter. Further comment on human health and noise is discussed below.

7.9.1 PUBLIC HEALTH

Construction Phase

In terms of the noise exposure of workers on site and potential hearing damage that may be caused due to exposure to high levels of noise from machinery and equipment, the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007) provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The employer will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures where necessary.

Operational Phase

Once operational, the nature of on-site sources are comparable to other similar activities in the surrounding area which form part of the ambient noise environment. The noise limits at the nearest noise sensitive locations are set in line with the best practice guidance in order to control any adverse impacts on people. In addition, operational noise limits also align with those set by the WHO Guidelines for Community Noise (WHO 1999) document in order to avoid any daytime annoyance or speech interference. Taking the above into consideration, operational noise levels associated with the development will be = well below any level that has the capacity to cause any risk of long-term exposure to noise on human health. There are no health risks associated with operational noise resulting from the development.

7.10 Difficulties Encountered in Compiling Required Information

No difficulties were encountered in the preparation of this chapter.

7.11 References

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.

Chapter 8

Biodiversity

8.1 INTRODUCTION

This Chapter describes the Biodiversity of the site of the Proposed Development and surrounding environs, with emphasis on habitats, flora and fauna and it details the methodology of assessment. 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), 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). 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).

8.1.1 QUALITY ASSURANCE AND COMPETENCE

Enviroguide's staff members are highly qualified in their field. Professional memberships include the Chartered Institutes of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

All surveying and reporting have been carried out by qualified and experienced ecologists and environmental consultants. Donnacha Woods, Project Ecologist with Enviroguide, undertook the majority of on-site surveys for this report, while desktop research was carried out by Donnacha Woods and Liam Gaffney, Project Ecologist with Enviroguide. 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, with a specialisation in ornithology.

Liam Gaffney has an M.Sc. (Wildlife Conservation and Management) from University College Dublin, and a wealth of experience in desktop research, literature scoping-review, and report writing; as well as practical field experience (large mammals, fresh water macro-invertebrates etc.).

8.1.2 DESCRIPTION OF DEVELOPMENT

The Proposed Development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The Site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

8.1.3 Characteristic of Development relevant to this Chapter

The land-use at the site of the Proposed Development will be changed from industrial and commercial land use to a mixed-use development of residential, retail/commercial uses and a creche.

The Proposed Development Construction Phase elements will include the following:

- Demolition of existing buildings including the existing Techrete factory Teelings Garage and the Garden Centre together with and above and below infrastructure;
- Basement construction including bulk excavation over an area of 6,308m^2 to a depth of 2 meters below ground level (mBGL) (2.8mOD) in the west beneath Block A and over an area of 9,933m^2 to a depth of 5.2mBGL (-0.2mOD) beneath Blocks B, C and D in the mid and eastern portions of the site; and
- During development works it is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe as per Irish Water guidelines;

The Operational Phase of the Proposed Development will include the following:

- Opening up of the Bloody Stream and developing a riparian strip across the site that will include the construction of an open impermeable concrete channel spanning the breadth of the site with underground drainage connections at either ends, a settlement chamber and landscaped banks on either side of the channel.
- Storm water from the development will be managed in accordance with SuDS. It is proposed an extensive green roof that will drain into the Bloody Stream throughout the development. Water collected in the lower ground car park and basement will be collected for outfall into the mains foul sewer;
- The majority of the site will be hard covered with buildings and impermeable pavement on completion of the Proposed Development;
- Disposal of rainfall on permeable paving will be designed to replicate the green field infiltration rate and will therefore not be included in the surface water drainage system. Permeable paving / green areas will be only within the western park and limited areas along the northern and southern boundaries of the site;
- The final layout and change to the landscape and land use, such as the physical building presence ranging in height, such as:
    - Block A, with a maximum of eight storeys;
    - Block B, with a maximum of eight storeys;
    - Block C, with a maximum of eight storeys will provide
    - Block D, with a maximum of seven storeys

8.2 METHODOLOGY

This section details the steps and methodology employed to undertake the Ecological Impact Assessment of the Site of the Proposed Development.

8.2.1 SCOPE OF ASSESSMENT

The specific objectives of the study were to:

- Undertake a baseline ecological survey of the Site and evaluate the nature conservation importance of the Site;
- Assess the direct, indirect and cumulative ecological implications or impacts of the project during its lifetime;
- Where possible, propose mitigation measures to remove or reduce those impacts at the Design and Construction Phases; and
- Achieve the best possible biodiversity outcome from a change in current land use.

8.2.2 DESK STUDY

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

- Information on species records[1] and distributions, obtained from the National Biodiversity Data Centre (NBDC) at *www.maps.biodiversityireland.ie* ;
- Information on waterbodies, catchment areas and hydrological connections obtained from the Environmental Protection Agency (EPA) at www.*gis.epa.ie;*
- Information on bedrock, groundwater, aquifers and their statuses, obtained from Geological Survey Ireland (GSI) at *www.gsi.ie* ;

[1] The proposed development site lies within the 10km grid square O03, the 2km grid square O03T and the 1km grid square O0736. Records from the last 30 years from available datasets are given in the relevant sections of this report.

- 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 Fingal County Council, available at *www.fingal.ie and Dublin City Council at www.dublincity.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 o f the Proposed Development, taken from the Construction Management Plan which has been submitted as a separate document with this planning application.
- Information on the potential for flood events at the Proposed Development site, informed by the Flood Risk Assessment which has been submitted as a separate document with this planning application;
- Information on the Interpretative Ground Investigation Report produced by Golder and Associates which has been submitted as a separate document with this planning application;
- The current conservation status of birds in Ireland taken from Colhoun & Cummins (2013); and
- Findings from survey work undertaken in 2017 by Roger Goodwillie & Associates, Altemar Ltd. and Scott Cawley Ltd. in relation to a previous planning application at the Site of the Proposed Development.

A comprehensive list of all the specific documents and information sources consulted in the completion of this report is provided in Section 8.13 - References.

8.2.3 FIELD SURVEYS

8.2.3.1 Habitat Surveying, Mapping and Evaluation

Habitat surveys of the Site of the Proposed Development were carried out by an ecologist on the 2nd October 2018 and 19th June 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. Habitat categories, characteristic plant species and other ecological features and resources were recorded on field sheets. Habitats within the surrounding area of the Proposed Development were classified based on views from the site and satellite imagery where necessary (Google Earth, Digital Globe and OSI).

8.2.3.2 Bat Surveys

Roost inspection and dusk emergence surveys were carried out by ecologists on 13th September 2018 and 19th June 2019. Potentially important features for bats including each of the Site buildings and some mature trees were studied extensively for potential bat activity.

Buildings within the Site of the Proposed Development were labelled into the following groups:

- B1 = Former *Techcrete* premises comprising complex of large disused warehouses.
- B2 = Former *Howth Garden Centre* premises, comprising main building and several outbuildings.
- B3 = Former *Beshoff Motors* premises, comprising recently occupied car show building.

8.2.3.2.1 Roost Inspection Survey

The roost inspection survey methodology followed the best-practice techniques outlined in the Bat Conservation Trusts "*Bat Surveys for Professional Ecologists*" (3rd edition, 2016) guidelines.

All buildings within the Site 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 When investigating potential bat roosts, best practise methodology referred to in *NRA Guidelines for the Treatment of Bats during the Construction of National Road Schemes,* (NRA, 2006) was implemented.

8.2.3.2.2 Dusk Emergence Survey

The emergence survey followed the latest methodology published by the Bat Conservation Trust in 2016 - *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)*. Three heterodyne bat detectors were used (*SSF Bat2* x2 and *Batbox III*). Visual observations were taken with the aid of powerful L.E.D. torches (*AP Pros-Series 220 Lumens High Performance Spotlights*). The emergence survey commenced at 19:15, approximately 30 minutes prior to sunset (19:45), and lasted until 21:15. The survey was undertaken during favourable weather conditions, e.g. dry with mild temperatures (13-14°C) and calm conditions.

The detectors were tuned up and down in frequently between 25 kHz - 55 kHz as this frequency range is able to pick up the calls of all Irish bat species, excluding Lesser Horseshoe bats (85kHz), which are not known in the area (over 145km northwest near Lough Key, Co. Roscommon is the nearest location that they are known to occur).

8.2.3.2.3 Activity Survey

A post-sunset activity surveys were carried out in relation to the Proposed Development on 19th June 2019.

Survey methodology followed the best-practice techniques outlined in the Bat Conservation Trusts "*Bat Surveys for Professional Ecologists*" (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. A SSF Bat2 super-heterodyne bat detector was used to detect any bat activity within the development site and immediate area. A set transect was walked by an ecologist and the details of all records (peak frequency, species, time, location) were recorded on field sheets and 1:250 field maps.

8.2.3.3 Bird Surveys

An extensive suite of bird surveys was undertaken as part of this assessment and these are described in detail below.

8.2.3.3.1 Wintering Bird Surveys

Wintering bird surveys were carried out at two sites in proximity to the Site of the Proposed Development between November 2018 and March 2019 as detailed below:

- Site 1 (primary): *Claremont Strand* – area of sand flats north of the Site of the Proposed Development; and
- Site 2 (secondary): *Deer Park Golf Course* – areas of grassland habitat south of the Site of the Proposed Development.

The aim of the wintering bird survey was to ascertain the composition, numbers and frequency of species utilising areas in proximity to the Site of the Proposed Development, in order to inform decisions on the potential for disturbance as a result of the Proposed Development.

Surveys at Claremont Strand were conducted in the form of eight individual hourly counts from two pre-defined vantage points on each survey day. Surveys were carried out bi-weekly from November to December 2018, and weekly from January to April 2019. A total of 125 hourly counts from 16 survey days[2] were carried out over the 2018/19 winter season.

Surveys of the grassland habitat at Deer Park Golf Course were undertaken on an *ad-hoc* basis on each survey day, with a total of 36 counts completed over 9 days between January and March 2019.

The wintering bird surveys were scheduled in order to cover over all permutations of tidal conditions and time of day throughout the 2018/19 winter season. All observations were recorded on 1:6,000 grid-ded field maps. Grids were chosen using available in-field landmarks in order to facilitate accurate recordings of flock locations. The following information was recorded at each hourly count:

- Species present;
- Number of birds;
- Activity (e.g. roosting, foraging); and
- Flock locations.

8.2.3.4 Flight-line Surveys

Flight-line surveys were carried out at the Site of the Proposed Development between November 2018 and April 2019. Methodology was adapted from Scottish Natural Heritage's survey methodology for assessment of onshore wind farms (SCH, 2014).

The aim of these surveys was to ascertain the composition, numbers, frequency and heights of species in passage over the Proposed Development site in order to inform decisions on potential disturbance to flight-lines of birds commuting to/from roost sites and/or between feeding sites as a result of the erection of the proposed structures.

A total of 37 twenty-minute observations was undertaken from a pre-determined vantage point over a total of 15 days[3] throughout the 2018/19 winter season. Surveys were concentrated at dawn and dusk in order to gather information on potential flight-lines of birds commuting to/from roost sites but were also undertaken at various times throughout the day in order to gather information on potential flight-lines of birds commuting between feeding sites. The following information was taken for each recorded observation:

- Species;
- Number of birds;
- Flight direction;
- Estimated flight duration over Proposed Development site (0-5, 5-10. 10-15, 15-20, >20 seconds); and
- Estimated average height over Proposed Development site[4].

The flight-line surveys were concentrated on qualifying interests (QI) characterised as "poor" fliers and considered to be more at risk of collision (Eirgrid, 2012). A total of 10 twenty-minute observations was

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[2] 1st November 2018; 22nd November 2018; 4th December 2018; 19th December 2018; 11th January 2019; 16th January 2019; 24th January 2019; 30th January 2019; 6th February 2019; 14th February 2019; 21st February 2019; 28th February 2019, 5th March 2019; 13th March 2019; 20th March 2019; and 30th March 2019.

[3] 1st November 2018; 22nd November 2018; 4th December 2018; 19th December 2018; 11th January 2019; 16th January 2019; 24th January 2019; 30th January 2019; 6th February 2019; 14th February 2019; 21st February 2019; 28th February 2019, 5th March 2019; 13th March 2019; and 20th March 2019.

[4] Heights were estimated based on relative heights to existing site buildings, i.e. <1, 1.5x, 2x etc. These estimations were then converted to actual measurements based on the known building heights.

undertaken at dawn, 11 at dusk and 16 at various other times throughout the day over the 2018/19 winter season.

8.2.3.4.1 Breeding Bird Surveys

A breeding bird survey was carried out on the 27th of May 2019 by Enviroguide Ecologist Eric Dempsey. The survey methodology followed the British Trust for Ornithology's (BTO) *Common Bird Census* (CBS) technique (Bibby *et al.*, 1992), and the equipment used was Opticron Imagic 8 x 42 Binoculars. A pre-determined transect was walked and all bird species encountered were recorded on field sheets, along with the corresponding breeding evidence code (see Appendix I), location (on 1:500 field maps), behaviour and numbers.

8.2.3.5 Mammal Survey

Mammal surveys of the site were carried out in conjunction with other field surveys. The site 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 this survey, the site was searched for tracks and signs of mammals as per Bang and Dahlstrom (2001).

8.2.3.6 Other Fauna

During the course of the habitat surveys at the Proposed Development site, other species of fauna were noted, and these are included in the report where applicable. No marine surveys were required to be carried out as there are no marine Species of Conservation Interest listed for the relevant Natura 2000 sites.

8.2.4 CONSULTATION

The following have been consulted regarding the Proposed Development:

Fingal County Council who confirmed the need for a full Environmental Impact Assessment report for this project (other comments related to AA Screening and NIS)

Department Application Unit - National Parks and Wildlife Service (NPWS);

The following is a summary of the main points highlighted by NPWS in relation to this Chapter:

- provide details of bat surveys and assess impact of lighting; (addressed in 8.2.3.2, 8.5.1, 8.7.1.7, 8.7.2.1 and Appendix III)
- provide details of bird surveys including breeding birds; (addressed in 8.2.3.3, 8.3.4.4 and Appendix I)
- provide details of habitat assessment; (addressed in 8.2.3.1 and Appendix II)
- assess hydrogeological and hydrological impacts of dewatering the site in relation to wetland habitats and species; (addressed in 8.4.2)
- address issue of gulls with high buildings mimicking cliff habitat; (addressed in 8.5.1 Impacts on Birds))
- develop Construction Environment Management Plan (CEMP) for project; (to be submitted with this planning application.

Data of rare and protected species of flora and fauna within the vicinity of the Proposed Development were acquired from the NPWS on 14th March 2019.

8.2.5 ASSESSMENT

The value of the ecological resources, i.e. the habitats and species present or potentially present, was determined using the ecological evaluation guidance given in the National Roads *Authority's 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. Any habitats or species evaluated as being of Local Importance (higher value), or greater, are selected as Key Ecological Receptors (KERs) and are assessed further.

The assessment of the potential effect or impact of the Proposed Development on the identified KERs was carried out with regard to the criteria outlined in the Draft EPA Guidelines (EPA, 2017. These guidelines set out a number of parameters such as quality, magnitude, extent and duration that should be considered when determining which elements of the Proposed Development could constitute impact or sources of impacts.

8.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

8.3.1 SITE OVERVIEW

The Proposed Development site is located along the north side of the Howth Road (R105) and is situated *c*.60m west of Howth DART Station. The site covers a total area of *c*.2.68ha and encompasses the former *Howth Garden Centre*, *Beshoff Motors* and *Techcrete* premises. The site borders the Howth Road to the south and the DART railway line to the north. Claremont beach is located *c*.30m to the north of the site and Howth Castle is situated *c*.260m to the south of the site. The Proposed Development site is primarily composed of buildings and artificial surfaces, some recolonising bare ground and treelines along the R105.

8.3.2 DESIGNATED SITES

Table 1 below presents details of the key ecological features of designated sites with 15km of the Proposed Development and gives their distance from the Proposed Development site. As there are no direct links to any Natura 2000 sites outside this zone or usage of the site by Species of Conservation Interest (SCI) from outside this zone it can be deemed with certainty that there will be no impact on biodiversity outside this 15km buffer zone.

Table 8.1. Designated sites of conservation importance located within 15km of the proposed development site.

Site Code	Site Name	Qualifying Interests	Distance to Site
		Special Areas of Conservation (SAC)	
000199	Baldoyle Bay SAC	- [1140] Mudflats and sandflats not covered by seawater at low tide - [1310] Salicornia Mud - [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows	0.02km
000202	Howth Head SAC	- [1230] Vegetated Sea Cliffs - [4030] Dry Heath	0.79km
000206	North Dublin Bay SAC	- [1140] Mudflats and sandflats not covered by seawater at low tide - [1210] Annual Vegetation of Drift Lines - [1310] Salicornia Mud	1.38km

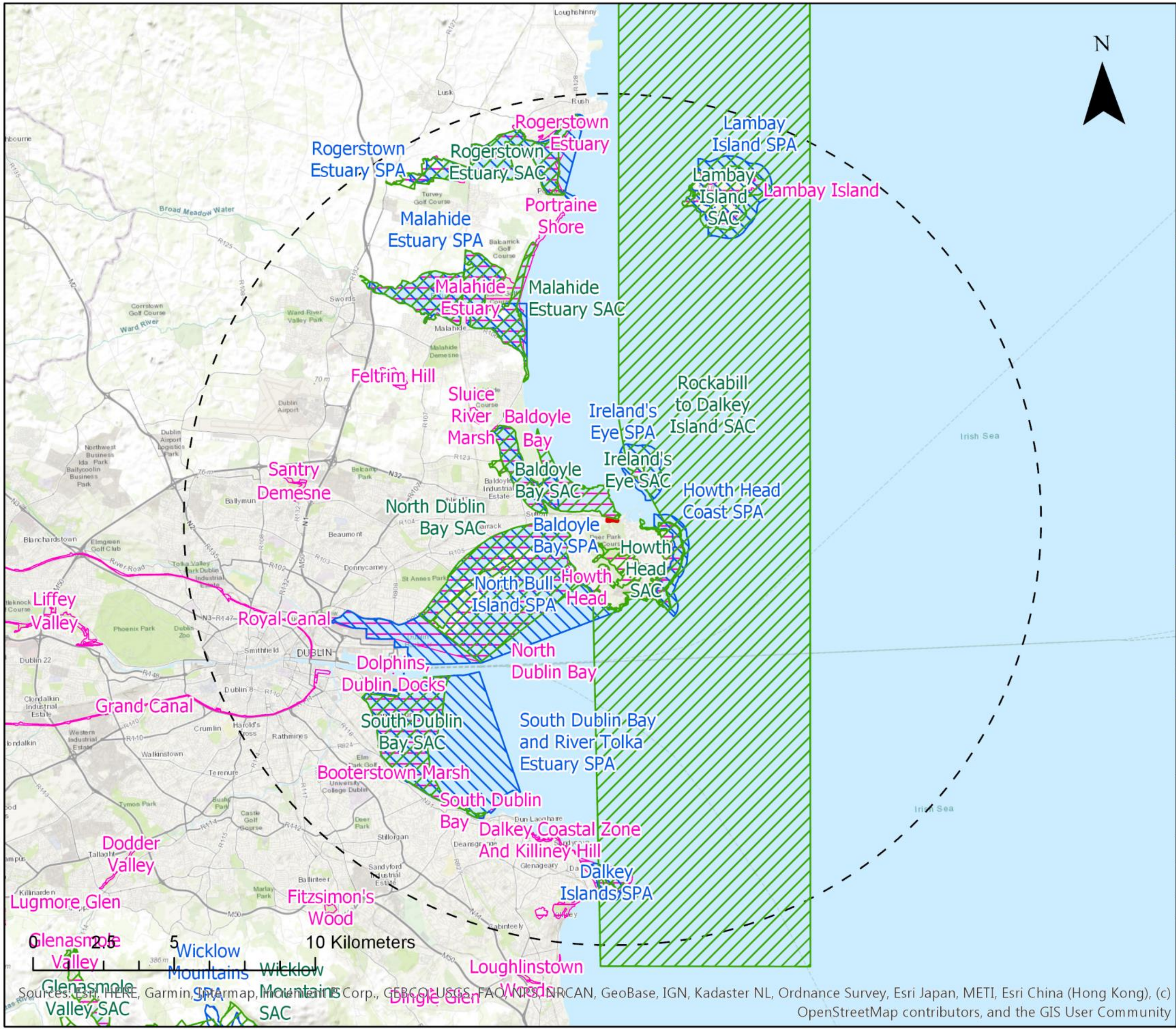
		- [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows - [2110] Embryonic Shifting Dunes - [2120] Marram Dunes (White Dunes) - [2130] Fixed Dunes (Grey Dunes)* - [2190] Humid Dune Slacks - [1395] Petalwort (Petalophyllum ralfsii)	
003000	Rockabill to Dalkey Island SAC	- [1170] Reefs - [1351] Harbour Porpoise (*Phocoena phocoena*)	1.42km
002193	Ireland's Eye SAC	- [1220] Perennial Vegetation of Stony Banks - [1230] Vegetated Sea Cliffs	1.47km
000205	Malahide Estuary SAC	- [1140] Mudflats and sandflats not covered by sea-water at low tide - [1310] Salicornia Mud - [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows - [2120] Marram Dunes (White Dunes) - [2130] Fixed Dunes (Grey Dunes)*	5.65km
000210	South Dublin Bay SAC	- [1140] Mudflats and sandflats not covered by sea-water at low tide - [1210] Annual vegetation of drift lines - [1310] Salicornia and other annuals colonising mud and sand - [2110] Embryonic shifting dunes	7.80km
000204	Lambay Island SAC	- [1170] Reefs - [1230] Vegetated Sea Cliffs - [1364] Grey Seal (*Halichoerus grypus*) - [1365] Common (Harbour) Seal (*Phoca vitulina*)	10.79km
000208	Rogerstown Estuary SAC	- [1130] Estuaries - [1140] Mudflats and sandflats not covered by sea-water at low tide - [1310] Salicornia Mud - [1330] Atlantic Salt Meadows - [1410] Mediterranean Salt Meadows - [2120] Marram Dunes (White Dunes) - [2130] Fixed Dunes (Grey Dunes)*	11.54km
Special Protection Areas (SPA)			
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]	1.20km

004113	Howth Head Coast SPA	- [A188] Kittiwake (Rissa tridactyla) [breeding]	1.29km
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	1.40km
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	1.75km
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]	6.24km

		- [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	
004024	South Dublin Bay and River Tolka Estuary SPA	- [A046] Light-bellied Brent Goose (*Branta bernicla hrota*) [wintering] - [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	6.70km
004069	Lambay Island SPA	- [A009] Fulmar (*Fulmarus glacialis*) [breeding] - [A017] Cormorant (*Phalacrocorax carbo*) [breeding] - [A018] Shag (*Phalacrocorax aristotelis*) [breeding] - [A043] Greylag Goose (*Anser anser*) [wintering] - [A183] Lesser Black-backed Gull (*Larus fuscus*) [breeding] - [A184] Herring Gull (*Larus argentatus*) [breeding] [wintering] - [A188] Kittiwake (*Rissa tridactyla*) [breeding]	10.55km

		- [A199] Guillemot (*Uria aalge*) [breeding] - [A200] Razorbill (*Alca torda*) [breeding] - [A204] Puffin (*Fratercula arctica*) [breeding]	
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	11.02km
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]	12.12km
Natural Heritage Areas (NHA)			
There are no NHAs within 15km of the Proposed Development site.			
Proposed Natural Heritage Areas (pNHA)			
000199	Baldoyle 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.*	0.02km
000202	Howth Head		0.79km
000206	North Dublin Bay		1.39km
000203	Ireland's Eye		1.49km
001763	Sluice River Marsh		5.55km
000205	Malahide Estuary		5.65km

000210	South Dublin Bay		7.82km
001208	Feltrim Hill		8.48km
000210	Dolphins, Dublin Docks		9.00km
001215	Portraine Shore		9.90km
000178	Santry Demesne		10.73km
000204	Lambay Island		11.01km
001206	Dalkey Coastal Zone And Killiney Hill		11.17km
002104	Grand Canal		11.18km
002103	Royal Canal		11.32km
000208	Rogerstown Estuary		11.59km
001205	Booterstown Marsh		11.62km



Legend

- Special Area of Conservation
- Special Protection Areas
- Natural Heritage Area
- Proposed Natural Heritage Area
- 15km Buffer
- Site Boundary

Project

Environmental Impact Assessment Report for Residential Development, Howth Road, Howth, Co. Dublin

Client

ATLAS GP LIMITED

Title

Figure 1. Designated Sites Within 15km of the Proposed Development

enviroguide consulting

a 3D Core C, Block 71, The Plaza Park West, Dublin 12 D12F9TN
w www.enviroguide.ie
e info@enviroguide.ie
t +353 (0)1 565 4730

Drawn by: LG	Projection: IRENET95 Irish Transverse Mercator
Checked : JD	
Date: 04/10/2019	Scale: 1:180,838 @A4

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries.

8.3.3 HABITATS

The surrounding area of the Proposed Development site is characterised by a mix of commercial and residential premises, the DART railway line, Claremont Beach, St. Mary's Church and Deer Park Golf Course. The site itself comprises the former *Howth Garden Centre*, *Beshoff Motors* and *Techcrete* premises.

The Site of the Proposed Development site is located within the Mayne River sub-catchment (Mayne_SC_010) and the Howth_010 sub-basin. The Bloody Stream, or "Howth Stream" (IE_EA_09H230880) is mapped by the EPA as flowing through the western section of the site, from south to north. This watercourse is mapped as rising within the grounds of the Deer Park Hotel. It then flows northerly for *ca*.1.2km to where it enters the project site. The culverted watercourse passes underground through the project site for *c*.130m, where it then passes under the railway line and discharges into the Irish sea approximately 20m north of the site boundary. The EPA does not have any operational monitoring stations on the Bloody Stream.

The habitats within the study area are coded and categorised to level 3 according to Fossitt (2000) and described in detail in the following sections.

8.3.3.1Buildings and Artificial Surfaces (BL3)

This habitat type covers the majority of the site and extends from the eastern boundary of the site at the former Howth Garden Centre as far as the western portion of the site within the former Techcrete premises. While generally comprised of hard artificial surfaces with no vegetative growth, there has been some colonisation in cracks between surfaces. The most abundant plant found here is butterfly bush (*Buddleja davidii*), with other flora including red valerian (*Centranthus ruber*), pink-sorrel (*Oxalis articulate*) and mind-your-own-business (*Soleirolia soleirolii*).

8.3.3.2 Dry Meadows and Grassy Verges (GS2)

The habitat type is primarily found in the western section of the site, between the western-most former *Techcrete* building and the western site boundary. Other parcels of this habitat are found in some areas of the site, where vegetation has colonised areas of undisturbed material. The habitat has formed from recolonising bare ground (ED3) that has been left unmanaged for a number of years, with some areas still conforming to this habitat type. The quantity of non-native species found in this habitat is relatively high, with an abundance of butterfly bush (*Buddleja davidii*). Other species found here include red clover (*Trifolium pratense*), white clover (*Trifolium repens*), creeping buttercup (*Ranunculus repens*), red valerian (*Centranthus ruber*), common valerian (*Valeriana officinalis*), bramble (*Rubus fructicosus*), mouse-ear hawkweed (*Pilosella officinarum*), ribwort plantain (*Plantago lanceolata*), sea plantain (*Plantago maritima*), oxe-eye daisy (*Leucanthemum vulgare*), knapweed (*Centaurea nigra*), common bird's-foot-trefoil (*Lotus corniculatus*), dandelion (*Taraxacum vulgaria*), bush vetch (*Vicia sepium*), ragwort (*Senecio jacobaea*), cat's ear (*Hypochaeris radicata*), yarrow (*Achillea millefolium*), creeping thistle (*Cirsium arvense*), hedge mustard (*Sisymbrium officinale*), tree mallow (*Malva arborea*), charlock (*Sinapis arvensis*), common romping fumitory (*Fumaria muralis*), petty spurge (*Euphorbia peplus*), stinking tutsan (*Hypericum hircinum*), broad-leaved dock (*Rumex obtusifolius*), yellow-wort (*Blackstonia perfoliata*) and wild teasel (*Dipsacus fullonum*). Cock's foot (*Dactylis glomerata*) is an abundant grass and there are scattering of rushes (*Juncus* spp.) throughout the habitat.

8.3.3.3 Scrub (WS1)

Scrub has colonised a number of areas throughout the Proposed Development site, primarily in the northwest and southwest corners of the site in addition to areas in close proximity to the former Techcrete site buildings. There is a large proportion of non-native species in much of this scrub habitat. The most commonly found species include butterfly bush (*Buddleja davidii*), bramble (*Rubus fructicosus*), hedge bindweed (*Calystegia sepium*), fuchsia (*Fuchsia magellanica*), goat willow, ivy (*Hedera* *hibernica*), nettle (*Urtica dioica*), tree mallow (*Malva arborea*), herb robert (*Geranium robertianum*) and montbretia (*Crocosmia x crocosmiiflora*).

8.3.3.4 Hedgerows (WL1)

This habitat type is found along some of the southern boundary of the site, along the Howth Road. The dominant species found here are butterfly bush (*Buddleja davidii*), bramble, nettle (*Urtica dioica*), ivy (*Hedera hibernica*) and a number of immature ash (*Fraxinus excelsior*) and sycamore (*Acer pseudo-platanus*).

8.3.3.5 Treelines (WL2)

A section of this habitat is found along the southwestern boundary, adjacent to the Howth Road. The non-native Leyland cypress (*Cuprocyparis leylandii*) is the dominant species here, with some sycamore (*Acer pseudoplatanus*) and ash (*Fraxinus excelsior*) also present.

8.3.3.6 Earth Banks (BL2)

This is a highly modified man-made habitat found in the southwest corner of the Proposed Development site.

8.3.3.7 Depositing / Lowland Rivers (FW2)

The Bloody Stream runs through the Proposed Development site and enters the Irish Sea north of the railway line. The watercourse is underground and culverted in its entirety throughout the site.

8.3.3.8 Habitat Evaluation

Habitats have been evaluated below in Table 8.2 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 below in Section 8.7. The summary in Table 2 below indicates the evaluation rating assigned to each habitat. The rationale behind these evaluations is also provided.

Table 8.2. Evaluation of habitats recorded within the proposed development site.

Species	Evaluation	Rationale	Key Ecological Receptor (KER)
Buildings and Artificial Surfaces (BL3)	Local Importance (lower value)	Highly modified habitat with some colonisation by primarily non-native species.	No
Dry Meadows and Grassy Verges (GS2)	Local Importance (lower value)	While this habitat contains some value as a grassland, the proportion of non-native species is high and scrub has started encroaching.	No
Scrub (WS1)	Local Importance (lower value)	Primarily composed of non-native species and of little to no conservation value.	No
Hedgerows (WL1)	Local Importance (lower value)	Primarily composed of non-native species and of little to no conservation value.	No
Tree Lines (WL2)	Local Importance (lower value)	Primarily composed of Leyland Cypress trees which offer limited value to wildlife.	No
Earth banks (BL2)	Local Importance (lower value)	Man-made habitat with little to no conservation value.	No
Bloody Stream (FW2)	Local Importance (higher value)	Underground and culverted throughout, but links to coastal habitat of conservation importance.	**Yes**

8.3.4 SPECIES AND SPECIES GROUPS

8.3.4.1 Flora

8.3.4.1.1 Rare and Protected Flora

The Site of the Proposed Development site is located within the Ordnance Survey National Grid 10km Square O23. Species records from the National Biodiversity Data Centre (NBDC) online database for the 10km square O23 were studied for the presence of rare or protected flora species. A search of the two kilometre (O23U & O23Z) and 1km (O2839 & O2739) encompassing the Site of the Proposed Development on the online database was also completed but yielded no records. A data request was made for further rare and protected species records for the O23 10km grid square, from the NPWS on 14th March 2019. Table 3 below presents details of the rare and protected flora species found within the 10km square O23 from both of the above sources.

Table 8.3. Records of rare or protected flora for the surrounding 10km (o23) grid square from the nbdc.
Npws = records from the last 30 years obtained from npws database

Name	Species Group	Date of last record	Database	Designation
Baltic Bryum (*Bryum marratii*)	Moss	14/09/2007	Bryophytes of Ireland	Flora Protection Order
Cernuous Thread-moss (*Bryum uligi-nosum*)	Moss	03/10/2008	Bryophytes of Ireland	Flora Protection Order; Endan-gered
Many-seasoned Thread-moss (*Bryum intermedium*)	Moss	14/09/2007	Bryophytes of Ireland	Flora Protection Order; Endan-gered
Warne's Thread-moss (Bryum warneum)	Moss	14/09/2007	Bryophytes of Ireland	Flora Protection Order; Endan-gered
Lesser Centaury **NPWS** (*Centaurium pulchel-lum*)	Flowering plant	23/07/2014	Miscellaneous Vascular Plant Records Dec 2014	Flora Protection Order; Endan-gered
Borrer's Saltmarsh-grass (or Tufted Salt-marsh Grass) **NPWS** (*Puccinellia fascicu-lata*)	Flowering plant	20/09/2007	Miscellaneous Rare Plant Records	Flora Protection Order; Endan-gered
Meadow Barley **NPWS** (*Hordeum secalinum*)	Flowering plant	1991	Herbarium and Literature Database 19/02/2013	Flora Protection Order; Vulnera-ble
Petalwort **NPWS** (*Petalophyllum ralfsii*)	Liverwort	17/11/2004	Rare and Threatened Bry-ophyte Survey 2004	Flora Protection Order
Hairy Violet **NPWS** (*Viola hirta*)	Flowering plant	1989	*Viola hirta*	Flora Protection Order, Vulnera-ble

8.3.4.1.2 Invasive Species

There are records for 19 species of flora considered to be invasive within the 10km square O23 and 2km grid squares O23U and O23Z within which the Proposed Development site is located. Details of these records are listed in Table 4 below. There are no records of invasive flora for the 1km grid squares O2739 and O2839.

A number of non-native species, some of which are considered to be invasive, were recorded during the habitat survey of the Proposed Development site. These included butterfly-bush, sycamore and fuchsia among others, as detailed above in section 8.3. No Japanese knotweed was recorded at the site during the habitat survey. The potential for the spread of invasive species during the removal of excavated soil from the site is addressed in the CEMP which details measures to prevent this.

Table 8.4. Records of invasive species of flowering plant for the surrounding 2km (o28u, o28z) & 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** **O23U**	26/08/2016 24/05/2014	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species
Canadian Waterweed (*Elodea canadensis*)	**O23** **O23Z**	24/05/2014 24/05/2014	Ireland's BioBlitz	- High Impact Invasive Species - Regulation S.I. 477
Cherry Laurel (*Prunus laurocerasus*)	**O23**	08/06/2013	Local BioBlitz Challenge 2013	- High Impact Invasive Species
Common Cord-grass (*Spartina anglica*)	**O23**	19/08/2017	Online Atlas of Vascular Plants 2012-2020	- High Impact Invasive Species - Regulation S.I. 477
Evergreen Oak (*Quercus ilex*)	**O23**	08/06/2013	Local BioBlitz Challenge 2013	- Medium Impact Invasive Species
Giant Hogweed (*Heracleum mantegazzianum*)	**O23** **O23U**	24/05/2014 24/05/2014	Ireland's BioBlitz	- High Impact Invasive Species - Regulation S.I. 477
Himalayan Honeysuckle (*Leycesteria formosa*)	**O23**	08/06/2013	Local BioBlitz Challenge 2013	- Medium Impact Invasive Species
Japanese Knotweed (*Fallopia japonica*)	**O23** **O23U**	14/08/2017 23/05/2016	National Invasive Species Database	- High Impact Invasive Species - Regulation S.I. 477
Japanese Rose (*Rosa rugosa*)	**O23**	08/06/2013	Local BioBlitz Challenge 2013	- 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** **O23U** **O23Z**	22/07/2016 22/07/2016 13/05/2005	Online Atlas of Vascular Plants 2012-2020 Species Data from the National	- High Impact Invasive Species - Regulation S.I. 477

			Vegetation Database	
Salmonberry (*Rubus spectabilis*)	**O23** **O23U**	24/05/2014 24/05/2014	Ireland's BioBlitz	- Medium Impact Invasive Species - Regulation S.I. 477
Sea-buckthorn (*Hippophae rhamnoides*)	**O23**	24/08/2017	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species - Regulation S.I. 477
Sycamore (*Acer pseudoplatanus*)	**O23** **O23U** **O23Z**	26/08/2016 24/05/2014 13/05/2005	Online Atlas of Vascular Plants 2012-2020 Species Data from the National Vegetation Database	- Medium Impact Invasive Species
Three-cornered Garlic (*Allium triquetrum*)	**O23** **O23U** **O23Z**	03/05/2015 08/04/2015 23/05/2014	Online Atlas of Vascular Plants 2012-2020 Ireland's BioBlitz	- Medium Impact Invasive Species - Regulation S.I. 477
Traveller's-joy (*Clematis vitalba*)	**O23**	21/09/2015	Online Atlas of Vascular Plants 2012-2020	- Medium Impact Invasive Species
Turkey Oak (*Quercus cerris*)	**O23**	08/06/2013	Local BioBlitz Challenge 2013	- Medium Impact Invasive Species

8.3.4.2 Mammals (excl. bats)

Records for terrestrial mammals were obtained from the NBDC online database, along with records obtained from the NPWS. Table 5 below lists these species, their date of last record and summarises their protected status.

Table 8.5. Records of terrestrial mammals for the surrounding 1km (o2839, o2739), 2km (o28u, o28z) & 10km (o23) grid squares from the nbdc.

Species	Grid square	Date of last record	Source	Designation
NATIVE				
Badger (*Meles meles*)	**O23**	17/09/2017	Mammals of Ireland 2016-2025	- Wildlife (Amendment) Act 2000 - Bern Convention Appendix III
Hedgehog (*Erinaceus europaeus*)	**O23** **O23U**	02/10/2016 02/10/2016	Mammals of Ireland 2016-2025	- 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** **O23Z** **O2839**	08/11/2015 15/04/2014 17/06/2012	Atlas of Mammals in Ireland 2010-2015	- Wildlife (Amendment) Act 2000
Red Fox (*Vulpes vulpes*)	**O23** **O23U** **O23Z** **O2839**	29/03/2017 21/04/2016 04/07/2013 04/07/2013	Mammals of Ireland 2016-2025; Atlas of Mammals in Ireland 2010-2015	- n/a
Red Squirrel (*Sciurus vulgaris*)	**O23** **O23U** **O23Z** **O2839**	28/09/2017 23/05/2014 31/12/2007 31/12/2007	Mammals of Ireland 2016-2025; Ireland's BioBlitz; The Irish Squirrel Survey 2007	- Wildlife (Amendment) Act 2000
Wood Mouse (*Apodemus sylvaticus*)	**O23** **O23Z** **O2839**	08/11/2015 06/09/2012 06/09/2012	Atlas of Mammals in Ireland 2010-2015	- n/a
NON-NATIVE				
Brown Rat (*Rattus norvegicus*)	**O23** **O23U**	15/11/2015 23/05/2014	Atlas of Mammals in Ireland 2010-2015; Ireland's BioBlitz	- High Impact Invasive Species - Regulation S.I. 477 (Ireland)
Eastern Grey Squirrel (*Sciurus carolinensis*)	**O23** **O23U**	07/10/2017 23/09/2015	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** **O23U** **O23Z** **O2839**	23/06/2015 24/05/2014 24/05/2014 24/08/2013	Atlas of Mammals in Ireland 2010-2015; Ireland's BioBlitz	- Medium Impact Invasive Species
Feral Ferret (*Mustela furo*)	**O23**	31/08/2005	National Feral Ferret (*Mustela putoris furo*) Database	- High Impact Invasive Species
House Mouse (*Mus musculus*)	**O23**	28/11/2015	Atlas of Mammals in Ireland 2010-2015	- High Impact Invasive Species

No rare or protected mammal species were directly recorded during site surveys. The habitats within the Proposed Development site are of variable value for mammals. There is potential habitat for hedgehog within the scrub areas in the western area of the site. No badger setts were recorded during the site survey and it is considered unlikely that badgers would utilise the project site. There are no open watercourses or areas of woodland within the project site. There is therefore little or no potential habitat for hare, otter, pine marten, red squirrel, pygmy shrew, stoat or wood mouse within the Proposed Development site (Carey *et al.*, 2007; O'Mahony *et al.*, 2012; Reid *et al.*, 2007 & 2013; Sleeman, 1993).

Red fox was not observed during site surveys, although they are likely to utilise areas of the site. Similarly, while no rabbit burrows were observed at the site, this species has the potential to utilise some areas. Brown rat and house mouse are also likely to utilise the surrounding area. There is little habitat for grey squirrel or feral ferret within the Proposed Development site, although the wooded areas south of the site offer some potential habitat. None of the six species mentioned in this paragraph are of conservation concern and the potential impact to these species is therefore not considered further.

8.3.4.3 Bats

Records for four species of bat exist within the 1km, 2km and 10km grid squares which encompass the Proposed Development site. These species records are listed in Table 8.6.

Table 8.6. Records of bats for the surrounding 1km (o2839, o2739), 2km (o28u, o28z) & 10km (o23) grid squares from the nbdc.

Species	Grid square	Date of last record	Source	Designation
Brown Long-eared Bat (*Plecotus auritus*)	**O23** **O23U** **O2739**	23/05/2014 23/05/2014 23/05/2006	Ireland's BioBlitz; National Bat Database of Ireland	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000
Leisler's Bat (*Nyctalus leisleri*)	**O23** **O23U** **O2739**	07/06/2013 23/05/2006 23/05/2006	Local BioBlitz Challenge 2013; National Bat Database of Ireland	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	**O23** **O23U** **O23Z** **O2739**	23/05/2014 23/05/2006 23/05/2014 23/05/2006	Ireland's BioBlitz; National Bat Database of Ireland	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	**O23** **O23U** **O23Z** **O2739**	23/05/2014 23/05/2006 23/05/2014 23/05/2006	Ireland's BioBlitz; National Bat Database of Ireland	- EU Habitats Directive - Annex IV - Wildlife (Amendment) Act 2000

8.3.4.3.1 Roost Inspection Survey

During the day-light hours of the 13th of September 2018 the inside and outside B1 and B2 and the outside of B3 were examined extensively for signs of bat presence or activity. The buildings contained in B1 and B2 showed multiple potential entry points for bats, but no evidence of bat presence was observed. The building present in B3 had been recently occupied and had lights on at the time of the survey. The buildings at B1 were also re-entered approximately 15 minutes before sunset in order check for any signs of Brown Long-Eared Bat, as this species is known to fly in high ceiling spaces shortly before sunset. Also, chatter from emerging bats may also be evident. No visual or audible signs of bats were found at this time.

8.3.4.3.2 Dusk Emergence Survey

On the night of the survey a total of 2 individual bats were positively recorded emerging from B1. There were no bats seen or recorded emerging form B2 or B3. There were no large emergences seen or recorded that would suggest any building within the Proposed Development site was being used as a maternity roost.

There was low bat activity recorded in the vicinity of the buildings which may be due to the location of the site on the seafront. Weather conditions were optimal for bats on the night of survey with warm weather conditions coupled with a wooded landscape to the south and other wooded areas, treelines and hedgerows in the vicinity. The recordings are summarised in Table 8.7 below.

Table 8.7. Summary of recordings from dusk emergence survey.

Species	Area observed/recorded	Peak Freq. (KHz)	Time (hh:mm)
Leisler's Bat	Woodland to the south across road.	27	19.49
Soprano Pipistrelle	Woodland to the south across road.	56	20.16
Leisler's Bat	In and around B2.	25	20.23
Soprano Pipistrelle	Woodland to the south across road.	55	20.24
Natterer's Bat	NE corner of B1 near railway, the same bat continues up and down the eves of the building >9 times, seen to have emerged from building.	48	20.23 – 20.34
Leisler's Bat	Eastern end of B1.	22	20.32
Natterer's Bat	NE corner of B1 near railway.	48	20.41
Natterer's Bat	NE side of B1 near railway, seen emerging and flying along the building eves multiple times.	48	20.56

It is considered that B1 and B2 have the potential to be used as temporary roosts (as opposed to a maternity roost) between March and September. The emergence survey showed that a total of two bats were observed using B1 on the night of the survey while other bats were using the nearby treelines and woodland across the road from the site (to the south), likely as a feeding area. It is important to note, however, that even though bats were not seen to be using B2 (which has potential entry points) during the night in question, there remains the possibility that bats may still use it at other times of the year as a temporary roost. It is considered unlikely that B3 is used for roosting bats.

8.3.4.3.3 Activity Survey

A very low level of bat activity was recorded during the activity survey on the 19th June 2019. Temperatures during the survey ranged from 13°C to 11°C with a light breeze rising to a moderate breeze in open exposed areas of the site along the coastline. The survey began at 21:43 and finished at 00:01. No activity was recorded within the Proposed Development site boundary during the survey. The recorded passes are given in Table 8.8 below.

Table 8.8. Records of bat activity from activity survey carried out on 19th June 2019.

Species	Area observed/recorded	Peak Freq. (KHz)	Time (hh:mm)
Common Pipistrelle	Within woodland to the south of Proposed Development site.	45	23:14
Common Pipistrelle	Within woodland to the south of Proposed Development site.	44	23:37

8.3.4.4 Birds

8.3.4.4.1 Breeding Birds

Results from the breeding bird surveys carried out at the Proposed Development site on 27th May 2019 are shown in Table 8.9 below. A total of 11 species were identified within the Proposed Development site with 1 species identified as '*confirmed breeding*'; 0 species identified as '*probable breeders*', and 10 species identified as *'possible breeders'* based on activity observed during the survey.

Table 8.9. Bird species recorded within the project site during site breeding bird surveys and their associated breeding status codes.

Species	BoCCI[5] Status	EU Designa-tion	Breeding Evidence Code[6]	Breeding Status
Jackdaw	**Green**	N/A	H	**Possible breeder**
Starling	**Amber**	N/A	H	**Possible breeder**
Pied Wagtail	**Green**	N/A	H	**Possible breeder**
Linnet	**Amber**	N/A	H	**Possible breeder**
Greenfinch	**Amber**	N/A	H	**Possible breeder**
Robin	**Amber**	N/A	S	**Possible breeder**
Wren	**Green**	N/A	S/H	**Possible breeder**
House Sparrow	**Amber**	N/A	H	**Possible breeder**
Blackbird	**Green**	N/A	S	**Possible breeder**
Goldfinch	**Green**	N/A	H	**Possible breeder**
Swallow	**Amber**	N/A	ON	**Confirmed breeding**

[5] Birds of Conservation Concern in Ireland 2014-2019 (Calhoun, K. and Cummins, S., 2012).
[6] British Trust for Ornithology (BTO) *Breeding Evidence Code*. See Appendix I.

8.3.4.4.2 Wintering Birds

The peak counts of all species recorded from all 125 hourly counts from November 2018 to April 2019 are given in Table 8.10 below. Peak counts from surveys undertaken at Deer Park Golf course are also shown. The overall average peak counts (calculated as the average of all daily peak counts) are displayed in parenthesis. The 1% national and international figures are taken from (Lewis *et al.*, 2019) and are based on results from the Irish Wetland Bird Survey (I-WeBS) and figures from Wetland International (2012 & 2018) respectively. The Irish Wetland Bird Survey (I-WeBS) is 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.

Table 8.10. Peak counts for all species recorded during winter bird surveys for 2018/19 season.

Species	Peak Count Recorded		1% National	1% International
	Claremont Strand	Deer Park Golf Course		
Herring Gull (*Larus argentatus*)	**959** (273)	46	**n/a**[7]	**14,400**
Great Black-backed Gull (*Larus marinus*)	97	1	**n/a**[2]	**3,600**
Black-headed Gull (*Larus ridibundus*)	31	0	**n/a**[2]	**31,000**
Common Gull (*Larus canus*)	8	3	**n/a**[2]	**16,400**
Oystercatcher (*Haematopus ostralegus*)	43	2	**610**	**8,200**
Curlew (*Numenius arquata*)	28	47	**350**	**7,600**
Redshank (*Tringa totanus*)	2	0	**240**	**2,400**
Greenshank (*Tringa nebularia*)	5	0	**20**	**3,300**
Ringed Plover (*Charadrius hiaticula*)	75	0	**120**	**540**
Turnstone (*Arenaria interpres*)	13	0	**95**	**1,400**
Dunlin (*Calidris alpina*)	14	0	**460**	**13,300**
Light-bellied Brent Goose (*Branta bernicla hrota*)	27	0	**350**	**400**
Cormorant (*Phalacrocorax carbo*)	2	0	**110**	**1,200**
Heron (*Ardea cinerea*)	3	7	**25**	**5,000**
Little Egret (*Egretta garzetta*)	1	0	**20**	**1,100**

[7] I-WeBS typically does not record gull species sufficiently in order to be able to generate accurate 1% national figures.

No count of any species recorded at either survey site were above the respective 1% national population figures, with the majority of species present at numbers significantly below these thresholds. As expected, numbers of most species were highest around low tide and reduced significantly at high tide. Waders were recorded in relatively low numbers at the site for the given habitat type, with Oystercatcher and Curlew being the most frequently recorded, albeit in low numbers.

The tidal defence mound north of Claremont Beach was used by various species as a high tide roost. Species frequently recorded here included Oystercatcher, Ringed Plover, Black-headed Gull, Herring Gull, Greenshank and Turnstone.

The largest peak count of any species recorded was Herring Gull, at 959 recorded on 16th January 2019. The peak and average counts of Herring Gull recorded on each survey day at Claremont Strand are displayed in Figure 8.2 below. The highest numbers were recorded in January, with the lowest numbers recorded in March.

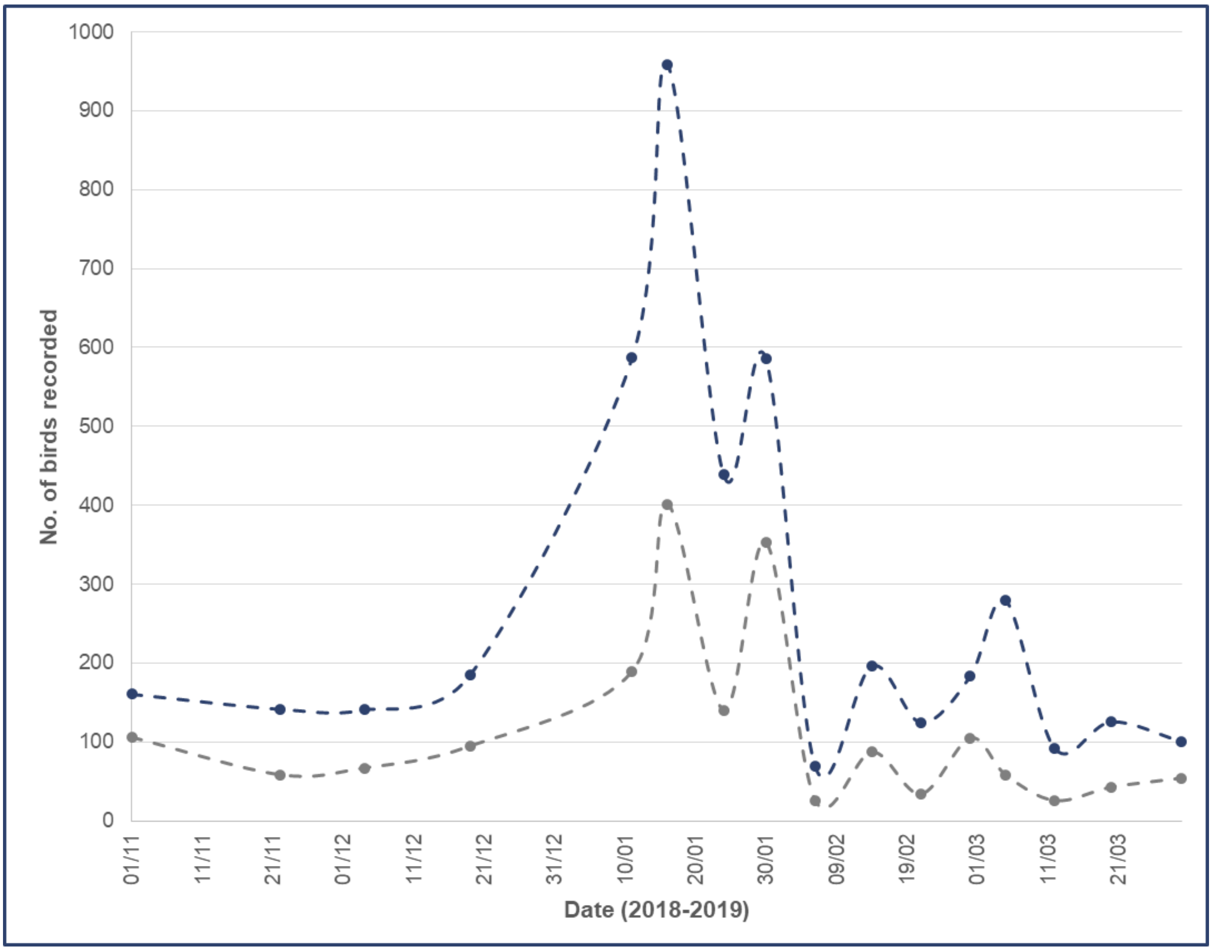


Figure 8.2. Daily peak and average counts of herring gull recorded on each survey day from november 2018 to march 2019.
● = daily peak count, ● = daily average count

8.3.4.5 Fish

8.3.4.5.1 Atlantic salmon (*Salmo salar*) & trout (*Salmo trutta*)

There are two species of salmonid associated with freshwater habitats in Ireland, namely Atlantic Salmon (*Salmo salar*) and Brown Trout (*Salmo trutta*). The Atlantic Salmon is listed as an Annex II species under the Habitat Directive. There are no records for either of these species within either the 10km grid square O23 or 2km grid squares O23U & O23Z.

8.3.4.5.2 Lamprey (*Lampetra sp. & Petromyzon marinus*)

All three Lamprey species recorded in Ireland are listed on Annex II of the EU Habitats Directive. Lamprey larval burrows are characteristically found at eddies or backwaters, on the inside of bends or behind obstructions, where current velocity is below that of the main stream and where organic material tends to accumulate (Kelly & King, 2001). There are no records for any species of Lamprey within either the 10km grid square O23 or 2km grid squares O23U & O23Z.

8.3.4.5.3 European eel (*Anguilla anguilla*)

European eel are a red listed species and are currently considered to be the most threatened fish species in Ireland, following a recent red-listed publication (King *et al.* 2011). There are no records for European eel within either the 10km grid square O23 or 2km grid squares O23U & O23Z.

8.3.4.5.4 Amphibians

The Common Frog (*Rana temporaria*) is listed under Annex V of the EU Habitats Directive and is further protected in Ireland under Wildlife (Amendment) Act 2000. There are records of Common Frog from the Amphibians and Reptiles of Ireland database, with the most recent from March 2018, for the 10km grid square O23.

There are no garden ponds or other habitat features considered to be of value for either common frog or smooth newt. No individuals of either species, or their spawn / eggs, were observed during site surveys.

8.3.4.6 Invertebrates

8.3.4.6.1 White-clawed Crayfish (*Austropotamobius pallipes*)

In Ireland, the white-clawed crayfish most commonly occurs in small and medium-sized lakes, large rivers, streams and drains, wherever there is sufficient lime (Reynolds, 2007). The overall conservation status of the White-clawed Crayfish in Ireland is inadequate, due to the reduction in its range and the continuing pressures that it faces (NPWS, 2013). There are no records for White-clawed Crayfish within either the 10km grid square O23 or 2km grid squares O23U & O23Z.

8.3.4.6.2 Marsh Fritillary (*Euphydryas aurinia*)

Marsh Fritillary butterfly is listed under Annex II of the EU Habitats Directive. There are records for this species within the 10km grid square O23 from the Butterflies of Ireland database, with the most recent from June 2018.

Marsh Fritillary, or its associated food plant; devil's bit scabious (*Succisa pratensis*), were not recorded during site surveys. The project site does not contain any wet grassland or other habitat considered suitable for marsh fritillary.

8.3.4.6.3 Other species and species groups

There are records of Common Lizard (*Zootoca vivipara*, formerly *Lacerta vivipara*) within the 10km square O23 from the Amphibians and Reptiles of Ireland database, with the most recent from April

2014. However, it is considered that there is little habitat of value for this species within the project site (Farren *et al.*, 2010).

8.3.4.7 Fauna Evaluation

Fauna that have been observed in the project site, or for which records exist in the wider area, have been evaluated below in Table 8.11 for whether they are likely to be KERs for which detailed assessment is required, ie whether they are "*likely to be affected significantly by any aspect of the* [Proposed Development]". 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 8.11. Evaluation of fauna recorded within the proposed development site.

Species	Evaluation	Rationale	Key Ecological Receptor (KER)
Badger	National Importance	No potential habitat for badger within project site, built-ground covers majority of site land. No setts or signs of badger recorded on site.	No
Hedgehog	National Importance	Potential habitat for hedgehog in the form of scrub areas in the west of the project site.	**Yes**
Irish (mountain) Hare	National Importance	No potential hare habitat present on the project site. Built-ground covers majority of site land with absence of woodland and open grassland areas.	No
Irish Stoat	National Importance	Little or no potential stoat habitat present on the project site. Built-ground covers majority of site land with absence of wooded areas, and animal burrows as potential den sites.	No
Otter	International Importance	No potential otter habitat found on the project site with an absence of any open waterbodies and a considerable built land component to the site.	No
Pine Marten	National Importance	Little or no potential pine marten habitat present on the project site. Built-ground covers majority of site land with absence of wooded areas, and animal burrows as potential den and refuge sites.	No
Pygmy Shrew	National Importance	Little or no potential pygmy shrew habitat present on the project site. Built-ground covers majority of site land with absence of wooded areas, animal burrows, grasslands and hedgerows as potential nest sites.	No

Red Squirrel	National Importance	No potential red squirrel habitat present on the project site. Built-ground covers majority of site land with an absence of suitable foraging and nesting habitat i.e. wooded areas and trees.	No
Bat assemblage	International Importance	Although relatively low bat activity on project site potential for temporary roosts in Building 1 and 2. Two bats recorded entering Building 1 during survey.	**Yes**
Wintering bird Assemblage	International Importance	Project site is adjacent to an area of sand flats which supports wintering birds.	**Yes**
Breeding bird Assemblage (Green listed)	County Importance	Numerous green-listed species potentially nesting on site.	**Yes**
Breeding bird Assemblage (Amber listed)	National Importance	One confirmed breeding species recorded in the form of swallows located on the project site. Other bird species likely nesting within the vicinity of the site also.	**Yes**
Common Frog	International Importance	No ponds or suitable breeding habitat located within the project site.	No
Common Lizard	National Importance	No evidence of common lizard on project site during surveys, with a lack of preferred habitat types on site i.e. wet upland conditions, peat-lands or coastal dunes.	No
Marsh Fritillary	International Importance	Neither marsh fritillary, nor its associated food plant; devil's bit scabious (*Succisa pratensis*), were recorded during site surveys. The project site does not contain any wet grassland or other habitat considered suitable for marsh fritillary.	No

The terminology and methodology for assessing impacts is detailed in Table 8.12 below;

Table 8.12. Terminology for assessment of 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
Significance of Effects on the Receiving Environment	**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.
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

8.4 Potential Impact of the Proposed Development- Construction phase

8.4.1 Direct Impacts

Impacts on Designated Sites

The closest Natura 2000 sites to the Proposed Development are the Baldoyle Bay and Howth Head SACs located *c*. 20m and *c*. 790m from the proposed site respectively. The nearest SPA to the proposed site is the Ireland's Eye SPA located *c.* 1.2km away, while the Baldoyle Bay pNHA and Howth Head pNHA are also both located *c*. 20m and *c.* 790m from the proposed site respectively. It should be emphasised at this point that Claremont Strand is outside the Baldoyle Bay SPA and that the impact significance on any SPA.s is low because bird populations recorded using Claremont beach are low. 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:

- Baldoyle Bay SAC [000199]
- Howth Head SAC [000202]
- Ireland's Eye SPA [004117]
- North Bull Island SPA [004006]
- Baldoyle Bay SPA [004016]
- Malahide Estuary SPA [004025]
- Lambay Island SPA [004069]
- South Dublin Bay and River Tolka Estuary SPA [004024]
- Rogerstown Estuary SPA [004015]

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

Disturbance to Wintering Birds from Construction-related Noise

A potential impact on the qualifying interests of seven SPAs (Ireland's Eye SPA, North Bull Island SPA, Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay and River Tolka Estuary SPA, Lambay Island SPA and Rogerstown Estuary SPA) was identified from noise generated during the Construction Phase of the Proposed Development which has the potential to cause temporary disturbance to a number of the qualifying interest (QI) species of the above SPAs, which may utilise ex-situ feeding sites within close proximity to the Proposed Development.

[In general it has been the experience of the authors that once the source of the noise is removed, bird species will return to the feeding grounds.]

Disturbance to Wintering Birds from Construction-related Noise - Conclusions

While it is possible that acute high-volume noises that may be generated during the temporary Construction Phase of the Proposed Development have the potential to disturb flocks of wintering birds at Claremont Strand, any disturbance caused will not adversely impact on the conservation objective attributes of "Population Trend" and "Distribution" due to the following:

- *The insignificant numbers of the bird species recorded utilising these areas during the winter. The peak count of each of the species recorded at Claremont Strand from 125 individual hourly* *counts was significantly below the respective 1% national and international population estimate thresholds (The overall average counts of each species recorded in relation to their respective national population estimates was 0.14%);*

- *The short-term duration of the Construction Phase in terms of any resulting noise generated; and*
- *The measures included as part of the CMP for this Proposed Development in relation to noise control.*

Impacts on Air Quality at Designated sites

Dust

The report carried out by AWN (2019) in relation to the Proposed Development states the following:

Chapter 6 – Air Quality and Climate has conducted an assessment of the ecological impact of the Proposed Development with respect to dust in the Construction Phase and on any links with a significant change in AADT flows during the Operational Phase.

For the Construction Phase of the Proposed Development an appraisal has been carried out to assess the risk to sensitive ecological receptors in accordance with the Institute of Air Quality Management's publication Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014). For the purposes of this assessment, high sensitivity receptors are regarded as designated ecological sites such as Baldoyle Bay SAC. The qualitative assessment found that dust mitigation measures detailed in Appendix 6.3 and the CEMP are implemented, fugitive emissions of dust from the site will be not significant in the short-term construction period and pose no nuisance at nearby sensitive ecology.

"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, the majority of the deposition occurs within the first 50m."

All of the Natura 2000 sites discussed in the NIS for this Proposed Development, with the exception of Baldoyle Bay SAC, are located outside of the above 200m deposition zone. As such, adverse dust related impacts on air quality at designated sites, associated with the Construction Phase of the Proposed Development, are not expected to be significant. Baldoyle Bay SAC is located *ca.* 20m from the Site of the Proposed Development and so is within this initial dust deposition zone. However the above report states the following:

"*Most importantly, when the dust minimisation measures detailed in the Construction Management Plan and Appendix 6.3 are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors."*

It is noted that asbestos has been identified on site as per the Asbestos Report submitted as part of this application. It will be a requirement to have all asbestos removed prior to any other works commencing. This will be carried out by a qualified asbestos contractor and according to the method statement and risk assessment provided by them. Once the asbestos is removed in this manner it will not pose a risk to biodiversity.

Traffic-related Pollution

The increased traffic associated with the servicing of the construction site by HGVs during the Construction Phase of the Proposed Development also has the potential to contribute to adverse impacts on local air quality, including that of Baldoyle Bay SAC and North Dublin Bay SAC, along impacted road links leading to and from the Proposed Development site.

AWN describes the traffic-related risk as follows:

"… traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene and PM_{10}. However, impacts from these emissions have been screened out using the UK DMRB guidance (UK Highways Agency 2007), on which the TII guidance was based. This guidance states that road links meeting one or more of the following criteria can be defined as being 'affected' by a Proposed Development and should be included in the local air quality assessment:

- *Road alignment change of 5 metres or more;*
- *Daily traffic flow changes by 1,000 AADT or more;*
- *HGV flows change by 200 vehicles per day or more;*
- *Daily average speed changes by 10 km/h or more; or*
- *Peak hour speed changes by 20 km/h or more.*

As the number of HGVs servicing the Proposed Development site will not come close to exceeding the 200 per day limit described above, AWN conclude that a further assessment of Construction Phase-traffic related impact on air quality is not required:

"The Proposed Development increase in Construction Phase HGVs will be a maximum of 80 HGVs per day. The AADT volume, speeds or road alignment do not change by an amount greater than the criteria discussed above. Therefore, none of the road links impacted by the Proposed Development satisfy the above criteria and an assessment of the impact of traffic emissions on ambient air quality during the Construction Phase is not necessary".

Impacts on Habitats and Flora

The Proposed Development will result in the loss of the majority of recolonising bare ground, buildings and artificial surfaces, scrub, hedgerows, treelines and earth banks. None of these habitats are of conservation importance and their loss would not be predicted to have any negative impact on local biodiversity. The hedgerows, scrub and treelines are primarily composed of non-native species, some of which are considered to be invasive i.e. butterfly bush.

The Bloody Stream, which flows under the project site, is not currently of high nature value. However, as part of the Proposed Development, this watercourse is to be de-culverted and a riparian strip developed. This will have an overall positive impact on this habitat, in addition to providing valuable habitat to a range of species. Planting along the proposed riparian strip be composed of native species where possible, as will to planting throughout the whole development.

Impacts on Mammals

No mammals of conservation concern were recorded within the project site. The loss of habitats within the site as a result of the Proposed Development will likely have negligible impact on mammals of conservation concern, such as hedgehog, due to the low value of the Proposed Development areas. Noise generated during the Construction Phase has the potential to cause disturbance to mammals in the locality, however the general surrounding of the project is developed residential and as such, a significant presence of mammals would not be expected.

Impacts on Bats

The survey undertaken on September 13th 2018 showed Natterer's Bat using Building 1, albeit in small numbers. Bats were not seen using Building 2 however the possibility of bat being present on other nights cannot be absolutely ruled out. It is unlikely Building 3 is used for roosting bats due to the modernity of the building and its very recent operational history.

The removal of recolonising scrub vegetation on site will have a negligible impact on local bat populations due to the expanse of parkland and woodland habitat located to the south of the site, which contain an abundance of foraging habitat in the form of hedgerows and treelines. The majority of bat activity recorded in the vicinity of the proposed site was in fact associated with these areas. It is concluded that in the absence of mitigation measures, the proposed demolition of the three buildings, specifically B1, would result in a permanent, moderate negative impact on bat species at a local level though the loss of potential roost sites.

Temporary lighting required during construction could illuminate previously unlit feeding areas on the proposed site or adjacent to it, making them unsuitable for bats. Although Leisler's bats and pipistrelle species recorded onsite may tolerate some lighting of feeding areas, other species are potentially adversely affected by strong lighting. Therefore, the potential impact is considered to be temporary and moderate at the local level.

Impacts on Birds

All birds are protected under the Wildlife Acts 1976 as amended. Vegetation clearance has the potential for permanent, moderate negative impacts to local breeding bird populations. It should be noted that the bird population concerned here is extremely small. Any planting of vegetation as a result of the Proposed Development will mitigate against this.

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. However due to the Proposed Development's location in an urban area; its location *c*.60m west of Howth DART Station; and the location of the Howth Road (R105) running along the its southern boundary, birds on the Proposed Development site are likely used to human related disturbance. The local breeding bird populations in the proposed site area would not be expected to be impacted in any significant way by the construction of the Proposed Development due to the already disturbed nature of the area.

The impact of construction related disturbance on breeding birds in areas not directly impacted by construction works, both within the boundary of the Proposed Development site and in areas immediately adjacent, is considered to be negligible.

Impacts on Other Taxa

The proposed riparian strip and restructuring of the Bloody Stream waterbody has the potential for a positive impact in the form of the provisions of habitat for species such as Common Frog, Common Lizard and Butterfly species.

8.4.2 INDIRECT IMPACTS

Impacts on Designated Sites

The closest Natura 2000 sites to the Proposed Development are the Baldoyle Bay and Howth Head SACs located *c*. 20m and *c*. 790m from the proposed site respectively. The nearest SPA to the proposed site is the Ireland's Eye SPA located *ca.* 1.2km away, while the Baldoyle Bay pNHA and Howth Head pNHA are also both located *c*. 20m and *c.* 790m from the proposed site respectively. 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:

- Baldoyle Bay SAC [000199]
- Howth Head SAC [000202]
- Ireland's Eye SPA [004117]
- North Bull Island SPA [004006]
- Baldoyle Bay SPA [004016]
- Malahide Estuary SPA [004025]
- Lambay Island SPA [004069]
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A Natura Impact Statement (NIS) has been produced and accompanies this planning application, the NIS concludes the following:

Disturbance to Wintering Birds from Construction-Related Noise

A potential impact on the qualifying interests of seven SPAs (Ireland's Eye SPA, North Bull Island SPA, Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay and River Tolka Estuary SPA, Lambay Island SPA and Rogerstown Estuary SPA) was identified from noise generated during the Construction Phase of the Proposed Development which has the potential to cause temporary disturbance to a number of the qualifying interests of the above mentioned seven SPAs, which may utilise ex-situ feeding sites within close proximity to the Proposed Development.

The conservation objective attributes for each of the qualifying interests of the above seven SPAs are "Population Trend" and "Distribution". The target for the conservation objective attribute of "Population Trend" for each of the relevant qualifying interests is defined as "long term population trend stable or increasing". The target for the conservation objective attribute of "Distribution" for each of the relevant qualifying interests is defined as "no significant decrease in the range, timing and intensity of use of areas by [relevant species], other than that occurring from natural patterns of variation".

The peak count of each of the species recorded at Claremont Strand from 125 individual hourly counts was significantly below the respective 1% national and international population estimate thresholds. While it is possible that acute high-volume noises that may be generated during the temporary Construction Phase of the Proposed Development have the potential to disturb flocks of wintering birds at Claremont Strand, any disturbance caused will not adversely impact on the conservation objective attributes of "Population Trend" and "Distribution" due to the following:

- *The insignificant numbers of the birds recording utilising these areas during the winter. The overall average counts of each of the species recorded in relation to the respective national population estimates is 0.14%;*
- *The short-term (2 years) duration of the Construction Phase in terms of any resulting noise generated; and*
- *The measures included as part of the Construction Management Plan in relation to noise control.*

Construction-Related Surface Water Discharges

A potential impact on the qualifying interests of Baldoyle Bay SAC was identified as a result of possible discharges of surface waters containing sediment, silt, oils and/or other pollutants into the SAC, which is located <20m from the site boundary, either directly or via the Bloody Stream, during the Construction Phase of the Proposed Development.

The pressure of "increased suspended sediment / turbidity" listed in ABPmer (2013) is analogous to the pressure of construction-related surface water discharges as a result of the Proposed Development. The assessment contained in ABPmer (2013) categorises the Resilience of this habitat to increased sediment as "very high" and the Sensitivity as "not sensitive". The fauna associated with this habitat type are primarily infaunal and were therefore considered by ABPmer to have a high resistance to increased sediment levels.

In addition, The Construction Management Plan (CMP) accompanying this application outlines specific measures in relation to the protection of the Bloody Stream during the Construction Phase of the Proposed Development. These are detailed in section 7 above. It is proposed to re-route the Bloody Stream for the entirety of the Construction Phase. This is described in detail in Chapter 12 of this EIAR. The stream will flow underground in a 750mm diameter pipe until the development is complete in order to eliminate the possibility of contamination of the watercourse, and subsequently Baldoyle Bay SAC, from works associated with the Construction Phase of the Proposed Development. As an additional protection against plant/activity, the pipes will be encased in 150mm of concrete, in accordance with Irish Water Guidelines.

It is therefore considered that there will be no adverse effects on the constituent community type of "fine sand dominated by Angulus tenuis community complex" of Baldoyle Bay SAC in respect of the conservation objective attributes of "habitat area" and "community distribution" as a result of construction-related surface water discharges from the Proposed Development.

Construction-related Ground water Discharges

A potential impact on the qualifying interests of Baldoyle Bay SAC was identified as a result of possible discharges of ground water containing sediment, silt, oils and/or other pollutants into the SAC, which is located <20m from the site boundary, via ground water tidal influence, during the Construction Phase of the Proposed Development.

The proposed dewatering works to mitigate the potential for groundwater contamination as a result of excavation is a low to likely probability and mild consequence resulting in a Low to Low/Moderate risk. A detailed risk to ground water assessment has been completed as part of this planning application and can be found in Golder 2019 Interpretative Ground Investigation Report accompanying this planning application. The findings of the MMRP (Golder, 2019c), Tier 1, Tier 2 and Tier 3 risk assessment of soils and controlled water data generated from the recent and historic site investigations has indicated the presence of elevated concentrations of several contaminants on the Site primarily within made ground deposits. A summary of the contaminants of concern are contained in **Table 8.13** below:

Table 8.13 – Containment of Concerns

Contaminants of Concern – Human Health	Contaminants of Concern – Controlled Waters
Lead	Arsenic
Benzo(a)pyrene	Chromium
Benzo(b)fluoranthene	Lead
Dibenzo(ah)anthracene	Mercury
Asbestos	Sulphate

Speciated and Total Petroleum Hydrocarbons (TPHs)	Total Polycyclic Aromatic Hydrocarbons (PAHs)
	Ammoniacal Nitrogen

This report states that the *'risks to the adjacent Baldoyle Bay are unlikely to low likelihood probability and minor consequence, therefore there is a Very Low to Low risk'*

All groundwater and surface water collected throughout the Construction Phase of the Proposed Development will be pumped through a treatment system to remove elevated suspended solids and hydrocarbon sheen as set out in the Minerex, 2019 Dewatering Plan and CEMP. The treated water will be discharged to foul sewer only under licence from IW thereby removing any potential impact on the groundwater and surface water quality as a result of water discharges during the Construction Phase of the Proposed Development.

It is therefore considered that there will be no adverse effects on the constituent community type of "fine sand dominated by Angulus tenuis community complex" of Baldoyle Bay SAC in respect of the conservation objective attributes of "habitat area" and "community distribution" as a result of construction-related surface water discharges from the Proposed Development.

No other potential impacts were identified in this assessment.

8.4.3 Impact Potential

The potential for impacts on the receiving environment are more likely associated with the Construction Phase.

The potential for the import of invasive species contained in any soil being imported for backfill must be considered. The CEMP submitted as a separate document with this planning application details the measures that will be employed to ensure that all soil and stone imported on to the site will be free of contaminants including the potential for invasive species.

The accidental release of hazardous material including fuels, contamination, released from the site and a failure of secondary containment or a materials handling accident.

The failure of secondary containment could also result in an accidental release in the scenario of disturbance of locally contained contaminant source during bulk excavation works including but not limited to; underground storage tanks, drainage and sumps. If this were to occur over open ground, then these materials could infiltrate through the soil contaminating the soil and underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. The potential impact could be moderate to significant, short to long-term on the receiving hydrological regime depending on the nature of the incident.However, the proposed use of secure secondary containment, small quantities of materials such as fuels being used on site and the measures contained within the CEMP including regular bund testing,will ensure that this worst case scenario will not occur.

As part of the dewatering required for the Construction Phase, in a 'worst case' scenario, the breakdown of the temporary treatment system could result in discharge of the contaminated water to the foul sewer network and receiving water at the final discharge point to the Irish Sea at Dublin Bay. It is considered that the impact of discharge to the foul sewer network may present an 'imperceptible, 'short term' impact on the Ringsend WwTP. However any impact on the Ringsend WWTP will not adversely affect the integrity of the SACs and SPAs in Dublin Bay.

8.4.4 Secondary

There are no secondary impacts associated with the Construction Phase of the Proposed Development**.**

8.4.5 Cumulative

Existing or proposed projects or plans impacting on the same key ecological receptors 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 in respect of birds when assessed in isolation in relation to these receptors as the amount of proposed vegetation clearance is minimal and replanting is proposed as part of the Proposed Development.

The impacts in respect of bats is detailed in Section 8.4.1 above. Given that it is unlikely that there will be wide-scale vegetation clearance in the surrounding locality (i.e. the surrounding area is predominantly made of residential houses and gardens, coastland and Deer Park) significant cumulative impacts are deemed unlikely.

With regards to the potential cumulative impacts on the relevant qualifying interests and conservation objectives listed for the aforementioned EU designated sites, as a result of the Proposed Development acting in-combination with other plans or projects; the following permitted, or in-progress, developments within the vicinity of the Proposed Development were reviewed and considered for possible cumulative impacts with the Proposed Development:

SHD/001/18 (*Crekav Trading GP Limited*) - Planning application for proposed strategic housing development comprising 164 no. residential units at the former Baily Court Hotel, Main Street and at lands located south of the Martello tower on Balscadden Road, Howth County Dublin all on a site measuring *c*.1.55ha.

This development has the potential to act in-combination with the Proposed Development during construction in relation to the following identified impacts:

- Environmental nuisances (noise, dust and vibrations) generated during the Construction Phase of the Proposed Development which have the potential to cause disturbance to key indicator species.

The potential for this cumulatively effect would only arise should the Construction Phase of the Proposed Development occur simultaneously with the Construction Phase of the above permitted development.

F18A/0267 (*Dept. of Agriculture, Food & Marine*) - Construction of two number ground level industrial buildings (5 number units each) and associated site works at Claremont, West Pier, Howth, Co. Dublin.

The above development has the potential to act in-combination with the Proposed Development in relation to the following identified impacts:

- Environmental nuisances (noise, dust and vibrations) generated during the Construction Phase of the Proposed Development which have the potential to cause disturbance to qualifying interests of seven SPAs within the precautionary zone of influence of the Proposed Development, should they regularly utilise this section of coastal habitat in close proximity to the Proposed Development.

The potential for this cumulatively effect would only arise should the Construction Phase of the Proposed Development occur simultaneously with the construction and/or operation of the above permitted development.

F17A/0553 (*Oceanpath Ltd.*) - The construction of 1,258 sq.m.(approx) two storey extension (8.135 metres high approx) to west side of existing 1,130 sq.m. (approx.) two storey building (8,135 metres high approx.) at Sites 37-03 and 37-05, Claremount Industrial Estate, West Pier, Howth, Co Dublin.

The construction of the above permitted development has already been completed. It is considered that there is no potential for the Proposed Development to act cumulatively with the above development, and therefore no potential for likely significant effects on Natura 2000 sites as a result of cumulatively effects.

F18/0074

Permission granted for the provision of 130m long quay wall; associated deck area, road access, hard standing; localised dredging to facilitate works, dredging to -4m Chart Datum along the front of new quay wall to provide berthing depth and land reclamation of approximate 0.30 Ha on the east side of Middle Pier of Howth FHC.

Granted Permission on 01/10/2019

Once the mitigation measures set out in the Grant of Permission F18/0074 dated 10th July 2018 and in particular those contained in the following Conditions it is deemed that this permitted development will not act cumulatively with the Proposed Development to have any significant negative effects on Biodiversity:

2. Mitigation Measures set out in Section 8 of the Natura Impact Statement received as Significant Additional Information shall be undertaken in full.

Reason: To ensure protection of Natura 2000 site and associated qualifying interests.

3. Mitigation Measures set out in Section 5.4 of the Marine Mammal Risk Assessment shall be undertaken in full.

Reason: To ensure protection of Natura 2000 site and associated qualifying interests.

4. The Environmental Management Plan, which shall contain the following documents, shall be submitted for agreement of the Planning Authority prior to the commencement of development:

a. An excavation and spoil management plan;

b. Surface water management plan;

c. Waste management plan;

d. Fuel and oil management plan;

e. Procedures and contingency plans to deal with emergency accidents and spills;

f. Name and contact details of a community liaison for the project.

Reason: To ensure adequate protection of the aquatic environment.

8.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT- OPERATIONAL PHASE

8.5.1 DIRECT IMPACTS

Impacts on Designated Sites

The closest Natura 2000 sites to the Site of the Proposed Development are the Baldoyle Bay and Howth Head SACs located *ca*. 20m and *ca*. 790m from the proposed site respectively. It should be noted that Claremont Strand is outside the Baldoyle Bay SPA which is approximately 2.7 Km from the Site of the Proposed Development, The nearest SPA to the proposed site is the Ireland's Eye SPA located *ca.* 1.2km away, while the Baldoyle Bay pNHA and Howth Head pNHA are also both located *ca*. 20m and *ca.* 790m from the proposed site respectively.. 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:

- Baldoyle Bay SAC [000199]
- Howth Head SAC [000202]
- Ireland's Eye SPA [004117]
- North Bull Island SPA [004006]
- Baldoyle Bay SPA [004016]
- Malahide Estuary SPA [004025]
- Lambay Island SPA [004069]
- South Dublin Bay and River Tolka Estuary SPA [004024]
- Rogerstown Estuary SPA [004015]

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

Disturbance to Flight-lines from Presence of Proposed Structures

A potential impact on the qualifying interests of seven 7 No. SPAs (Ireland's Eye SPA, North Bull Island SPA, Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay and River Tolka Estuary SPA, Lambay Island SPA and Rogerstown Estuary SPA) was identified from the operation of the Proposed Development, which has the potential to impact on the flight lines of qualifying interests commuting to/from roost/feeding sites as a result of the presence of the proposed structures.

Disturbance to Flight-lines from Presence of Proposed Structures – Conclusions

Following the assessment of further information, it is determined that the presence of the structures associated with the Proposed Development will not adversely impact on the conservation objective attributes of "Population Trend" and "Distribution" of relevant qualifying interests. This determination is based on the following:

- *The infrequency of occurrence of 'at-risk' species recorded in-flight over the Proposed Development site;*
- *The insignificant numbers of individual birds of at-risk' species recorded in-flight over the Proposed Development site; and*
- *The average recorded flight heights of 'at-risk' species recorded in-flight over the Proposed Development site in relation to the projected maximum height of the Proposed Development structures.*

Overshadowing

The Proposed Development is located adjacent to the Annex I habitat "mudflats and sandflats not covered by seawater at low tide" [1140] at Claremont Beach. The constituent community type in this area is "fine sand dominated by Angulus tenuis community complex". The presence of the structures associated with the Proposed Development will result in a degree of overshadowing at Claremont Beach and a potential for impact was identified on this habitat.

Overshadowing - Conclusions

The distinguishing species of this habitat do not photosynthesise and are therefore not considered to be sensitive to the effects of shading. While a potential reduction in microphytobenthos could result in decreases in sediment stability, the fine sands of this habitat are waterlogged and therefore should remain relatively cohesive regardless and not result in additional sediment production In addition the overshadowing effect associated with the structures of the Proposed Development during the Operational Phase will be of varying extent and limited duration; dependent on time of day and year.

It is therefore considered that the presence of the structures associated with the Proposed Development and the resulting overshadowing at Claremont beach will not adversely affect the constituent community type of "fine sand dominated by Angulus tenuis community complex" present in this area in respect of the conservation objective attributes of "habitat area" and "community distribution".

Light Spill

Similarly, to overshowing during the day, light spill from the Proposed Development at night-time, has the potentially to cause disturbance to the qualifying interest of the SACs and SPAs in the area.

While it is considered that the presence of additional light sources in the area will increase, it will not adversely affect the constituent community type of "fine sand dominated by Angulus tenuis community complex" present in this area in respect of the conservation objective attributes of "habitat area" and "community distribution".

The conservation objective attributes for each of the qualifying interests of the above seven SPAs are "Population Trend" and "Distribution". The target for the conservation objective attribute of "Population Trend" for each of the relevant qualifying interests is defined as "long term population trend stable or increasing". The target for the conservation objective attribute of "Distribution" for each of the relevant qualifying interests is defined as "no significant decrease in the range, timing and intensity of use of areas by [relevant species], other than that occurring from natural patterns of variation".

The peak count of each of the species recorded at Claremont Strand from 125 individual hourly counts was significantly below the respective 1% national and international population estimate thresholds. While it is possible that additional night-time light may cause indirect disturbance during the Operational Phase of the Proposed Development, with the potential to disturb flocks of wintering birds at Claremont Strand and beyond into Baldoyle Bay, any disturbance caused will not adversely impact on the conservation objective attributes of "Population Trend" and "Distribution" due to the following:

- *All luminaires having sharp cut off optic's, limiting intense light travelling far distances;*
- *The light emitted from light fittings shall have no photo biological risk and shall be categorised as 'Exempt Group' in relation to emissions of Blue Light, Infrared and Ultraviolet Radiation in accordance with EN 62741:2008;*
- *Luminaires will be selected to ensure that when installed, there shall be zero direct upward light emitted to the sky (all output light shall be at or below 90 ° to the horizontal) to help prevent sky glow from light pollution in the night sky; and*
- *The luminaires shall have a luminous intensity classification of between G4 and G6 to IS EN 13201-2:2003/BS 5489-1:2013.*

Impacts on Habitats and Flora

Given the low ecological value of the habitat types currently present at the proposed site i.e. mostly non-native, recolonising species on hard standing; the introduction of managed habitat proposed for this site, such as the de-culverting of the Bloody Stream waterway and the installation of an associated riparian strip planted with native tree and plant species, will have a long-term significant positive impact on the proposed site.

Impacts on Mammals

No mammals of conservation concern were recorded within the project site. Increased noise, light and human presence associated with the Operational Phase has the potential to cause disturbance to mammals in the locality, however the general surroundings of the Proposed Development is developed residential and infrastructure, i.e. DART line, train station and road and as such, a significant presence of mammals would not be expected, while those present would likely be accustomed to human related disturbance.

The opening of the Bloody Stream and the installation of an associated riparian strip will likely benefit mammals in the vicinity of the proposed site, providing some higher value habitat and increasing the biodiversity potential of the area.

Impacts on Bats

The presence of the proposed buildings and artificial lighting on the proposed site is likely to result in some localised impact to bats commuting through or feeding within the Proposed Development site. 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. In the absence of mitigation, the displacement impact of lighting during the operation phase is considered to be a significant negative impact to bats at a local scale.

It is likely that bats will be able to still pass through the area albeit via different dark corridors to those currently used. A lighting plan has been developed which has modelled the predicted lighting levels generated by the proposed residential development and accompanies this planning application.

Impacts on Birds

Noise and increased human presence associated with the Operational 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. However due to the Proposed Development's location in an urban area; its location *ca*.60m west of Howth DART Station; and the location of the Howth Road (R105) running along the its southern boundary, birds in the vicinity of the Site of the Proposed Development site are likely to be accustomed to human related disturbance. The local breeding bird populations within the Site of the Proposed Development would not be expected to be impacted in any significant way by the Operational Phase of the Proposed Development due to the already disturbed nature of the area. The impact of the Operational Phase on breeding birds, both within the boundary of the Proposed Development site and in areas immediately adjacent, is considered to be negligible.

The presence of certain building types in coastal areas have the potential to mimic cliffs and attract certain birds especially Gulls *Larus sp*. Given that the existing buildings did not attract gulls to the site and given the availability of natural habitat locally it is unlikely that the Proposed Development will be used as a mimic habitat by these species.

Planting throughout the Site of the Proposed Development and along the proposed riparian strip will be comprised of native species of trees and plants where possible and as a result will likely also have a positive effect on breeding bird populations in the vicinity of the Site of the Proposed Development.

Impacts on Other Taxa

The presence of the proposed riparian strip and restructured Bloody Stream waterbody during the Operational Phase of the Proposed Development has the potential to provide a long-term moderate positive local impact in the form of additional habitat for species such as Common Frog, Common Lizard and Lepidoptera species.

8.5.2 INDIRECT IMPACTS

8.5.2.1 Increased Human Presence

Impacts on Designated Sites

The closest Natura 2000 sites to the Proposed Development are the Baldoyle Bay and Howth Head SACs located *ca*. 20m and *ca*. 790m from the proposed site respectively. The nearest SPA to the proposed site is the Ireland's Eye SPA located *ca.* 1.2km away, while the Baldoyle Bay pNHA and Howth Head pNHA are also both located *ca*. 20m and *ca.* 790m from the proposed site respectively. 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:

- Baldoyle Bay SAC [000199]
- Howth Head SAC [000202]
- Ireland's Eye SPA [004117]
- North Bull Island SPA [004006]
- Baldoyle Bay SPA [004016]
- Malahide Estuary SPA [004025]
- Lambay Island SPA [004069]
- South Dublin Bay and River Tolka Estuary SPA [004024]
- Rogerstown Estuary SPA [004015]

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

Disturbance to Wintering Birds

A potential impact on the qualifying interests of seven SPAs (Ireland's Eye SPA, North Bull Island SPA, Baldoyle Bay SPA, Malahide Estuary SPA, South Dublin Bay and River Tolka Estuary SPA, Lambay Island SPA and Rogerstown Estuary SPA) was identified from increased human presence at Claremont Beach during the Operational Phase of the Proposed Development which has the potential to cause disturbance to qualifying interests of the above SPAs, should they regularly utilise this section of coastal habitat.

Disturbance to Wintering Birds – Conclusions

The stretch of coastal areas west of Claremont Strand, i.e. encompassing Burrow Strand and the Hole in the Wall beach, also have the potential to experience increased human presence as a result of the Proposed Development. These areas likely to support similar bird species assemblage as Claremont Strand. As shown in results section, numbers of waterbirds are highest at low tide when the area of exposed sandflats is highest. There is currently no restriction on the usage of Claremont Strand, Hole in the Wall beach and Burrow Beach by recreational users and dogs.

Baldoyle Bay SAC

The Proposed Development is located adjacent to an area of Annex I habitat "mudflats and sandflats not covered by seawater at low tide" [1140] at Claremont Beach. The constituent community type in this area is "fine sand dominated by Angulus tenuis community complex". A potential impact on this habitat *type was identified arising from the increased human presence and associated usage of Claremont Beach as a result of the Proposed Development.*

Baldoyle Bay SAC - Conclusions

The assessment contained in ABPmer (2013) categorises the Resilience of this habitat to trampling by foot as “very high” and the Sensitivity as “not sensitive”. It is therefore considered that the potential increased human presence at Claremont beach, Hole-in-the-wall beach and Burrow beach will not adversely affect the constituent community type of “fine sand dominated by Angulus tenuis community complex” present in this area in respect of the conservation objective attributes of “habitat area” and “community distribution”.

Howth Head SAC

A potential impact on the qualifying interests of Howth Head SAC was identified as a result of a possible increase in footfall and visitor numbers within the SAC, and the potential resulting habitat loss/alteration/erosion, as a result of the increase in local population numbers during the Operational Phase of the Proposed Development.

Howth Head SAC - Conclusions

The walking routes along the ‘Cliff Path Loop’ do currently have measures in place to manage human disturbance; in the form of the fencing of vulnerable habitat, and the provision of barriers along the designated walking routes to direct footfall safely through the SAC. As such, the increase in usage as a result of the increased population associated with the Proposed Development is not deemed to have the capacity to cause significant adverse impacts in relation to the conservation objectives attributes of Howth Head SAC.

8.5.2.2 Alterations of Flow Rate at Bloody Stream Outflow

The Proposed Development is located adjacent to the Annex I habitat “mudflats and sandflats not covered by seawater at low tide” [1140] within Baldoyle Bay SAC. The constituent community type in this area is “fine sand dominated by Angulus tenuis community complex”. The Bloody Stream currently outflows into this habitat via the Bob Davis culvert c.20m north of the Proposed Development site.

Alterations of Flow Rate at Bloody Stream Outflow - Conclusions

Using the pressure approach and the sensitive habitat type, and any change to the flow rate being localised in nature, it is deemed that it will not have an adverse impact on the “fine sand dominated by Angulus tenuis community complex” community type found on Claremont Strand. This is mainly due to the potential small increase of water flow, and due to the fact that the Blood Stream outfall currently experiences varied flowrates. There will be limited impact to the flow rates that are already experienced on a yearly cycle at present.

8.5.3 IMPACT POTENTIAL

There will be no discharges to ground, groundwater, surface water drainage resulting in discharge to the adjoining Baldoyle Bay SAC as part of the Proposed Development. Any accidental release of contaminants in a worst case scenario such as leaks or spill from vehicles for example associated with an accident at the Proposed Development during operation will be captured to the onsite drainage and discharged to the public foul sewer that includes in-line primary treatment (i.e. interceptors) prior to outfall to the public sewer. There is potentially a worst-case scenario where there is a complete failure of the containment and treatment systems with a resulting impact on the Ringsend Wastewater Treatment Plant.

The 2012 Ringsend Wastewater Treatment Plant application for planning permission (Ref. PL.29N.YA0010) was for a population equivalent of 2.4 million and was predicated on the findings of the 2005 Greater Dublin Strategic Drainage Study (**GDSDS**). The GDSDS set out the drainage requirements for the Greater Dublin Area (**GDA**) up to 2031. The GDSDS relied on the Regional Planning Guidelines (**RPGs**) and the National Spatial Strategy (**NSS**) in order to estimate the future projected population increases for the GDA. The studies indicated a predicted growth in population from 1.2 million in 2002 to just over 2 million in 2031 for the GDA region. Therefore, both the initially permitted 2012 upgrade and the permitted 2019 revised upgrade (Ref. ABP-301798-18) for Ringsend Wastewater Treatment Plant take account of population growth up to 2.4 million population equivalents.

On 13th November 2019 An Bord Pleanala granted permission for irish Water's Greater Dublin Drainage Scheme in Clonshaugh in North Dublin. (Reference PL06F.301908). This project when complete will provide and additional 500,000 PE (Population Equivalent) wastewater treatment to the Greater Dublin Area.

8.5.4 SECONDARY

A secondary potential during the operation phase in a extreme Flooding Events, the Proposed Development and surrounding area are located within Flood Zone C, i.e. the lowest risk zone where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). In the worst-case scenario flood, would potentially be a sea breach, due to the nature of the site. However, this is extremely unlikely due to the site levels, the current sea protection in place and the proposed boundary wall to the North of the development is set at 4.5m OD and all openings limited to 4.5m OD.

8.5.5 CUMULATIVE

8.5.5.1 Ringsend Wastewater Treatment Plant

This section addresses the general issue of potential cumulative impacts with Ringsend Wastewater Treatment Plant arising from the Proposed Development and other developments, including future developments.

In summary, the impact of the Proposed Development and any future development has already been appropriately considered and assessed as part of the application process for the existing planning permissions pertaining to Ringsend Wastewater Treatment Plant.

The 2012 Ringsend Wastewater Treatment Plant application for planning permission (Ref. PL.29N.YA0010) was for a population equivalent of 2.4 million and was predicated on the findings of the 2005 Greater Dublin Strategic Drainage Study (**GDSDS**). The GDSDS set out the drainage requirements for the Greater Dublin Area (**GDA**) up to 2031. The GDSDS relied on the Regional Planning Guidelines (**RPGs**) and the National Spatial Strategy (**NSS**) in order to estimate the future projected population increases for the GDA. The studies indicated a predicted growth in population from 1.2 million in 2002 to just over 2 million in 2031 for the GDA region. Therefore, both the initially permitted 2012 upgrade and the permitted 2019 revised upgrade (Ref. ABP-301798-18) for Ringsend Wastewater Treatment Plant take account of population growth up to 2.4 million population equivalent.

Notwithstanding the above, on an individual basis, the Proposed Development will have an imperceptible effect on the relevant qualifying interests and conservation objectives listed for the aforementioned EU designated sites in question, in terms of flows, relative to the total amount of waste water currently being received at Ringsend Wastewater Treatment Plant.

In addition, Irish Water has provided a Confirmation of Feasibility Letter and Statement of Design Acceptance for the foul sewer design of the Proposed Development submitted separately with this application. Irish Water is in control of this infrastructure and the purpose of the Confirmation of Feasibility

Letter and Statement of Design Acceptance is to confirm the viability of the Proposed Development with respect to its potential impact on the capacity of Ringsend Wastewater Treatment Plant, as the receiving infrastructure. By providing a Confirmation of Feasibility Letter and Statement of Design Acceptance, Irish Water has confirmed that, based on current projected infrastructure, the Proposed Development can be accommodated within the drainage network.

As stated above An Bord Pleanala granted permission for Irish Water's Greater Dublin Drainage Scheme in Clonshaugh in North Dublin. (Reference PL06F.301908) on On 13th November 2019. This project when complete will provide and additional 500,000 PE (Population Equivalent) wastewater treatment to the Greater Dublin Area. This will further reduce the potential for impact on Natura 2000 sites.

8.5.5.2 Increased human presence

SHD/001/18 (*Crekav Trading GP Limited*) - Planning application for proposed strategic housing development comprising 163 no. residential units at the former Baily Court Hotel, Main Street and at lands located south of the Martello tower on Balscadden Road, Howth County Dublin all on a site measuring *c*.1.55ha.

The permitted SHD at Balscadden, Howth, Co. Dublin has the potential to act cumulatively with the Proposed Development in relation to the following impacts identified above:

- Increased human presence at Claremont Beach during the Operational Phase of the Proposed Development, which has the potential to cause disturbance to qualifying interests of seven SPAs within the precautionary zone of influence of the Proposed Development, should they regularly utilise this section of coastal habitat.
- Possible increased footfall and visitor numbers within Howth Head SAC, and the potential resulting habitat loss/alteration/erosion, as a result of the increase in local population numbers because of the Proposed Development.

The above SHD (SHD/001/18) will result in an increase of a potential *c*.342 inhabitants in the local area. This increase in population, in conjunction with the potential of *c.* 1,075 inhabitants from the Proposed Development, could act cumulatively in relation to the potential impacts outlined above.

Walking routes along Cliff Path Loop are already managed for disturbance, for example there is fencing and barriers in place to project habitats. Increased usage as a result of the Proposed Development will not result in a significant increase with the capacity to result in adverse impact to habitats in relation to conservation objective of Howth Head SAC. This is mainly due to the mitigation measure already in place along the Cliff Path Looped walk.

8.6 'DO NOTHING' IMPACT

In the 'Do Nothing' scenario the potential impact on the receiving ecological environment if the Proposed Development did not proceed is considered.

It is considered that there would be no change or resulting impact on the brownfield nature of the site which would remain as a dis-used commercial / industrial site and there would impact or change to the ecology of the site.

8.7 Mitigation Measures

8.7.1 Construction Phase

The following mitigation measures have been agreed in consultation with Barrett Mahony Consulting Engineers and Walls Construction. The below text is taken from the Construction Management Plan (BMCS, 2019a), Flood Risk Assessment Report (BMCE, 2019b) and outline Construction Environmental Management Plan (OCEMP Enviroguide 2019) which are submitted with this application.

8.7.1.1 Noise

Noise control audits will be conducted at regular intervals through the Construction Phase of the development. In the first instance it is envisaged that such audits will take place monthly. This subject to review and the frequency of audits may be increased if deemed necessary. The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions. To this end, consideration will be given to issues such as the following:

- Hours of operation being correctly observed;
- Opportunities for noise control 'at source';
- Optimum siting of plant items;
- Plant items being left to run unnecessarily;
- Correct use of proprietary noise control measures;
- Materials handling;
- Poor maintenance; and
- Correct use of screening provided and opportunities for provision of additional screening.

8.7.1.2 Dust

8.7.1.2.1 Dust Management Plan

The objective of dust control is to ensure that no significant nuisance occurs at nearby sensitive receptors. To develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA. Effective site management regarding dust emissions will be ensured by the formulation of a dust management plan (DMP) for the site. The key features of the DMP are:

- the specification of a site policy on dust;
- the identification of the site management responsibilities for dust;
- the development of documented systems for managing site practices and implementing
- management controls; and
- the development of means by which the performance of the dust management plan can be assessed.

8.7.1.2.2 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies. At the planning stage, the siting of construction activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs:

- During working hours, technical staff shall be on site and available to monitor dust control methods as appropriate;
- Complaint registers will be kept on site detailing all telephone calls and letters of complaint received about construction activities, together with details of any remedial actions carried out;

- It is the responsibility of the contractor always to demonstrate full compliance with the dust control conditions herein; and
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the Construction Phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust using best practise and procedures. During the excavation of the basement, it is envisaged areas of rock will be encountered. This will be broken out using a rock breaker and the dust controlled using spray cannons. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed, and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are highlighted below.

8.7.1.2.3 Dust Control – Site Roads

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. However, effective control measures can easily be enforced. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency[8] ranging from 25 to 80%. This means that speed restrictions alone have the potential to reduce dust by up to 80%

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles;
- Bowsers will be available during periods of dry weather throughout the construction period.
- Research has found that the effect of watering is to reduce dust emissions by 50%. The bowser will operate during dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

8.7.1.2.4 Dust Control – Land Clearing/Earth Moving

Land clearing / earth-moving during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.
- During excavation of contaminated materials, use of water will be controlled and managed to prevent generating contaminated runoff.
- An asbestos survey has been completed which identified asbestos-containing materials (ACMs) on site; in the buildings and in the made ground. An asbestos removal plan will be authored prior to commencing work on site. All works will be carried out by a suitably qualified specialist contractor. All ACMs will be managed in accordance with the relevant regulations.

8.7.1.2.5 Dust Control – Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

[8] Control efficiency means the percentage by which a control device or technique reduces the emissions from a stationary source

The regular watering of stockpiles has been found to have an 80% control efficiency.

8.7.1.2.6 Dust Control – Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures.

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered with tarpaulin always to restrict the escape of dust;
- Public roads outside the site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- If practicable, a wheel wash facility will be employed at the exit of the site so that traffic leaving the site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.
-

8.7.1.3 Surface Water

<u>Protection the Bloody Stream</u>

During the excavation phase, the Bloody stream will be re-routed. The stream will continue to flow underground through a 750mm diameter pipe diversion until the development is complete. This eliminates the possibility of contamination from the works above. To ensure no damage from plant/activity above the pipes will be encased in 150mm concrete. Post construction, the Bloody Stream will de-culverted through the site creating a riparian strip.

The riparian strip will be one of the last areas to be completed. This will involve, construction of an open concrete channel spanning the breadth of the site, underground drainage connections at either end, a settlement chamber and landscaped banks on either side of the channel. The riparian strip will be of varying width, with graded 1:3 banks on either side. Before the streams channel disappears under the raised walkway and outfall into the sediment chamber located under the access road at rear of the development. A grate will be fitted over the outfall drain in the pond, which will stop any debris entering the culvert. To ensure water is always present in the pond, it will be set at a lower level to the outfall. By doing this it will slow the pace of the river and act as a sediment chamber.

8.7.1.4 Groundwater

Shallow groundwater may be encountered during the construction works in particular the basement excavation. Where water must be pumped from the excavations, water will be managed in an in accordance with best practice standards (i.e. CIRIA – C750) and regulatory consents. Water will not be discharged to open water courses (e.g. the Bloody Stream or shore) and will be disposed to foul sewer.

Disposal to sewer will require, a consent/licence issued under Section 16 of the Local Government (Water Pollution) Acts and Regulations and must be obtained from Irish Water. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements. All dewatering will be undertaken in strict compliance with the conditions of the discharge licence for the project.

A treatment system will be installed for the duration of the project to meet the requirements of the discharge licence but will typically include a number of stages of settlement and filtration to remove sludge, suspended solids, free-phase hydrocarbons (oils) and dissolved phase hydrocarbons.

A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer.

8.7.1.5 Flooding

The Bloody stream is introduced to the site via a 3m channel traversing the site in a landscaped riparian strip. The riparian strip will be approximately 65m long with a varying width of minimum 12 meters and reaches a depth in the centre of over 2 meters below ground level for the development. It is intended that the riparian strip will be a designated flood zone in the development.

Several steps are proposed to mitigate flooding of the Bloody Stream:

- A water grate is to be provided at the end of the strip, this will ensure that any large items are captured before entering the underground water system.
- At the end of the strip the channel flows into manhole S6 this has a sediment chamber 3 meters long, before outflowing in a 900 diameter pipe at 0.150m higher than the base of the chamber. This manhole is in the access road running along the northern perimeter of the site and is easily accessible for maintenance.
- The section of the channel running underground has a clear head height of 2 meters. This allows further access for maintenance and clearance.
- An overflow drain has been provided in the event of blockage, an alternative route is available.

All the above precautions are designed to mitigate blockages that could result in flooding.

8.7.1.6 Dewatering

All excavations will be encompassed by secant pile wall around the basement excavation to allow de-watering and dry excavation. Extracted groundwater will be treated on site and disposed to sewer only under a temporary discharge consent. To achieve this disposal route, a temporary water treatment facility (including holding tanks) will be constructed on the site, and other apparatus as required to ensure the conditions of the temporary discharge consent are met (this will include activated carbon filtration, siltbusters etc.). Water is anticipated to be treated and pumped to a holding area and sampled and tested by the Contractor prior to discharge. Upon receipt of analysis results and screening against required consent limits, the Contractor will arrange the appropriate disposal, with the groundwater treated and discharged to foul sewer in accordance with temporary discharge consent (to be arranged by the Contractor).The Contractor will ensure that no contaminated water/liquids leave the site (as surface water run-off or otherwise), enter the local storm drainage system or direct discharge to the Baldoyle Bay SAC. Excavations and potentially contaminated stockpiled soils will be constructed/located/sheeted in a manner that ensures leachate generation is limited and water is contained within the site boundary. These measures in addition to the measures detailed in Section 8.4.3 will ensure that the worst case scenario involving a direct discharge of contaminated water into the receiving environment, will not occur.

If free product is identified during works, this will be pumped, and removed off-site via tanker to a licensed waste disposal facility. Full details of the dewatering plan are contained in the OMP and the Dewatering Plan designed by Minerex.

8.7.1.7 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, a bat activity survey will be carried out at the appropriate time of year by a qualified ecologist in order to determine the presence of any potential roosts.

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.

If possible, works should be carried out during the winter months (October to March) as there would be less likelihood of bats roosting in the buildings during this time. Any demolition work should be undertaken in a slow, careful and sensitive manner, which will allow any bats present a chance to escape.

In the event a roost is accidentally exposed despite mitigation, all works must cease, and NPWS contacted in order to obtain the required derogation licence.

A bat ecologist will be retained for the duration of the demolition works.

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.

Boxes should be erected:

- On straight limb trees with no crowding branches or other obstructions for at least 3m above and below the position of the bat box,
- On trees with a diameter wide and strong enough to hold the required number of boxes, at a height of 3-5m to reduce the potential of vandalism and predation of resident bats,
- In groups of three bat boxes per tree arranged at the same height facing North, Southeast and Southwest. This ensures a range of temperatures are available to residing bats.

It is concluded that the proposed demolition of the three buildings, specifically B1, with the above mitigation measures implemented, including a derogation licence and presence of a bat specialist ecologist onsite during demolition, will have a negligible impact on bat species in the area given the plentiful supply of mature trees to the south and the erection of the bat boxes as a compensatory measure.

Post planning a bat contour assessment will be undertaken to ensure that foraging and commuting habitat can be accommodated within the development and ensure no long-term loss of foraging and commuting habitat. There is also a potential to create habitat for roosting bats, with erecting the bat boxes.

8.7.2 OPERATIONAL PHASE

8.7.2.1 Night-time Light Pollution

The external site lighting installation will be designed in line with the following industry standards, best practice guidelines and local authority guidelines:

- Fingal County Council Public Lighting Standards;
- ET101:2008 National Rules for Electrical Installations;
- ET211:2003 Code of Practice for Public Lighting;
- EN 13201 Road Lighting Standards;
- BS 5498:2013 Code of Practice for Design of Road Lighting;
- Luminaires will be selected to ensure that when installed, there shall be zero direct upward light emitted to the sky (all output light shall be at or below 90˚ to the horizontal) to help prevent sky glow from light pollution in the night sky;
- The luminaires shall have a luminous intensity classification of between G4 and G6 to IS EN 13201-2:2003/BS 5489-1:2013 and recommendations of Institute of Lighting Professionals and Bat Conservation Trust 'Bats and Lighting in the UK' documentation and Bat Conservation Ireland Guidance Notes for Planners, Engineers, Architects and Developers December 2010;

- The light emitted from light fittings shall have no photo biological risk and shall be categorised as ‘Exempt Group’ in relation to emissions of Blue Light, Infrared and Ultra Violet Radiation in accordance with EN 62741:2008;
- The luminaires shall have a luminous intensity classification as per the recommendation of IS EN 13201-2:2003, BS 5489-1:2013 and the Institute of Lighting Professionals;
- Guidance for the Reduction of Obtrusive Light GN01:2011, produced by the Institute of Lighting Professionals;
- All luminaires shall comply with IS EN 60598; and
- All luminaires shall be energy efficient LED source fittings with sharp cut off optics.

8.8 RESIDUAL IMPACTS

Residual impacts are impacts that remain once mitigation has been implemented or impacts that cannot be mitigated. Table 12 below 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.

All mitigation measures detailed in this Chapter will be implemented in full and will remain effective throughout the lifetime of the facility. Therefore no significant negative residual impacts on the local ecology or on any designated nature conservation sites will result from the Proposed Development.

Table 8.14. 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	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Designated Sites								
Baldoyle Bay SAC [000199]	International Importance	The Proposed Development could potentially result in an increase in human presence within this SAC, which could negatively impact the relevant QI habitats present as a result of trampling.	Negative	Slight	Long-term	Imperceptible	The QI habitats in question, as detailed in the accompanying NIS, have a "*Very high*" resilience; and "*Not sensitive*" sensitivity, to trampling (ABPmer, 2013**). Further mitigation measures not required.**	**Imperceptible**
		The proposed development could potentially result in construction-related groundwater containing sediment/oil/pollutants/containments entering the SAC through the groundwater	Negative	Slight	Short-term	Significant	All excavations will be encompassed by secant pile wall around the basement excavation to allow dewatering and dry excavation and will eliminate the potential impact to groundwater – such as *low to likely probability and mild consequence resulting in a Low to Low/Moderate risk*	**Slight Effect**

Key Ecological Re-source	Level of Signifi-cance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Im-pact
			Quality	Magnitude / Extent	Duration	Significance		
		The Proposed Development could potentially result in construction-related surface water run-off containing sediment/oil/pollutants entering the SAC through the Bloody Stream waterway. It should be noted that these potential impacts are not at the level that they could impact adversely on the site integrity. Any such potential impacts are addressed in the NIS that accompanies this application.	Negative	Slight	Short-term	Significant	The QI habitats in question, as detailed in the accompanying NIS, have a "*Very high*" re-silience; and "*Not sen-sitive*" sensitivity, to in-creased sedimentation (ABPmer, 2013). As mitigation it is pro-posed to re-route the Bloody Stream water-way for the duration of the Construction Phase, culverting the stream underground in a 750mm diameter pipe encased in 1.50mm of concrete in accordance with Irish Water guidelines; thus protecting the stream from any potential con-struction related con-tamination.	**Slight Effect**
		Changes in the flow-rate of the Bloody Stream waterway associated with the Proposed Development could potentially impact on the QI habitats for this SAC. It should be noted that these potential impacts	Negative	Slight	Perma-nent	Slight	The potential impacts on relevant QI habitats in this case are not considered to be signif-icant due to the local-ised nature of the flow	**Slight**

Key Ecological Re-source	Level of Signifi-cance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Im-pact
			Quality	Magnitude / Extent	Duration	Significance		
		are not at the level that they could impact adversely on the site integrity. Any such potential impacts are addressed in the NIS that accompanies this application.					changes; the potential small increase of water flow, and the fact that the current Bloody Stream outfall exhibits varied flowrates as a matter of course i.e. there will be limited im-pact to the flow rates that are already experi-enced on a yearly cy-cle at present. **Further mitigation measures are therefore not re-quired.**	
		The Proposed Development once completed could potentially have an impact on the QI habitats of this SAC through an overshadowing effect.	Negative	Slight Lo-cal	Perma-nent	Impercepti-ble	The QI habitats in question, as detailed in the accompanying NIS, have a "*Very high*" re-silience; and "*Not sen-sitive*" sensitivity, to overshadowing (ABP-mer, 2013). Addition-ally, the distinguishing species of this habitat do not photosynthesise and are therefore not considered to be sensi-tive to the effects of	**Impercepti-ble**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
							overshadowing. No mitigation necessary.	
		The Proposed Development could potentially have an impact on the relevant QI habitats of this SAC due to the increased levels of night-time light-spill from the development once completed.	Negative	Slight Local	Permanent	Imperceptible	On further examination the potential for negative impacts to the relevant QI habitats in the case of this SAC; as a result of increased night-time light-spill, is not deemed to be likely. Therefore no mitigation measures necessary.	**Imperceptible**
Howth Head SAC [000202]	International Importance	The Proposed Development could potentially result in an increase in human presence within this SAC, which could negatively impact the relevant QI habitats present as a result of trampling / erosion.	Negative	Slight Local	Permanent	Significant	Walking routes along the Cliff Path Loop are already managed for disturbance, e.g. fencing and barriers in place to protect habitats. Increased usage as a result of the Proposed Development will not result in adverse impacts to habitats in relation to conservation objective of Howth Head SAC. This is mainly due to the	**Not significant**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
							mitigation measure already in place along the Cliff Path Loop walk. Therefore no further mitigation measures necessary.	
Ireland's Eye SPA [004117] **North Bull Island SPA [004006]** **Baldoyle Bay SPA [004016]** **Malahide Estuary SPA [004025]** **Lambay Island SPA [004069]** **South Dublin Bay and River Tolka Estuary SPA [004024]**	International Importance	The Proposed Development has the potential to impact on QI species associated with these SPAs; that feed on *ex-situ* sites along Claremont strand adjacent to the proposed site, through disturbance caused by the increased levels of noise generated during the Construction Phase of the Proposed Development.	Negative	Local	Short-term	Significant	The potential for adverse impacts on the relevant QI species in this case is not deemed to be significant due to the short term nature of the works (2 years); the insignificant numbers of birds recorded utilising Claremont strand during the winter; and the measures included as part of the Construction Management Plan in relation to noise control. Therefore no further mitigation necessary.	**Not Significant**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
Rogerstown Estuary SPA [004015]		The Proposed Development has the potential to impact on QI species associated with these SPAs; that feed on *ex-situ* sites along Claremont strand adjacent to the proposed site, through disturbance caused by the increased human presence along the strand associated with the Proposed Development.	Negative	Local	Permanent	Significant	The potential for adverse impacts on the relevant QI species in this case is not deemed to be significant due the insignificant numbers of birds recorded utilising Claremont strand during the winter (the overall average counts of each of the species recorded in relation to the respective national population estimates was 0.14%). As such, any disturbance caused is not expected to adversely impact on the conservation objective attributes of "*Population Trend*" and "*Distribution*" for these QI species. Therefore no mitigation measures necessary	**Slight effects**
Wintering Bird Assemblage		The Proposed Development has the potential to impact on QI species	Negative	Local	Permanent	Significant	Mitigation measures to be introduced are	**Not Significant**

Key Ecological Re-source	Level of Signifi-cance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Im-pact
			Quality	Magnitude / Extent	Duration	Significance		
		associated with these SPAs; that feed/roost on *ex-situ* sites along Claremont strand adjacent to the Site of the Proposed Development, through the increased levels of night-time light-spill from the devel-opment once completed.					detailed in the Light Plan accompanying this planning applica-tion i.e. All luminaires emitting light at or be-low 90° (zero upward direct light); with sharp cut-off optics (limits travel distance of light intensity); emitting light with no photo-bio risk and categorised as 'Exempt Group' in rela-tion to Blue Light, Infra-red and U.V. radiation. The potential for ad-verse impacts on the relevant QI species in this case is not deemed to be signifi-cant due the insignifi-cant numbers of birds recorded utilising Claremont strand dur-ing the winter (the overall average counts of each of the species recorded in relation to the respective national	

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation: Quality	Magnitude / Extent	Duration	Significance	Proposed Mitigation	Residual Impact
							population estimates was 0.14%).	
		The Proposed Development has the potential to impact on QI species associated with these SPAs; through the potential obstruction of flight lines to/from roost/feeding sites by on-site structures during the development's Operational Phase.	Negative	Local	Permanent	Not Significant	It is not considered that there will be any adverse impacts on QI species in this case due to the infrequency; and insignificant numbers, of 'at-risk' species recorded in-flight over the proposed sight during surveys; as well as the average flight heights recorded of 'at-risk' species in-flight over the Proposed Development, in-relation to the projected max heights of the development structures. Therefore no mitigation measures necessary.	**Not Significant**
Habitats								
Bloody Stream (FW2)	Local Importance	The Proposed Development has the potential to impact the Bloody	Negative	Local	Short-term	Significant	It is proposed to re-route the Bloody	**Imperceptible**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation: Quality	Magnitude / Extent	Duration	Significance	Proposed Mitigation	Residual Impact
	(higher value)	Stream habitat through the input of construction-related surface water run-off containing sediment/oil/ pollutants entering the stream.					Stream waterway for the duration of the Construction Phase, culverting the stream underground in a 750mm diameter pipe encased in 1.50mm of concrete in accordance with Irish Water guidelines; thus protecting the stream from any potential construction related contamination during the Construction Phase of the Proposed Development.	
		The Proposed Development has the potential to improve the ecological value of the Bloody Stream habitat through proposed plans to de-culvert the stream and install a riparian strip along its length.	Positive	Local	Permanent	Significant	This is a positive design measure.	**Significant**
Mammals								
Hedgehog	National Importance	Although no hedgehog was recorded on-site the Proposed Development has the potential to impact on this species through the removal of some potential (yet unlikely)	Negative	Imperceptible	Permanent	Significant	The removal of the recolonising scrub area to the west of the site will be of negligible impact to hedgehog due	**Not Significant**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
		habitat in the form of scrub on site during the Construction Phase.					to the low ecological value of this habitat type. In addition, the formulation of a riparian strip along the de-culverted Bloody Stream running through the proposed site, and the associated planting of native vegetation is a positive measure that will provide higher quality foraging habitat for hedgehog in the vicinity.	
Bat Assemblage	International Importance	The proposed site has the potential to impact on local bat populations through the removal of potential roosting habitat in the form of the buildings to be demolished on site.	Negative	Local	Permanent	Significant	Two bats were recorded utilising one of the 3 buildings on-site during surveys. As such the buildings are not considered to be of use to local bat populations as maternity roosts however may be used as a temporary roost. The loss of this potential roost site will be off-set by the installation of 3 no. bat-	**Slight Effects**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation: Quality	Magnitude / Extent	Duration	Significance	Proposed Mitigation	Residual Impact
							boxes in suitable locations in the vicinity of the proposed site.	
		The proposed site has the potential to impact on local bat populations through the disturbance of foraging/ commuting habitat through the increased night-time lighting associated with both the Construction and Operational Phases of the Proposed Development.	Negative	Local	Permanent	Significant	In relation to the potential impact of increased lighting on local bat populations the Light Plan accompanying this planning application describes a number of proposed mitigation measures i.e. All luminaires emitting light at or below 90° (zero upward direct light); with sharp cut-off optics (limits travel distance of light intensity); emitting light with no photo-bio and categorised as 'Exempt Group' in relation to Blue Light, Infrared and U.V. radiation.	**Slight Effects**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
							In addition, a bat contour assessment will be undertaken post planning to ensure that foraging and commuting habitat can be accommodated within the development and ensure no long-term loss of foraging and commuting habitat.	
Breeding Birds								
Breeding bird Assemblage (Green listed)	County Importance	The Proposed Development has the potential to impact on breeding birds in the vicinity through the increased levels of noise and human presence generated by the Construction Phase of the Proposed Development.	Negative	Local	Short term	Significant	Due to the urban/residential surroundings of the proposed site, and its proximity to the railway-line/station and nearby roads; local bird populations are likely accustomed to significant anthropogenic noise levels and human presence. To minimise the potential for any impacts related to noise generated by the Construction Phase, measures have	**Not significant**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
							been included as part of the Construction Management Plan in relation to noise control e.g. regular noise control audits.	
		The Proposed Development has the potential to impact on breeding birds in the vicinity through the increased levels of noise and human presence generated by the Operational Phase of the development.	Negative	Local	Long-Term	Not significant	The breeding species recorded within the Site or in the immediate vicinity of the site are species that breed in close proximity to human activity and as such will not be impacted by the Operational Phase of the Proposed Development.	**Not significant**
		The Proposed Development has the potential to impact on breeding birds in the vicinity through the clearing of vegetation during the Construction Phase of the Proposed Development.	Negative	Slight Local	Short-term	Significant	The majority of vegetation present on-site is of low ecological value as nesting habitat to breeding birds (mostly non-native recolonising shrub), however to ensure no major disturbance to breeding birds occurs all vegetation	**Not significant**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
							clearance will take place outside the breeding bird season (i.e. from the 1st March to the 31st August). In addition the proposed riparian strip will create additional habitat for foraging and breeding birds.	
		The Proposed Development has the potential to improve potential breeding habitat for local bird populations through the proposed planting of native species of plants and trees on site and along the proposed riparian strip.	Positive	Slight Local	Permanent	Significant	N/A	**Significant**
Breeding bird Assemblage (Amber listed)	National Importance	The Proposed Development has the potential to impact on breeding birds in the vicinity through the removal of potential nesting habitat for Swallow in the form of the buildings to be demolished;	Negative	Local	Permanent/ Long-term	Significant	Demolition of all site structures will take place outside of the breeding bird season.	**Not significant**

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		

Key Ecological Resource	Level of Significance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Impact
			Quality	Magnitude / Extent	Duration	Significance		
		The increased levels of noise and human presence generated by the Construction Phase of the Proposed Development has the potential to negatively impact on breeding birds adjacent to the Proposed Development.	Negative	Local	Short-term	Not significant	Due to the urban/residential surroundings of the proposed site, and its proximity to the railway-line/station and nearby roads; local bird populations are likely accustomed to significant anthropogenic noise levels and human presence. To minimise the potential for any impacts related to noise generated by the Construction Phase, measures have been included as part of the Construction Management Plan in relation to noise control e.g. regular noise control audits.	**Not significant**

Key Ecological Re-source	Level of Signifi-cance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Im-pact
			Quality	Magnitude / Extent	Duration	Significance		
		The increased levels of noise and human presence generated by the Operational Phases of the develop-ment has the potential to negatively impact on breeding birds adjacent to the Proposed Development.	Negative	Local	Long-term	Not signifi-cant	The breeding species recorded within the Site or in the immedi-ate vicinity of the site are species that breed in close proximity to human activity and as such will not be im-pacted by the Opera-tional Phase of the Proposed Develop-ment.	**Not signifi-cant**
		The Proposed Development has the potential to improve potential breed-ing habitat for local bird populations through the proposed planting of na-tive species of plants and trees on	Positive	Local	Perma-nent	Significant	The creation of a ripar-ian strip as a design measure	**Significant**

Key Ecological Re-source	Level of Signifi-cance	Potential Impact	Impact Without Mitigation				Proposed Mitigation	Residual Im-pact
			Quality	Magnitude / Extent	Duration	Significance		
		site and along the proposed riparian strip.						

8.9 INTERACTIONS

The biodiversity impacts detailed in this Chapter do not interact with other environmental factors.

8.10 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.

Wintering bird data presented in this report is derived from surveys carried out over one season, 2018/19. It is possible that potential variation between seasons that has not been recorded due to the singular nature of the above study, could lead to variation in the results contained in this report

Wintering bird surveys covered the period of November to April 2018/19, and as such the use of survey sites by wintering birds during September/October has not been ascertained. However, the lack of data for these months is not considered to have impacted on the conclusions contained in this report. Peak numbers of wintering birds in Dublin are routinely recorded in the period November to February, with January usually recording the highest numbers (I-WeBS data).

The height of birds recorded as part of the flight-line surveys were estimated based on comparison with existing site buildings. These measurements are therefore not exact and are prone to a degree of observer error. However, the height estimations are considered satisfactory for the purposes of assessments contained in this report.

8.11 CONCLUSION

It is considered that, provided mitigation measures proposed are carried out in full, there will not be any significant negative impact to any valued habitats, designated sites or individual or group of species as a result of the Proposed Development.

8.12 REFERENCES

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Chapter 9
Archaeology, Architecture and Cultural Heritage

9.0 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) aims to articulate the potential significance and sensitivity of the existing archaeological and architectural environment and to evaluate the likely impacts of the proposed development and the effect of those impacts on this environment. The 2.67ha site is located between the railway line and the R105 Dublin Road, just outside and to the west of the village of Howth in north County Dublin (Figure 9.1).

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

9.1 ARCHAEOLOGY

9.1.1 CHARACTERISTICS OF DEVELOPMENT RELEVANT TO THIS CHAPTER

Archaeological heritage

Archaeological heritage is a finite non-renewable physical and material resource, where archaeology is defined as the study of past human societies through their material remains and artefactual assemblages. The study of archaeological remains increases our understanding of the structure and culture of past societies that are not recorded by any other means. Each monument possesses a unique and, as such, invaluable record of the individual site, as well as providing evidence for its context in a wider cultural framework. Collectively, archaeological monuments contribute to charting cultural evolution and change.

There are no known archaeological monuments within the boundary of the proposed development site, where prior to the construction of the railway, the site constituted part of the foreshore. The foreshore in this area is however the location of a battle between the Anglo-Normans and the Norse of Howth in August 1177 and there are several accounts of human remains, presumably relating to the battle, being uncovered in the general area.

9.1.2 METHODOLOGY

9.1.2.1

The methodology undertaken in the production of this chapter included a desk-based assessment of the known archaeological and settlement history of the immediate area and a walk-over site inspection.

9.1.2.2 DESK-BASED ASSESSMENT

The desk-based assessment made use of the following sources:

- Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR)
- Topographical files of the National Museum of Ireland
- Documentary sources (as listed in the bibliography)
- Cartographical sources
- OSi Historic Mapping Archive and other historical mapping
- Aerial photographs
- *Excavations Bulletin* and Excavations Database (1970-2015)
- Fingal Development Plan 2017-2023

9.1.2.3 SITE INSPECTION

A walk-over inspection of the site was conducted on 9 March 2019, with further photographs taken on 17 March in better weather conditions. The purpose of the site inspection was to identify potential archaeological sites and features of historical, industrial, and cultural heritage merit that may be subject to direct or indirect impacts as a result of proposed development.

9.1.2.4 GUIDELINES, LEGISLATION AND STANDARDS

For the purposes of this report the following guidelines, legislation and standards were consulted:

- National Monuments Act, 1930 (as amended in 1954, 1987, 1994, 2004 and 2012 - S.I. 249 of 2012)
- The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999
- Planning and Development Act, 2000 (as amended)
- The Heritage Act, 1995
- Environmental Protection Agency, 2015, *Revised Guidelines on the information to be contained in Environmental Impact Statements*, Draft September 2015
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9.1.2.5 ASSESSMENT CRITERIA

The criteria used to assess the significance of the impact of a development on an archaeological landscape, site, feature, monument or complex are defined as follows:

- **Profound** Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological site is completely and irreversibly destroyed by a proposed development.
- **Significant** An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where

part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site.

- **Moderate** A moderate direct impact arises where a change to the site is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised, and which is reversible. This arises where an archaeological feature can be incorporated into a modern-day development without damage and that all procedures used to facilitate this are reversible.
- **Slight** An impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.
- **Imperceptible** An impact capable of measurement but without noticeable consequences.

Factors that are considered in relation to assessing the potential impact of a proposed development on every site of archaeological heritage are: its existing status/level of protection; its condition/preservation; its historic significance or attributed documentation; its group value; its rarity; its visibility in the landscape; and its vulnerability and its amenity value. In accordance with the guidelines set out by the EPA, each site, monument or complex is assessed on the basis of its context, character, significance and sensitivity/vulnerability. Any direct impact on a recorded archaeological monument or site is regarded at the very least as being a significant negative impact.

9.1.3 BASELINE ENVIRONMENT

9.1.3.1 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The name Howth is derived from a modification of the Scandinavian word *hoved,* meaning ‘head’. The Irish name for Howth, *Ben Edair*, translates as the ‘Hill of Edar’. Several possible etymologies survive for the name, including that Edar was a chieftain of the mythical Dé Dannan who was reputedly buried on the hill of Howth. Howth offers a palimpsest of archaeological sites as there is evidence for constant habitation from prehistoric period onwards (Stout and Stout, 1992).

Prehistoric period

The Mesolithic (Middle stone age *c*. 9000-4000BC) currently presents the earliest evidence for the human occupation of the greater Dublin area and its coastline during the immediate post-glacial period and Howth is no exception to this: the closest site dating to this period is the large shell midden site DU015-024, located 1.2km west of the proposed development in Burrow townland. Such sites are usually situated on or close to the shoreline and are typical of the transitory hunter-gatherer nature of these early occupants.

The Irish Neolithic (*c*. 4000-2800BC) marked a wholesale change in the way that humans occupied the landscape. Habitation became fixed, with the lifestyle revolving around the cultivation of crops and animal husbandry in tandem with the construction of large, stone-built monuments, both of which necessitated deforestation of large areas of the landscape and a large, settled and secure population. The area surrounding the proposed development site is no exception to this, the higher reaches of the Howth peninsula, its maritime aspect and location obviously constitutes prime real estate today and the same was true in the Neolithic. The closest example of the occupation of the immediate landscape during this period is the RMP located 400m to the east comprising a tomb DU015-028001. This was discovered in the late nineteenth century and is described as a stone cist (L 9m; W 700mm), which was exposed during house construction work in 1897 (Shearman 1866-9, 330-32). It was constructed of limestone blocks and was covered by a mound (Westropp 1922, 64).

A further ‘Mound’ which could be potentially dated to this period is the landscaped hillock, DU015-020, located 900m west along the coastline from the proposed development site. Although it is described in the RMP as ‘one of a number of mounds in the immediate area which produced human remains’ no further information could be found pertaining to it and where burial mounds usually date to the prehistoric period, this is not always the case. Approximately 1.1km to the south of the proposed development site is the DU015-032 portal tomb. With its single chamber it is a classic example of this type of tomb built throughout much of northwest Europe during the Neolithic period. In its elevated location at the foot of Muck Rock on the north side of Howth head this tomb would have been visible from much of the coastline north of here, which has various funerary monuments of similar date dotted along its length and indeed a direct line of site to/from the tombs (cairns) built during this period on Lambay island 15km to the north. Likewise the Cairn, DU016-007, would have been intervisible form these points, located as it is 2km to the southeast of the proposed development site, on the summit of Kilrock on Howth Head.

Early-medieval period

There are several ecclesiastical sites on Howth representing the early medieval period including St. Fintan’s Church at the foot of Shelmartin Hill. According to the *Annals of Inisfallen*, Howth was raided repeatedly by the Vikings. The first Viking raid was mentioned in the *Annals of the Four Masters* in the year 819. They recorded ‘the plundering of Etar by the foreigners, who carried off a great prey of women’. Two years later the *Annals* again record a raid on Howth. Thus, much of the history and archaeology of Howth is intertwined with the Norse. In 1014 after the Battle of Clontarf, the Norsemen are documented as fleeing to Howth, with the intention of regrouping and the establishing of a settlement. St. Mary’s Church, which was replaced by Howth Abbey (DU015-029001), is located 800m to the east of the proposed development, was founded by the Viking King of Dublin Sitric Silkenbeard *c.* 1042.

Medieval period

According to Lewis’ *Topographical Dictionary of Ireland*, Sir Amorey Tristram and Sir John De Courcy landed at Howth on St. Laurence’s day, 10 August 1177, leading a large military force which defeated the Norse inhabitants at what is referred to as the ‘Battle of Evora Bridge’. The bridge bought the road from Dublin over the Evora Stream, which is now referred as the Bloody Stream. Sir Amorey was awarded the lordship of Howth on account of the victory and took the St. Laurence name as his own. His descendants still occupy Howth Castle, 200m to the south of the proposed development site.

The Manor of Howth was granted to Almaric de St. Laurence in 1180 by Henry II and he is believed to have constructed a motte on the site now occupied by the Martello tower, 900m to the east of the proposed development site. St. Mary’s church was replaced in 1235 by the foundation of Howth Abbey, its associated monastery and their amalgamation with the older monastic settlement of Ireland’s Eye, with the Abbey itself being rebuilt in the fourteenth century

Post-medieval period

Howth harbour was built between 1807 and 1813 and it was formally established as the packet station for Dublin in 1818, however the harbour was prone to severe silting and it was replaced in the packet service by Kingstown (Dún Laoghaire) in 1833. Some 950m east of the proposed

development site stands a circular Martello tower (DU016-002002) (NIAH Reg. 11359033), one of 28 constructed to defend the coastline of Dublin (Bolton, 2008). Situated overlooking Balscadden Bay, its construction was completed in 1804 and it was originally armed with twenty-four pounder canon to defend against a possible Napoleonic invasion. The tower was constructed on a natural spur on top of which is believed to be the location of the remains of an Anglo-Norman motte (DU016-002001) discussed above. The damage to the motte was lamented by antiquarians such as T.S. Westropp (1922):
Unfortunately, in the wasteful craze for building useless Martello Towers, in the Napoleonic Wars, early in the last century, the great mound, like other interesting and historic structures was levelled; its successor alone marks its site.

The railway line was extended to Howth from Howth Junction in 1846 by the *Dublin & Drogheda Railway Company*. It originally ran to a temporary terminus to the west of the proposed development site but was extended to its present terminus the following year, after an embankment was constructed across the beach. This left an area of ground south to the Dublin Road on which the site under discussion is located.

9.1.3.2 RECORDED ARCHAEOLOGICAL SITES AND PROXIMATE ARCHAEOLOGICAL INVESTIGATIONS

The proposed development does not intrude on the statutory Zone of Notification of any known archaeological site or monument; however the most proximate Zone of Notification abuts part of the development site boundary (Figure 9.2). This site (DU015-042) constitutes a Burial Ground, where human remains were uncovered *c.* 1866 during the construction of the modern Protestant church, St. Mary's, which was built on the site of an earlier ecclesiastical establishment. Finds recovered included sword fragments and a jet ring (Shearman 1922, 65). Archaeological monitoring (Licence No. 03E0935) was undertaken for the provision of a new gas supply to the north of St. Mary's church in 2003. A 55m long slot trench on the higher ground within the church grounds revealed at least three *in situ* human burials and evidence for disarticulated remains (Scally, 2003).

The most proximate archaeological investigation to the proposed development site was undertaken by the writer in 2008 as part of the Dublin Bay Project (C124). This involved the monitoring of a trench excavation from Sutton Cross to Howth Harbour along the R105 and the trench extended along the site boundary. Where there was little of archaeological significance recorded, the field book suggests that natural sand was located *c.* 600mm under the road surface, with there being no evidence for bedrock at the depths required, which in this instance was 2500mm (Myles, 2008).

Some 200m south of the proposed development site in the townland of Howth Demesne lies a medieval archaeological complex comprising Howth Castle (DU015-027001), its associated Gatehouse (DU015-027002), an armorial plaque (DU015-027003) depicting the arms of the St. Lawrence family and a Chapel (DU015-026).

The proposed development site is located some 800m west of a medieval complex on Abbey Street, which extends north-south through Howth village. The most significant site is St. Mary's Church, a National Monument also known as Howth Abbey (DU015-029001), which was constructed in the fourteenth century on the site of the church founded by Sitric *c.* 1042. The church comprises a double aisled structure with a bellcote in its western end (Leask, 1978, 34-7). Two medieval graveslabs (DU015-029004) are attached to the eastern and southern walls of the south aisle. A fifteenth-century alter tomb (DU015-029003) is located at the east end of the southern aisle the covering slab of which bears the effigy of Sir Christopher St. Lawrence, Lord of Howth, and Anne Plunkett, his wife.

A graveyard (DU015-029006) on the southern side of the church contains burials ranging in date from the eighteenth century to modern times. Items of interest within the graveyard (which is enclosed using distinctive crenallated walls as depicted by the artist Gabriel Beringer in the eighteenth century) include a holy well (DU015-029002) against the northwestern boundary wall and a graveslab (DU015-029005) reused as a kerbstone in the southwestern corner.

The remaining RMP sites to the east of the proposed development site relate to medieval structures. The sole extant example is a fortified house (DU015-030), known as the 'College of Howth', located to the south of St. Mary's Church. This comprises a T-shaped building of late fifteenth/early sixteenth-century date fronting onto Abbey Street. A nineteenth-century description of the College states 'it is entranced from the south and consists of a hall, kitchen and the remains of seven cells. The ruins are sufficiently tenantable to afford shelter to a number of poor families' (Warburton *et al.,* 1818, 1260).

The remains of two medieval buildings have been uncovered as a result of previous archaeological assessments. The northwest angle of a late medieval structure (DU015-094) was recorded outside the southern boundary of the graveyard discussed above. This comprised two courses of quoin stone overlying a construction layer. A second medieval structure was recorded to the northeast of the church complex. This had a thirteenth- or fourteenth-century date and measured 8.6m E-W and 4m N-S internally with walls up to 0.95m in thickness, suggesting the building initially had more than one storey. Three floor levels were also uncovered in the building which was likely demolished in the late medieval period.

9.1.3.3 CARTOGRAPHICAL SOURCES

Cartographic evidence has provided a visual aid to identify the morphological development surrounding the proposed development site. The barony map of Coolock on the Down Survey *c.* 1657 (Figure 9.3) depicts the church of St. Mary's surrounded by trees, with a large house denoting the location of Howth village. There is no detail depicted along the foreshore apart from the beach.

Rocque's 1757 map (Figure 9.4) provides considerably more detail. The layout of the village is clearly visible with Abbey Street and Church Street depicted as well as a rectangular structure representing St. Mary's Church. Several substantial houses can be seen in the village centre along with the 'Roman Chapel'. The area of the proposed development site is depicted as a low rocky foreshore, with the beach extending to the north.

The first edition of the Ordnance Survey undertaken in 1838 (Figure 9.5) depicts Howth village as being similar to its present incarnation. Interestingly the rocky foreshore depicted by Rocque is not as obvious, and the beach extends immediately to the north of the road. The proposed development site thus occupies an area of tidal sandbanks with freshwater channels.

The most obvious development depicted on the 25-inch mapping of 1907/09 (Figure 9.6) is the railway which cuts across the tidal sands to the bottom of the West Pier. This had the effect of enclosing the area to the road, where the Bloody Stream was culverted under the railway line (Plate 9.1). Most of the site is annotated as *Mud*, where there is evidence for reclamation at the eastern end of the site and in the southwestern corner.This situation had not changed radically by the 1940s, where there was still a salt marsh depicted towards the centre of the site, and it would appear that the development of the Techcrete site encouraged the final reclamation of the area.

9.1.3.4 HOWTH CASTLE ARCHITECTURAL CONSERVATION AREA

The northern boundary of the Howth Castle ACA runs along the centre of R105. The objective of ACA designation is to protect the special character of an area through the careful control and positive management of change of the built environment. Therefore, the assigning of ACA status on a streetscape, cluster of buildings, or a town/village core results in restrictions on certain works to the exteriors of structures within the boundary of the ACA. There is no specific legislative control, outside of the usual planning criteria, for developments bordering, or in this instance, adjacent to the boundary of an ACA.

A Y-shaped junction connects the avenue leading to the castle with the R105 opposite the proposed development site. Before the Neo-Gothic gate pillars, marking the entrance to the Howth Castle estate, there is a small cul-de-sac to the east that provides access to St. Mary's Church and parish centre.

The entrance gateway was built *c.* 1835 and is listed on the NIAH (Reg. No. 11358027), where it is afforded Regional importance. The gateway comprises a large ashlar limestone structure with cast-iron entrance and pedestrian gates. The gateway consists of a pair of pointed segmental arches flanked by banded columns with reeded shafts and topped by decorative capping stones. The central columns act as gate piers to the main entrance gates, while the pedestrian gates are housed within the arches. A tree-lined avenue, planted on either side with Irish yews, slopes gently uphill towards the castle, with a walled garden running along the eastern side. The avenue curves slightly, skirting around the ruins of the medieval church (DU015-026) and there is no long vista from the gates from the castle.

9.1.3.5 EXISTING SITE

The proposed development site can be sub-divided into three discrete areas, with the bulk of the area formerly part of the Techcrete factory and adjacent undeveloped grounds to the west. Techcrete specialised in the design, manufacture and supply of architectural pre-cast cladding to the Irish and UK markets and the centre of the site is taken up by several interconnected two to three storey industrial structures of corrugated iron, blockwork and concrete panels.

The site is level with the railway line and there is no surface indication of any archaeological features or structures.

The western third of the site comprises open ground, with large concrete bins located in the northwestern corner against the railway boundary (Plates 9.2 and 9.3). The area is covered with grass and scrub and where there are some areas of concrete hard-standing, there are other areas of decayed tarmacadam through which the grass has grown.

The centre of the site is taken up with the Techcrete structures (Plates 9.4 — 9.6). These are of no architectural significance and in a semi-derelict condition. From their outward appearance, the structures would appear to have shallow foundations and have possibly occasioned little impact on the substrates beneath the concrete slab on which the structures sit.

The eastern area of the site is taken up by the former Beshoff Motors car showroom and an area of concrete hard-standing (Plate 9.7). Again, it is unlikely that the structure has deep foundations.

9.1.4 IMPACT OF THE PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

9.1.4.1 DIRECT

The proposed development site comprises foreshore reclaimed after the construction of the railway in 1847 and does not contain any previously recorded archaeological monuments. The general area is nonetheless known as a significant battle site and the Bloody Stream, supposedly named after the battle, runs under the site in a culvert.

After the standing structures have been demolished, there will be a quantifiable impact in terms of cubic meters associated with the excavation of basement levels for the four blocks as proposed. Where there have been no archaeological investigations undertaken on the site it is not possible to use the usual assessment criteria, however should archaeological material be present the impact is likely to be Significant.

The proposed development will therefore potentially impact negatively on any subsurface archaeological remains present. These could include human burials associated with the battle or from other periods, and where the Anglo-Norman forces arrived by sea, there remains the potential for the discovery of ship timbers submerged in the underlying silts.

9.1.4.2 INDIRECT

There are no indirect impacts associated with the construction phase of the proposed development.

9.1.4.3 SECONDARY

There are no secondary impacts associated with the construction phase of the proposed development.

9.1.4.4 CUMULATIVE

In terms of archaeological, architectural or cultural heritage, there are no projected cumulative impacts associated with the construction phase of the proposed development.

9.1.5 IMPACT OF THE PROPOSED DEVELOPMENT –OPERATIONAL PHASE

9.1.5.1 DIRECT

In terms of the surrounding archaeological environment the proposed development will not cause any visual impact on vistas or settings from the National Monument in Howth village. There are three Recorded Monuments to the south of the site, however dense tree growth does not permit views in either direction. There is consequently little potential for the proposed development to cause a negative visual effect on the vistas and settings of the monuments. This is further examined in the chapter relating to the landscape and visual impacts.

The existing vistas through and from the entrance gateway of Howth Castle — an important element of the ACA — will nonetheless be permanently altered, where the view to the sea will be confined to a visual avenue through the blocks of the proposed development. The vista from the gates has already been compromised by the semi-derelict Techcrete structures and the design of the proposed development can, if anything, be considered an improvement on the existing vista.

9.1.5.2 INDIRECT

There are no indirect impacts.

9.1.5.3 SECONDARY

There are no secondary impacts.

9.1.5.4 CUMULATIVE

The are no projected cumulative impacts.

9.1.6 'DO NOTHING' IMPACT

9.1.6.1

Should the proposed development not proceed, there will be no negative impact on the archaeological resource that may potentially be on the site.

9.1.7 MITIGATION MEASURES

9.1.7.1 CONSTRUCTION PHASE

Although there are no recorded monuments within the footprint of the proposed development, its location on the foreshore and the area's association with a documented battle will undoubtedly attract an archaeological condition on a successful grant of planning.

Established mitigatory measures involve the excavation under licence of a series of test trenches across the site post-demolition. Should archaeological deposits be encountered, a report detailing the extent and nature of the material will be submitted to the statutory authorities for further consideration. With the agreement of the statutory authorities the area can be opened up and the material excavated by hand.

Should there be no archaeological material recorded over the programme of test trenching, a monitoring brief to be undertaken over the course of development will establish (or not) the presence of archaeological deposits on the site. Where archaeological material is found to be present, development work will cease across the area identified and any deposits will be excavated by hand, subject to agreement with the statutory authorities.

9.1.7.2 OPERATIONAL PHASE

Following the implementation of the archaeological mitigation measures outlined above, there will be little residual impact on the archaeological heritage located within the development footprint. There are therefore no mitigation measures required over the operational phase of the proposed development.

9.1.8 RESIDUAL IMPACTS

9.1.8.1

Due to the nature of the development and the type of archaeology likely to be encountered on site, it is not considered likely that there will be residual impacts.

9.1.9 INTERACTIONS

9.1.9.1 PUBLIC HEALTH

There are no specific risks to human health associated with the cultural heritage of the site.

9.1.9.2 ANY OTHER APPLICABLE INTERACTIONS

There are potential interactions with the following specialist elements of the project during the construction phase:

- Land and Soils
- Water
- Landscape

9.1.10 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no difficulties encountered over the compilation of this chapter.

9.1.11 REFERENCES

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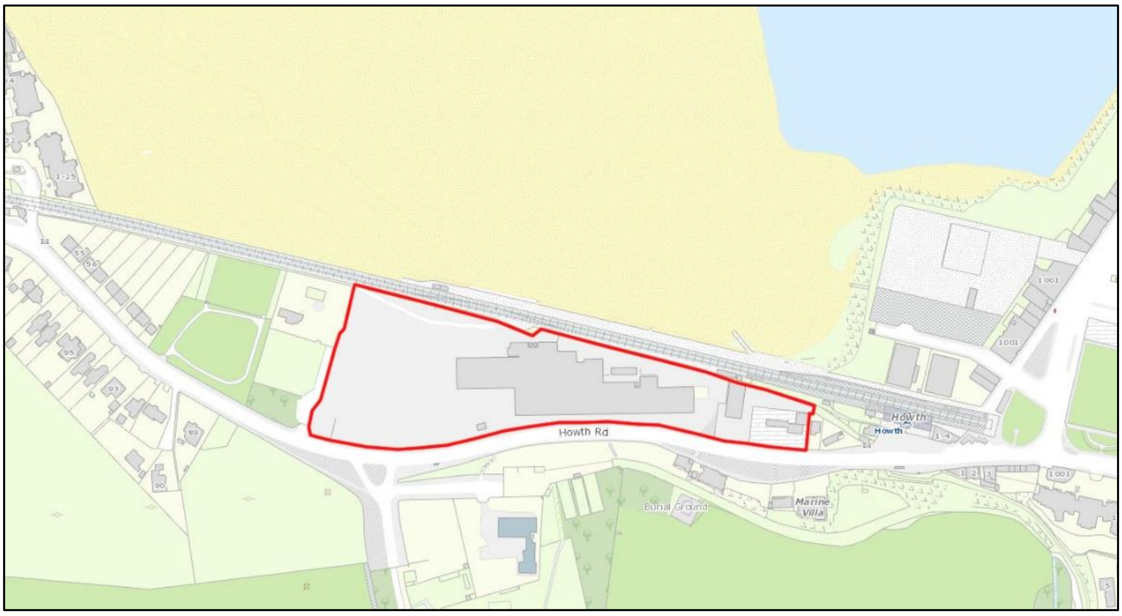


Figure 9.1 **Development site location (ASI Historical Environment Viewer)**

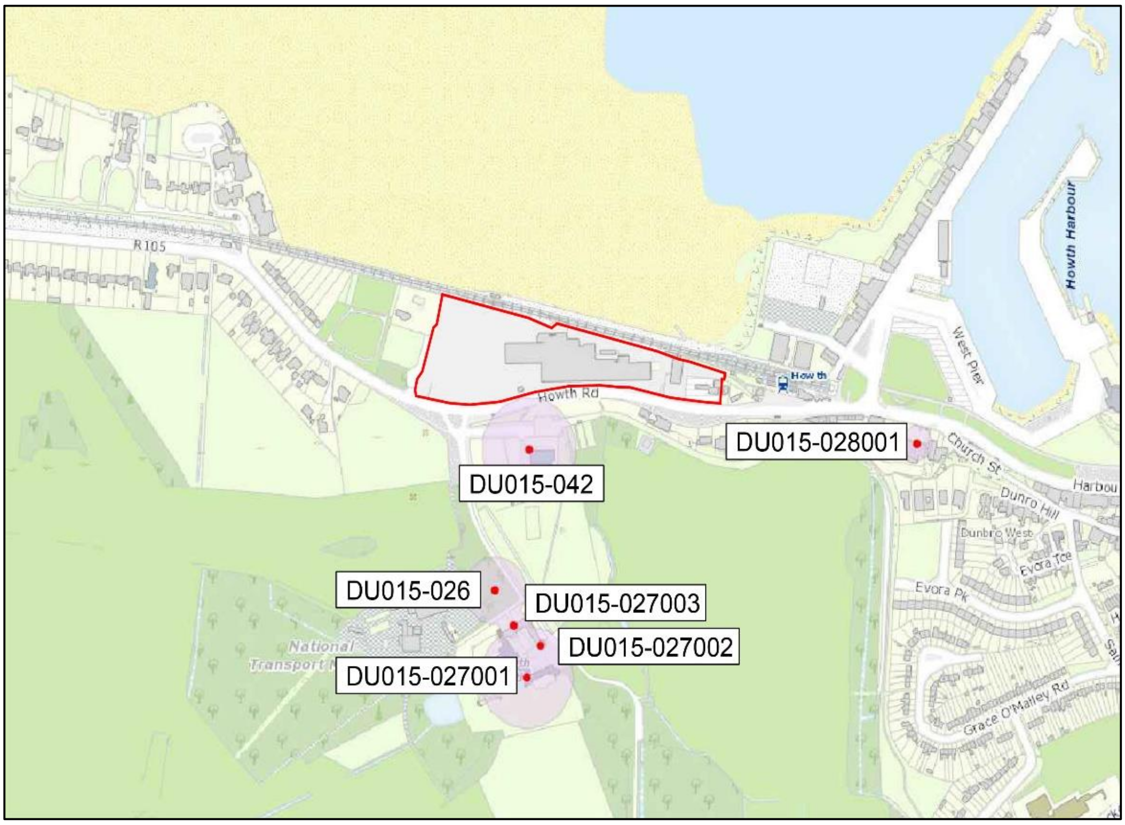


Figure 9.2 **Proposed development site with RMP sites (red dots) with associated Zones of Notification (ASI, Historic Environment Viewer)**

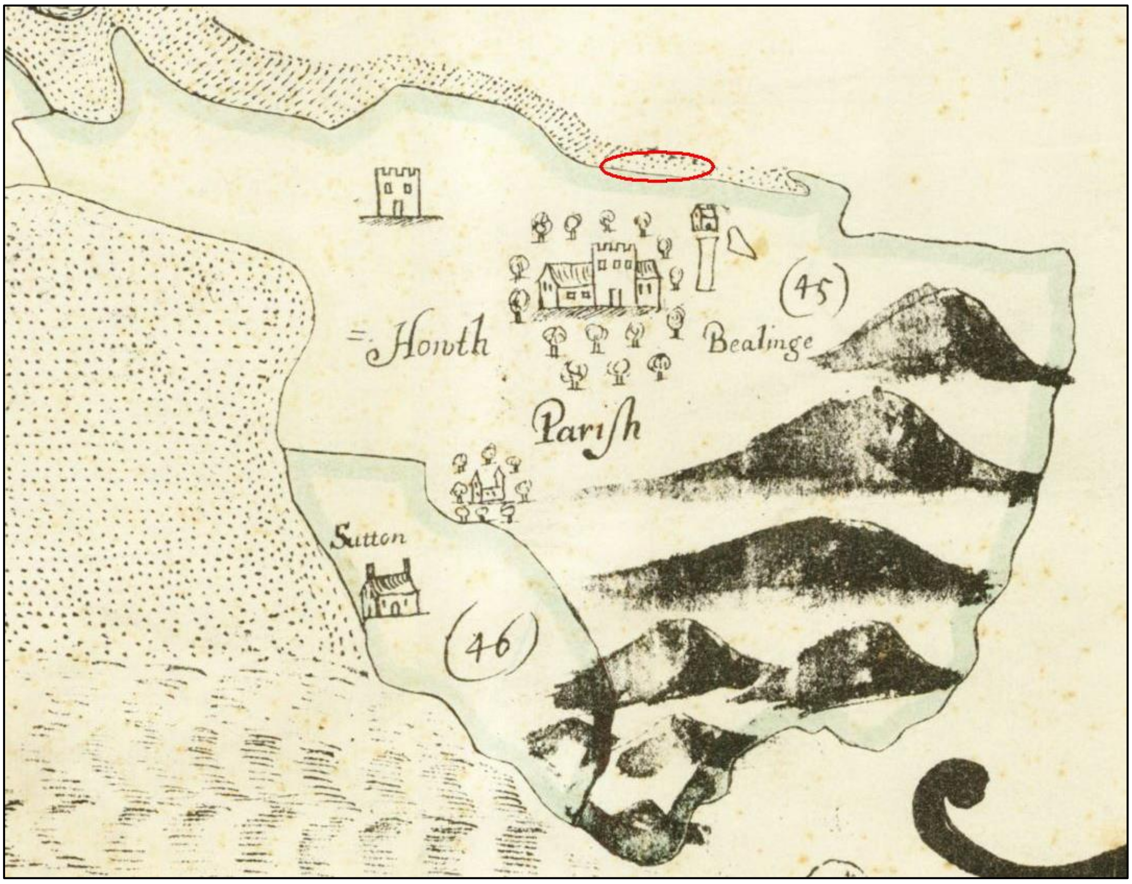


Figure 9.3 **'The Barony of Coolock in the County of Dublin'. Down Survey, *c.* 1657. Approximate site location indicated**

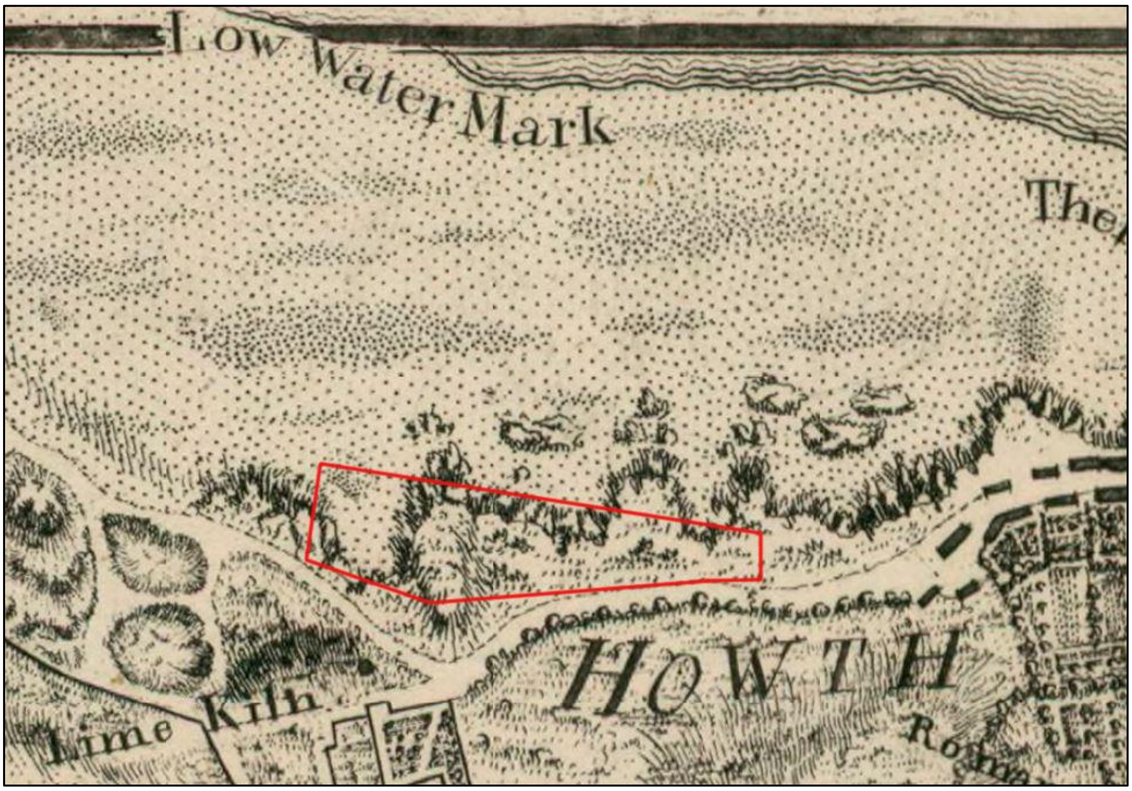


Figure 9.4 **John Rocque, *A Survey of the City, Harbour, Bay and Environs of Dublin*, 1757. Approximate site location indicated**

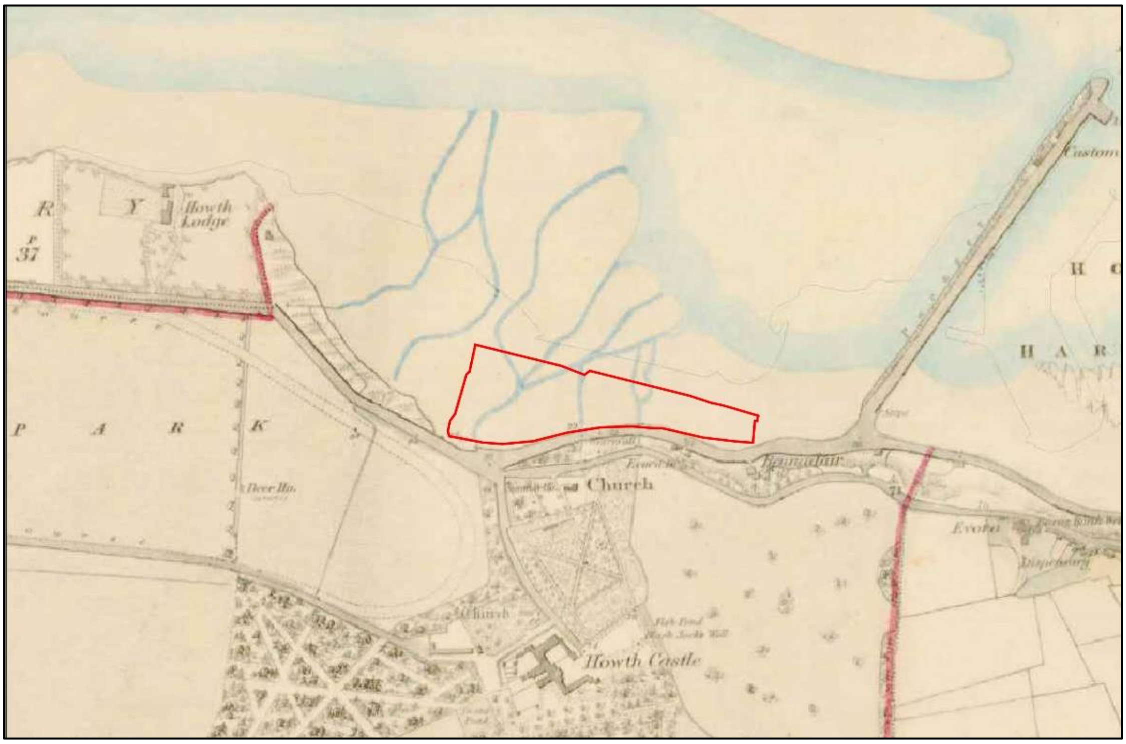


Figure 9.5 Ordnance Survey, Dublin, sheet 15, 6 inches to 1 mile, 1838

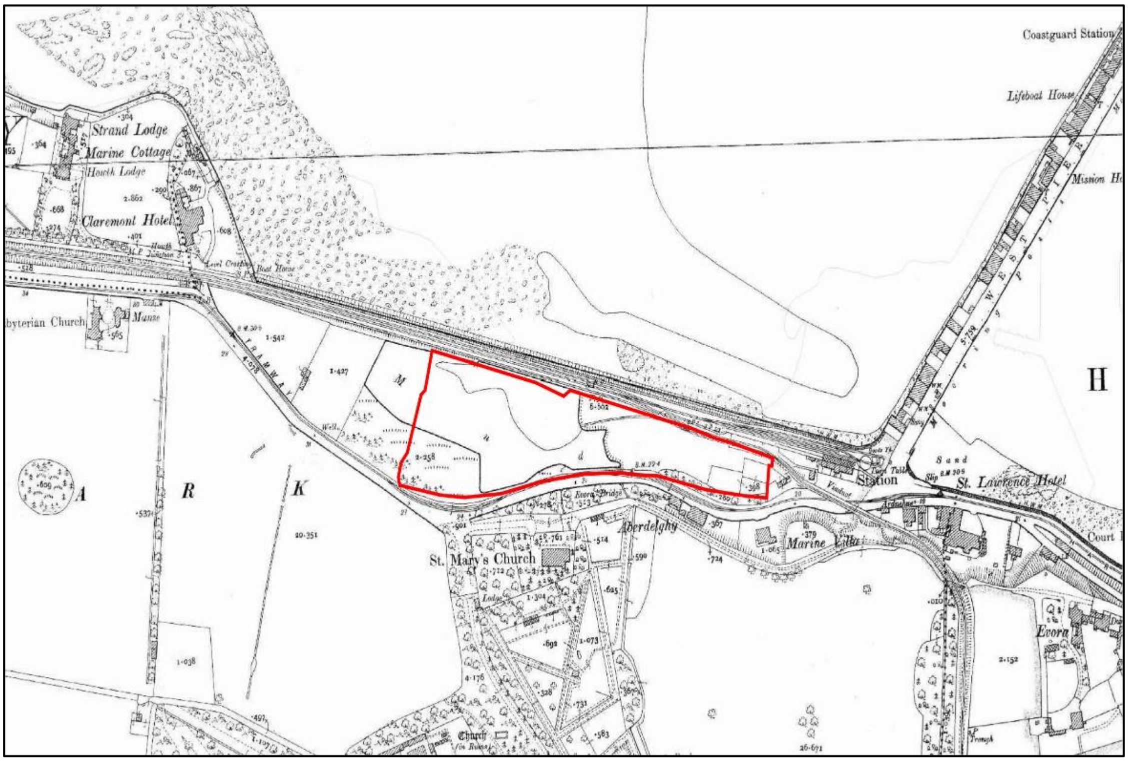


Figure 9.6 Ordnance Survey, Dublin, 25 inch to one mile, 1907/09

Plate 9.1 **Outflow of Bloody Stream, looking southwest**

Plate 9.2 **Western area of site, looking east**

Plate 9.3 Western area of site, looking north, with Ireland's Eye on the horizon

Plate 9.4 Techrete structures, looking southeast

Plate 9.5 **Eastern end of Techrete structures, looking south**

Plate 9.6 **Western end of Techrete structures, looking east**

Plate 9.7 **Former Beshoff Motors premises at eastern end of proposed development site, looking northwest**

9.2 ARCHITECTURAL HERITAGE

9.2.1 INTRODUCTION

This section of chapter 9 of the EIAR notes the presence of buildings and other structures that are of heritage significance, including, but not confined to, protected structures, and assesses the potential impact that the proposed development may have on their built fabric, their character or their settings. The assessment also takes into account the presence of architectural conservation areas (ACAs) in the vicinity of the application site and assesses any potential impact that the proposal may have on the character of the ACA.

This assessment has been carried out by Rob Goodbody BA(mod), DipEnvPlanning, DipABRC, MA, MUBC, MIPI, Historic Building Consultant.

9.2.1.1 CHARACTERISTICS OF DEVELOPMENT RELEVANT TO THIS SECTION

None of the structures on the site at present is of architectural heritage significance. The site is within sight of a number of protected structures and two ACAs and the potential impact of the proposed development needs to be assessed in relation to those protected structures that are within sight and within 100 metres of the development and the two ACAs within sight.

9.2.2 METHODOLOGY

The built heritage assessment examines buildings and other structures in the vicinity of the application site and assesses the architectural heritage 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 or 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 survive intact and ruins, or even fragments of buildings may be of importance.

The identification of buildings and structures to be assessed for impact was based in the first instance on an analysis of current Ordnance Survey maps. The potential for any building or other structure in the vicinity of the application site to have special architectural significance was also gauged through examination of the following sources:

- The Fingal Development Plan 2017-2023
- Pre-Ordnance Survey maps by John Rocque, 1757 and John Taylor, 1816
- Ordnance Survey six-inch maps of 1843, 1871 and 1907
- National Inventory of Architectural Heritage

Any buildings on or close to the application site that were identified on the earlier Ordnance Survey maps were then checked against the current Ordnance Survey maps to ascertain which were still extant.

The area was then walked on 24th February and again on 21st August 2019 to identify those structures noted in the desktop survey to assess them for their architectural quality. The possibility of finding structures of architectural significance not identified either from the desktop assessment was kept in mind during the site work and any potential additional structures were examined.

The entries in the Records of Protected Structures for Fingal were also checked.
The structures identified 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"1.

The definition for each of these categories is as follows:

International:
Structures or sites of sufficient architectural heritage importance to be considered in an international context. Examples include St Fin Barre's Cathedral, Cork. These are exceptional structures that can be compared to and contrasted with the finest architectural heritage in other countries.

National:
Structures or sites that make a significant contribution to the architectural heritage of Ireland. These are structures and sites that are considered to be of great architectural heritage significance in an Irish context. Examples include Ardnacrusha Power Station, Co. Clare; the Ford Factory, Cork; Carroll's Factory, Dundalk; Lismore Castle, Co. Waterford; Sligo Courthouse, Sligo; and Emo Court, Co. Laois.

Regional:
Structures or sites that make a significant contribution to the architectural heritage within their region or area. They also stand in comparison with similar structures or sites in other regions or areas within Ireland. Examples would include many Georgian terraces; Nenagh Courthouse, Co. Tipperary; or the Bailey Lighthouse, Howth. Increasingly, structures that need to be protected include structures or sites that make a significant contribution to the architectural heritage within their own locality. Examples of these would include modest terraces and timber shopfronts.

Local:
These are structures or sites of some vintage that make a contribution to the architectural heritage but may not merit being placed in the RPS separately. Such structures may have lost much of their original fabric.

Record only:
These are structures or sites that are not deemed to have sufficient presence or inherent architectural or other importance at the time of recording to warrant a higher rating. It is acknowledged, however, that they might be considered further at a future time

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 report it should be taken as including special 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.

[1] National Inventory of Architectural Heritage *NIAH Handbook* edition September 2017.

9.2.3 BASELINE ENVIRONMENT

9.2.3.1 HISTORICAL BACKGROUND

Prior to the mid-nineteenth century the application site was part of the foreshore, with no part of it above high-tide level. The coastline to the west of the entrance to Howth Castle was low-lying, while to the east the ground rose significantly, and the shoreline was marked with cliffs. The road to the village of Howth climbed this higher ground along the road that now forms the access to St Mary's Church and continued on to enter the village on the road now known as Dunbo Hill.

In 1807 work commenced on the construction of the present Howth Harbour and this necessitated improved access along the shoreline. The harbour was built to serve as a mail port and the road from Howth Harbour to Dublin was reconstructed to the designs of Thomas Telford by the contractor William Dargan. For some time after the opening of the new road along the coast the old road past the church to Dunbo Hill remained in use. The new arrangement was depicted on John Taylor's map of The Environs of Dublin, published in 1816 and in more detail on Francis Giles's survey of Dublin Bay that was carried out for the Ballast Office in 1819.

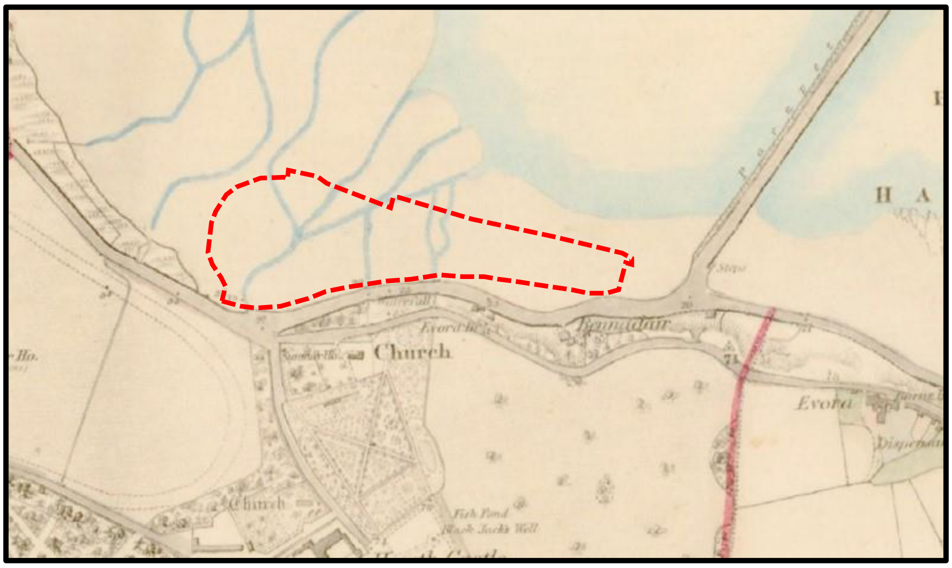


Figure 9.7: Ordnance Survey map of 1843 showing site location

The Ordnance Survey published its first six-inch map of the Dublin area in 1843 and sheet 16 of that map shows Howth and the area of the present site. The red line on the map extract above shows the approximate location of the site, all of which was still part of the intertidal sands at that time. Shortly after this, during 1846-47, the Dublin and Drogheda Railway Company constructed a railway line on an embankment across the open sea to reach the present Howth Railway Station, thereby cutting off an area of the intertidal zone from the open sea.

The opening of the railway to Howth in 1847 was followed soon afterward by the completion of the railway station building. A house for the station master followed, though not until later in the century and the house, to the west of the station building, was not present at the time of the publication of the Ordnance Survey's second-edition six-inch map in 1871.

In June 1901 Great Northern Railways opened a tramway between Sutton Railway Station and the Hill of Howth, extending the line to Howth Railway Station in August of that year. This necessitated the construction of a bridge over Harbour Road to the front of Howth Railway Station, with an embankment descending from the northern end of this bridge to bring the tramway along the southern margin of the main railway line. This tramway was closed in June 1959 and while the bridge over Harbour Road was removed, the embankment remains in place.

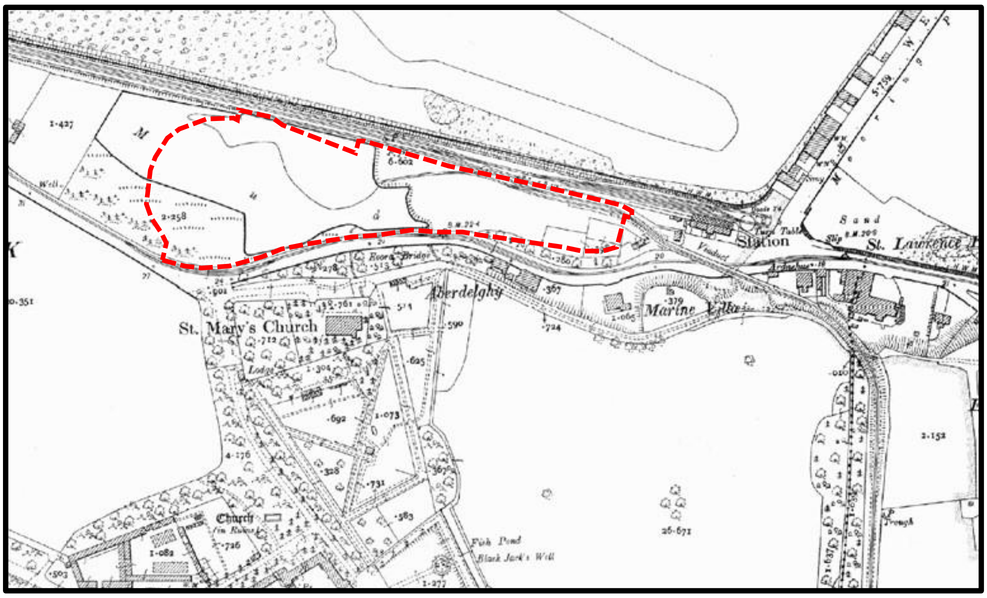


Figure 9.8: Ordnance Survey map of 1907

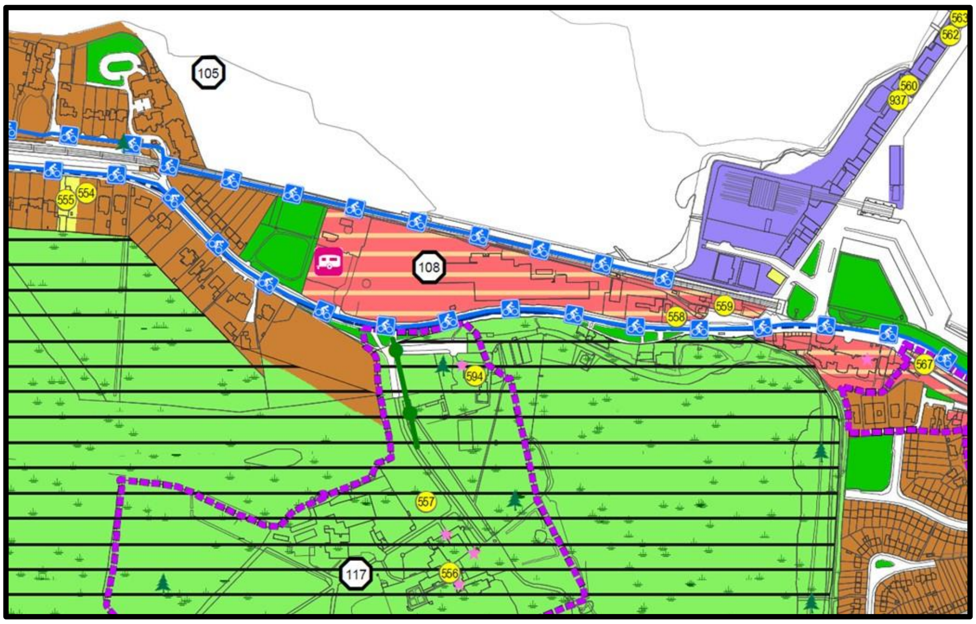
The Ordnance Survey's map at 1:2500 scale that was published in 1907 shows the application site to be partly still comprised of tidal mud, while parts of the site at either end had been reclaimed. The map shows the face of a bank near the mid-point of the site, indicating the westward extent of the fill that was used to reclaim the land. To the east of the site the tramway is shown crossing Harbour Road. The third-edition six-inch map, published in the mid-1930s, showed that a greater amount of the site had been reclaimed, though there was still part in the western half of the site that was as yet unclaimed. No buildings had been erected on the land by that time.

The old road to Howth was in use as a through road to the village until the end of the nineteenth century, following which the construction of the Hill of Howth tramway severed the link in order to provide a cutting for the descent of the tramway to Howth Railway Station. The two halves of the road remained in place for some years before being closed to public access, leaving a short stretch of public road at either end.

9.2.3.2 Record of Protected Structures

There are no protected structures on the application site and one that immediately adjoins the site. There are several protected structures in the vicinity, and these are denoted by the yellow circles on the map extract below, which is taken from map 10 of the Fingal Development Plan 2017-2023. The application site occupies the greater part of the land that is striped pink and yellow in the centre of the map extract, other than the western and eastern extremities.

Figure 9.9: Detail of Development Plan map 10



The protected structures within 100 metres of the application site are listed below, with the reference numbers given in the Record of Protected Structures. Howth Castle is included in this list, although at a distance from the site, as its grounds extend nearer to the site and the castle is considered to be of national significance. Howth Railway Station is also included, though more than 100 metres from the site, as a signal box adjacent to the site is protected with the railway station.

556	Howth Castle	Medieval castle (with later additions and alterations) including wings, towers, stables and 19th century entrance gates
558	Former station master's house	Mid-19th century former station master's house
559	Howth Railway Station	Mid-19th century railway station, signal box
594	St Mary's Church (C of I)	Gothic-style mid-19th-century Church of Ireland Church, with spire

9.2.3.3 Architectural conservation areas

Two ACAs have been designated by Fingal County Council in the vicinity of the application site. Each is indicated by a broken purple line on the extract from development plan map 10 that is reproduced above. At centre and left in the map is the Howth Demesne ACA, which includes land up to the southern side of Howth Road opposite the application site. To the east, at a distance from the application site, is the western extremity of the Howth Historic Core ACA.

9.2.3.4 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) carried out its survey of the Fingal area in 2000 and the results have been published. The structures identified in the survey as being of architectural heritage significance, with a rating at least as high as Regional, included all four of the protected structures noted above – with Howth Castle and its entrance gateway listed as separate items. The inventory also included a “single-arched bridge” on Howth Road, though this is, in fact, a railway arch beneath the viaduct for the Hill of Howth Tramway.

The buildings identified in the survey that are in the vicinity of the application site are listed below, with the reference number given in the NIAH.

11358054	Howth Castle	Howth Castle. [note that various constituent parts of the castle are listed individually in the NIAH but are at a distance from the application site.]
11358027	Howth Castle	Entrance gateway
11359001	Howth Road	Former station master’s house
11359004	Howth Road	Howth Station
11358026	Howth Road	St Mary’s Church of Ireland Church
11359002	Howth Road	Single-arch bridge

9.2.3.5 BUILDING SURVEY

In the section below each structure, or group of structures is examined to assess its special interest as built heritage. This would include special interest for its architectural, historic, artistic, cultural, scientific, social or technical interest. This list of potential interests is derived from section 10(2)(f) of the Planning and Development Act, 2000, which sets down the obligation of a planning authority to include objectives for the protection of structures in its development plan. The list also includes special archaeological interest, but this is not included in this part of the EIAR as it is considered in its own section.

Where a structure or group of structures is of special interest due to its age or other factors, an assessment of its architectural heritage significance is noted. In each of these cases the structure is given a number prefixed with “BH” for Built Heritage.

In each case the survey includes a brief description of the structure or group of structures, an approximate date of construction. In the case of the older structures the survey includes some background information about the structure to elaborate on the historical background given above.

The survey takes each of the structures in the sequence in which they are listed in the Record of Protected Structures, as in the list given above, following which the arch in the tramway viaduct is considered due to its inclusion in the NIAH, notwithstanding it not being a protected structure.

AH-1: Howth Castle

Plate 9.8: Howth Castle

Description
Howth Castle and its associated stables and other structures is an extensive range of buildings for the most part constructed with stone. The main walling is of rubble stone and with detailing, such as string courses, window surrounds and crenellation finished with dressed stone. The style is Gothic, with turrets, towers, battlements and other features of the genre.

Date of construction:	Various periods from medieval to 19th century
Protected structure:	Reference 556
NIAH:	Reference 11358054
Special interest:	Architectural, Artistic, Archaeological and Historical
Special interest rating:	National
Land take for development:	None

AH-2: Howth Castle gateway

Plate 9.9: Gateway to Howth Castle

Description
Gateway comprised of four piers of dressed limestone, each with engaged columns supporting a sub-conical capstone of limestone. The outer piers are connected to the adjacent pier by a gothic arch of limestone ashlar. The gates are of wrought iron with cast-iron bosses and finials.

Date of construction:	Early nineteenth century.
Protected structure:	Yes, as part of Howth Castle, reference 556.
NIAH:	Reference 11358027
Special interest:	Architectural and artistic
Special interest rating:	Regional
Land take for development:	None

AH-3: Former station master’s house

Plate 9.10: Former station master’s house

Description
The former station master’s house associated with Howth Railway Station is to the west of the station and the former tramway viaduct. The house is two-storey and three-bay and is faced with red brick, with buff-coloured brick quoins and arches. The roof is gable-ended, with an overhang and there is a gablet over the centre of the eastern façade. The house is set at an angle to the road. The original alignment of the public road included a double curve that was straightened in the twentieth century, leaving the house no longer facing the street. The lower part of the house is partly concealed by a high wall and vegetation.

Date of construction:	c.1870s
Protected structure:	Yes, reference 558
NIAH:	Reference 11359001
Special interest:	Architectural, artistic and social
Special interest rating:	Regional
Land take for development:	None

AH-4: Howth Railway Station

Plate 9.11: Howth Railway Station

Description
A two-storey, eleven-bay building with additional small wings set back at either end and a further single-bay addition at the eastern end. The central bay breaks forward to a single-flight stair leading to the upper-floor entrance. The street façade is rendered and painted, with plaster architraves to the window openings. The windows are casements with decorative divisions.

Date of construction:	1847
Protected structure:	Reference 559
NIAH reference:	Reference 11359004
Special interest:	Architectural, artistic and social
Special interest rating:	Regional
Land take for development:	None

AH-5: Howth Railway Station signal box

Plate 9.12: Signal box at Howth Railway Station

Description
A shiplapped signal box set on a high brick plinth. The roof is gabled, with decorative barge boards and with finials at the apex. The northern side and half of the eastern and western ends have large windows. The signal box directly adjoins the northern boundary of the application site.

Date of construction:	Late 19th century
Protected structure:	Reference 559 as part of Howth Railway Station
NIAH reference:	Not included
Special interest:	Architectural, technical
Special interest rating:	Regional
Land take for development:	None

AH-6: St Mary's Church

Plate 9.13: St Mary's Church

Description
Gable-ended church with lean-to side aisles. Walling is of squared rock-faced limestone with granite and sandstone detailing. Tower is of earlier date and is of quartzite rubble with limestone quoins and with a spire of limestone ashlar.

Date of construction:	Church 1866, tower 1816.
Protected structure:	Reference 594.
NIAH reference:	Reference 11358026
Special interest:	Architectural, artistic, social
Special interest rating:	Regional
Land take for scheme:	None

AH-7: Single-span arch in tramway viaduct

Plate 9.14: Tramway viaduct with brick arch

Description
The viaduct is constructed with snecked rock-faced limestone; the masonry of the parapet is faced with brick on the side towards the track. This part of the viaduct is on the northern side of Howth Road and immediately to the rear of the roadside abutment is a broad segmental arch with an arch ring of four courses of engineering brick, above which are two courses of buff-coloured brick.

Date of construction:	1901
Protected structure:	Not protected
NIAH reference:	Reference 11359002
Special interest:	Architectural, technical, historical
Special interest rating:	Regional
Land take for scheme:	None

9.2.3.4 ARCHITECTURAL CONSERVATION AREAS

As was noted above, there are two ACAs in the vicinity of the application site and each of these is described below.

Howth Castle Demesne ACA

Plate 9.15: Howth Road, with ACA at right

The Howth Castle Demesne ACA includes the part of the demesne that surrounds the castle and its various associated buildings and also extends northwards to include the entrance to Howth Castle and St Mary's Church. The road frontage of the ACA extends for about 140 metres directly opposite the application site. In the photograph above the application site is at the left-hand side of Howth Road, while the green space in the centre and the land at right are within the ACA.

Figure 9.10: Detail of development plan map showing ACA

The ACA is defined by the broken purple line in the map above, with the application site on the northern side of the road opposite.

Howth Historic Core Architectural Conservation Area

Plate 1.16: View towards application site from ACA

The Howth Historic Core ACA encompasses much of the urban centre of Howth, though not extending as far as the West Pier or Howth Railway Station. The photograph above shows the view from the western boundary of the ACA towards the application site; the buildings at left are beyond the ACA boundary.

The ACA also extends along Dunbo Hill and includes land to the west of the end of that road. The application site is not visible from the public road at Dunbo Hill due to the rising ground to the west of the road.

Figure 9.11: Detail of development plan map 10 showing ACA

The map extract above shows the Howth Historic Core ACA outlined in a purple broken line towards the right of the map. The application site is to the left of the red circle that bears the number 568.

9.2.4 POTENTIAL IMPACT OF PROPOSED DEVELOPMENT

9.2.4.1 CONSTRUCTION PHASE

There will be no significant impact on architectural heritage arising from the construction phase. There would be no direct impact on any of the protected structures and other buildings identified in this section as being of architectural heritage significance, nor would there be any direct impact on land that lies within either of the ACAs.

9.2.4.2 OPERATIONAL PHASE

Each of the structures identified in this section is listed below, with an assessment of the potential impact in the operational phase of the proposed development. In relation to built heritage the most likely impact of any development at the operational phase would be the impact on the character and setting of the heritage structure arising from the presence of the new development once completed.

<u>AH-1: Howth Castle</u>
The castle is separated from the application site by a distance of approximately 250 metres. Within that space there is extensive tree cover, while the application site is at a significantly lower level than the castle, ensuring that the development could not be seen from the castle. The castle has two vistas – the entrance front faces slightly to the north of due east and that view is funnelled through tree cover on either side with the result that the application site would not be seen from that angle. The garden front of the castle faces southward over the rising ground of the golf course. The northern side of the castle is a curtain wall that encloses the stable yard, and which has no windows. This side faces into the trees to the north. It is clear from this layout of the castle that the application site and the proposed development would not be visible from the castle and hence there would be no impact on the character of the protected structure, while the separation between the site and the castle ensures that there would be no impact on the setting.

<u>AH-2: Howth Castle gateway</u>
The gateway to Howth Castle is at a distance of approximately 90 metres from the nearest point of the application site. The approach to the gateway from Howth Road is the principal point from which the gateway is seen as the principal purpose of a finely-sculpted gateway such as this is to impress the visitor who approaches the property. The next most important element is the detail of the design and sculpting of the stonework. The approach from Howth Road, on the northern side of the gates is along a broad avenue flanked with trees, a wall and shrubs. There would be no impact on the setting as seen on the approach to the gateway from this side as the proposed development would be behind the viewer and out of sight.

The appreciation of the design and sculpting of the gateway is best experienced from close proximity and the presence of a building of any kind at a distance of 90 metres would have no impact on this appreciation.

The approach to the gateway from the southern side is via a curved avenue, diminishing the impact of the approach, while the gateway is partly obscured by vegetation. There would be a slight impact when seen from the south, as the proposed development would only come into view as the viewer approached close to the gateway and the gateway is partly obscured by vegetation when seen from this side.

<u>AH-3: Former station master's house</u>
The former station master's house is the closest protected structure to the application site, standing some twelve metres from the eastern end of the site. However, the nearest building to the protected structure would be Block D, which is set back significantly from the road frontage above ground-floor level. The nearest point of Block D to the former station master's house would be at a distance of approximately 24 metres, though this would not be in a direct line to the rear or side of the protected structure but set at an angle to the north-west. Being set back, this element is less visible in the street view. The part of the building closest to the former station master's house will be four-storey, while the remainder, at a distance of about 33.5 metres from the house, will be six-storey. When viewed from the former station master's house Beyond block D, to the west, block C is to rise to six-storey in the eastern

part and seven-storey to the west, while blocks A and B, at a further distance would also rise to seven-storey.

The effect of the proposed development would be to create a new street frontage to the west of the former station master's house, with the height rising gradually as the distance from the protected structure increases. The impact would change the character of the landscape beyond the station master's house, but by creating this new building line would bring the house into the streetscape in a way that would incorporate it. The angle of the protected structure to the street is unusual, as was noted in the survey above, and this ensures that the proposed buildings would be neither in a direct line to the rear nor to the side. The impact on the setting of the protected structure would be a moderate negative long-term effect, as the alteration to the character of the environment would be consistent with emerging trends.

AH-4: Howth Railway Station

The railway station building at Howth is set back from the road behind an area used as car parking. To the western side is the viaduct from the former Hill of Howth Tramway and this closes off the vista in that direction, giving a sense of enclosure to the station building. The proposed development would be screened from the station building to an extent that would ensure that the setting of the station building would not be adversely impacted.

AH-5: Howth Railway Station signal box

The signal box associated with Howth Railway Station is part of the protected structure that encompasses the station building. The signal box is located adjacent to the northern boundary of the application site. It lies just beyond the eastern end of the station platforms and while it has a functional relationship with the station this does not extend to the visual element, as it is not built with the same materials and is in a different style. Signal boxes, by their nature, tend to be solitary structures and are not sensitive to their settings, other than the expectation that they would be located adjacent to the railway track.

The layout of the proposed development is such that the signal box would be located adjacent to the open area between blocks C and D. This ensures that there would not be a high building directly adjacent to the signal box. Given that signal boxes are not sensitive to the presence or nature of buildings on the adjoining land the proposed development the impact on the protected structure would be a slight long-term positive effect. The buildings on the application site at present are of visually poor quality and their replacement with a well-designed and well-landscaped development would improve the setting of the signal box.

AH-6: St Mary's Church

St Mary's Church is located directly to the south of the application site and is separated from it by a distance of just over sixty metres. Within that space there is a high tree-covered bank, with the former roadway that now gives access to the church located between the bank and the churchyard. It will be possible to see the upper part of the proposed buildings from within the churchyard in the view of the church from the south, which would reveal the proposed buildings rising slightly above the trees to the north of the church. The proposed buildings would be at a distance of 100 metres and more from that viewing point. Within the rest of the church grounds the buildings will be visible when seen through the trees in winter, though this will not be significant.

The proposed development will have a moderate negative long-term impact on the setting of the church. The separation between the church building and the proposed development and the belt of trees, with the rise in land will all ensure that the magnitude of the impact is not greater.

AH-7: Single-span arch in tramway viaduct

The remnants of the viaduct of the former Hill of Howth Tramway is on the northern side of the road to the west of the railway station. This structure is not such as to have a setting or to be sensitive to its surroundings. At present there are substantial advertising hoardings on the structure. It is not considered that the proposed development would have any impact on the character of this viaduct or the brick arch that runs through it.

Howth Demesne Architectural Conservation Area
The core of the Howth Demesne ACA is separated from the application site by a belt of trees and the rise in level that occurs to the south of Howth Road. The small areas of land adjacent to Howth Road that are within the ACA are of lesser significance than the demesne itself. The proposed development will be visible from parts of the ACA and hence there will be some level of impact. As this is in line with emerging trends the impact would be a moderate negative long-term effect.

Howth Historic Core Architectural Conservation Area
As was noted in the survey above, the Howth Historic Core ACA is at a distance from the application site and the proposed development. This distance ensures that there would be no significant impact on the character of the ACA.

9.2.4.3 Potential cumulative impacts

Two planning permissions have been granted in the vicinity of the application site that need to be taken into account in relation to possible cumulative impacts.

- F18A/0267, granted in November 2018 to the Department of Agriculture, Food and Marine, relates to two ground-level industrial buildings at West Pier, Howth. The units will be used for light industrial activities such as repair and maintenance of maritime and fishing equipment and ancillary storage, and;

- F17A/0553, granted in December 2017 to Oceanpath Ltd for development at an existing food processing facility within Claremont Industrial Estate, West Pier, Howth. The permitted development consists of a two-storey extension of existing premises for food processing, its storage and distribution and a factory retail outlet.

It is not envisaged that these proposals or any other proposed development in the vicinity of the present proposal would result in appreciable cumulative impacts on the character of the protected structures or the ACAs.

9.2.4.4 Do-nothing impact

If no development were to proceed on the present application site there would be no change to the status or settings of the protected structures and the ACAs and there would thus be no resultant impact.

9.2.5 Avoidance, remedial and mitigation measures

9.2.5.1 Construction phase

As it is envisaged that there would be no impacts on architectural heritage at construction phase no avoidance, remedial or mitigation measures are required.

9.2.5.2 Operational phase

The following impacts were identified to the settings of the various elements of architectural heritage during the operational phase:

AH-2: Howth Castle Gateway – Slight impact in the view from the south

AH-3: Former station master’s house – moderate impact

AH-5: Signal box – Slight impact

AH-6: St Mary's Church – Moderate impact

Howth Castle Demesne ACA – Moderate impact.

In none of these instances would any avoidance, remedial or mitigation measures be appropriate, given that the application site is zoned for development and any development on this site will have an impact of some kind on the protected structures and ACAs in the vicinity. No mitigation other than elimination or substantial reduction in the scale of the proposed development would eliminate the slight to moderate impacts and the nature of these impacts would not warrant such a dramatic change to the proposal.

9.2.6 RESIDUAL IMPACTS

9.2.6.1 CONSTRUCTION PHASE

There would be no residual impacts on architectural heritage.

9.2.6.2 OPERATIONAL PHASE

The residual impacts would be unchanged in the absence of avoidance, remedial or mitigation measures.

9.2.7 MONITORING

9.2.7.1 CONSTRUCTION PHASE

No monitoring would be necessary in relation to architectural heritage.

9.2.7.2 OPERATIONAL PHASE

No monitoring would be necessary in relation to architectural heritage.

9.2.8 REINSTATEMENT

9.2.8.1 CONSTRUCTION PHASE

No reinstatement would be necessary in relation to architectural heritage.

9.2.8.2 OPERATIONAL PHASE

No reinstatement would be necessary in relation to architectural heritage.

9.2.9 DIFFICULTIES ENCOUNTERED DURING COMPILING

No difficulties were encountered during the compilation of this section.

9.2.10 References

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Chapter 10

Landscape and Visual Impact Assessment

10.1 INTRODUCTION

This chapter presents an assessment of the landscape and visual impacts of the Proposed Development. It has been prepared by The Paul Hogarth Company who have been appointed to undertake both the design of the external environment and public realm and the Landscape and Visual Impact Assessment (LVIA).

The purpose of the LVIA is to identify any likely significant effects on the landscape and visual resource as a result of the Proposed Development. In accordance with the published guidance, Landscape and visual effects are assessed separately, although the procedure for assessing each is closely linked. This procedure broadly involves the identification and evaluation of the baseline landscape and visual resource, the consideration of the change that would occur and an evaluation on the resulting significance of that change. The process adopts consistent criteria founded in published best practice guidance.

The landscape assessment considers how the Proposed Development would impact on the physical features and perceptual characteristics of the landscape and its resulting character and quality.

The visual assessment considers how the Proposed Development would impact on specific views experienced by visual receptors in the wider landscape and on visual amenity. It adopts a comparative visual technique from a broad selection of agreed viewpoints to understand how the Proposed Development would appear and the influence it would have.

The EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU, requires the focus of assessments to be on the identification of “likely significant effects” and not every effect. As such, a proportionate approach has been adopted.

The authors of the LVIA are chartered members of the Landscape Institute, who are experienced in both the design and delivery of large-scale public realm and urban design projects and the production of landscape and visual impact assessments. Experience has been calibrated across a wide-ranging portfolio of project types and landscape contexts across Ireland and the UK.

This LVIA has been undertaken by Mark Salisbury Ba (Hons) Dip LA, CMLI. Mark is a Chartered Member of the Landscape Institute who has practiced as a Landscape Architect since 2005 after graduating from the University of Sheffield with a Batchelor of Arts in Landscape Architecture with Town and Regional Planning. He subsequently graduated with a Postgraduate Diploma in Landscape Architecture in 2007 and achieved chartered status in 2013. Mark’s LVIA experience has been gained across a broad range of sectors for projects in England, Scotland, Wales, Northern Ireland and the Republic of Ireland.
Andrew Haley contributed to and reviewed the LVIA. Andrew is a Chartered Member of the Landscape Institute who has practiced as a Landscape Architect since 1991 after graduating from Heriot Watt University. Andrew is a director within the practice, is Chair of the Ministerial Advisory Group and is a Built Environment Expert for the Design Council, providing design advice in relation to projects of national significance.

Photomontages (against which this assessment should be read) have been prepared by Model Works Ltd. These are presented for each of the assessment viewpoints at Appendices 10.2, with a selection of comparative summer photomontages presented at Appendix 10.3.

10.1.1 Description of Development

The Proposed Development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

10.1.2 CHARACTERISTICS OF DEVELOPMENT RELEVANT TO THIS CHAPTER

Characteristics of the Proposed Development that are considered to be of relevance to the identification of landscape and visual effects relate primarily to the replacement of existing derelict-built features and existing vegetation on the site with new built form and associated external spaces.

In particular, features such as the height of the built form (and the disposition of this height), its massing, the architectural character and materiality of the new built form, together with its associated public and communal open spaces, green roofs, boundary treatments and planting are considered to be those features of the Proposed Development that are relevant. In addition to a resident population within the new built form, public walkways and improved connectivity across the site will result in an inherent increase in activity, albeit this is a feature and characteristic of the development that is to be expected of any redevelopment of the site.

Although the construction of the Proposed Development is of relevance to landscape and visual effects (in particular the presence of plant and construction activities), a proportional degree of focus is placed on the longer term and permanent effects of the Proposed Development.

10.1.3 POTENTIAL SOURCES OF LANDSCAPE AND VISUAL IMPACTS

CONSTRUCTION PHASE

Potential impacts during the construction phase will relate primarily with the removal of existing features on the site and the activity and movement within the confines of the site boundaries. Vehicle movements will increase and vertical elements such as tower cranes, high load lifters and scaffolding will be required.

Whilst the construction phase effects will be largely temporary (and an inevitable consequence of the construction of permanent features of the development), it will result in a fundamental change of use and change of character.

Landscape and visual effects have the potential to arise as a result of:

- Removal of existing vegetation;
- Demolition of all existing buildings on the site;
- Site preparation works and groundwork operations (including excavation for basement, intrusive foundation work and stockpiling of material) resulting in a change of ground levels;
- Site infrastructure and access including site – hoarding, lighting, cranes, car parking, storage areas;
- Installation of foundations and services;
- Construction of building and external spaces;
- Vehicular and plant movements including the presence of tower cranes;
- Construction traffic, dust and emissions;
- Construction lighting.

OPERATIONAL PHASE

The proposed redevelopment of the site will result in the replacement of existing derelict-built features and vegetation with new built form and associated external spaces. During its operation, the Proposed Development has the potential to result in landscape and visual effects as a result of:

- new built form in the landscape;
- new planting and open spaces;
- the intensification of activity on the site, including vehicle movements and pedestrian activity associated with future occupants and those walking through the development.

10.2 METHODOLOGY

The methodology adopted for this chapter is based on a combination of the approach and methodology set out in the Environmental Protection Agency (EPA) Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) and in the Guidelines for Landscape and Visual Impact Assessment 3rd edition (GLVIA3) (Landscape Institute (LI)/Institute of Environmental Management and Assessment (IEMA), 2013).

The EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU, requires the focus of assessments to be on the identification of “likely significant effects” and not every effect. Therefore, the LVIA retains a proportional focus in terms of the scope, extent, and likely impact of the Proposed Development and to the significance and sensitivity of the receiving landscape and visual environment.

Likewise, GLVIA3 presents detailed guidance on the process for LVIA and is acknowledged as a leading reference for LVIA in Ireland and the United Kingdom. This methodology advocates assessment that is appropriate, proportional, and relevant to the delivery of projects in Ireland.

In accordance with the published guidance, landscape and visual effects are assessed separately, although the procedure for assessing each is closely linked. A clear distinction has been drawn between landscape and visual effects as described below:

- Landscape effects relate to the effects of the proposals on the physical and perceptual characteristics of the landscape and its resulting character and quality;
- Visual effects relate to the effects on specific views experienced by visual receptors and on visual amenity more generally.

Using a combination of desktop study, site survey and photographic survey, the baseline conditions or 'receiving environment' are identified. The baseline study describes, classifies and evaluates the existing landscape and visual resource, focusing on its sensitivity and ability to accommodate change.

The main stages of the LVIA can be summarised as follows:

- Identify, evaluate and describe the current landscape character of the site and its surroundings and also any notable individual or groups of landscape features within the site;
- Identify important views and potential visual receptors and evaluate their sensitivity to the type of changes proposed;
- Determine the significance and sensitivity of the landscape/townscape/seascape and visual receptors;

- Identification and description of effects (magnitude of landscape and visual effects), informed by an understanding of extent, duration, quality, probability and frequency of effects;
- Assess the significance of effects by comparing the description of effects against the existing significance and sensitivity of the receiving landscape (townscape/seascape) and visual environment;
- Assess cumulative landscape and visual effects;
- Assess the likely interaction of effects;
- Identification and description of landscape and visual mitigation;
- Identification of residual effects.

CONSULTATION

Consultation was undertaken with Fingal County Council (FCC) during the course of several pre-application consultation meetings in relation to the evolving scheme. These dates include: 26/09/18, 08/11/18, 26/02/19, 18/04/19.

In addition to the evolving layout and external realm design, concerns from FCC pertaining to height and massing were iteratively responded to throughout the course of the pre-application consultation meetings as part of a collaborative and iterative approach to design and assessment.

Viewpoints are used as the primary means of communicating the visual effects of the Proposed Development. The identification of viewpoint locations was undertaken early in the process in order that the photography could be carried out during winter conditions. Subject to a critical review, the viewpoints were based around (and are consistent with) viewpoints used in previous assessments for permitted development schemes on the site.

In response to the FCC's Appraisal of Design (Dated 15.11.2018), a response was issued on the 14th December 2018 that identified a scope and a proposed series of viewpoints. During the course of the subsequent meetings, concerns relating to specific locations from which effects need to be understood were communicated by FCC. In particular, consultation with Gemma Carr (Senior Executive Parks Superintendent) reiterated the approach road into Howth and the view between the Howth Castle gates towards the sea as being key locations from which the visual effects need to be understood.

On 18/04/2019, an LVIA was presented during the fifth pre-application consultation meeting. It was confirmed by David Murray (Senior Executive Planner), that the scope of the LVIA and the selection of viewpoints was sufficient.

Viewpoints are considered to be comprehensive and representative in their coverage.

STUDY AREA

Initial site work informed by analysis of assessments and early stage visualisations indicated that the most notable landscape and visual effects are likely to occur within a similar study area to those applications previously assessed. With the intent that the focus of the LVIA remains proportional to the identification of likely significant effects, the assessment has considered the landscape within approximately 5km but retained a proportionate degree of focus on the landscape within 3km.

Beyond this range, where the development is visible, it is not considered to have the potential to notably influence the underlying characteristics that define the landscape and views, and as such will have limited potential to give rise to any significant effects. Other more prominent features would dominate, such as the landform of the peninsula, the expansive seascape context and prominent visual features such as Ireland's Eye.

10.2.1 Desk Study

A desktop review of available information was undertaken to provide the baseline assessment for the existing environment. Desktop studies took place during the course of the project between November 2018 and November 2019 with an initial focus being during the period between November 2018 and March 2019 to inform design development. This included a review of the following data sources and publications:

- Fingal Development Plan 2017-2023;
- Howth ACA Historic Core Statement of Character;
- Howth Castle ACA Statement of Character;
- Howth Nashville Rd and Park ACA Statement of Character;
- Howth St Nessan's Terrace ACA Statement of Character;
- Howth Special Amenity Area Order (SAAO), 2000;
- Howth Urban Centre Strategy, 2008;
- Photomontages as prepared by Model Works Ltd;
- Aerial photography;
- OSi online historic mapping; and
- EPA Envision Map Viewer (www.epa.ie).

10.2.2 Site Visits

Numerous site visits were undertaken between November 2018 and May 2019 to gain a comprehensive understanding of landscape character and visibility. This included a site familiarisation visit on the 08/11/2018, and site visits to locations in the wider landscape on 16/11/2018, 04/04/2019 and 18/04/2019.

Information regarding the dates for which the photography was obtained by Model Works Ltd. are illustrated for each viewpoint at Appendices 10.2 and 10.3. This photography was undertaken over the course of several days (to allow for appropriate weather and visibility conditions). All photography was captured in 2019, with winter photography taken across the following dates: 17/01/2019, 18/01/2019, 21/01/2019, 27/01/2019, 08/02/2019, 20/02/2019, 13/03/2019 and 10/04/2019. Summer comparative photography was undertaken on 14/05/2019, 15/05/2019, 27/05/2019.

The timing of the surveys allowed a worst-case level of visibility to be appreciated due to the increased visibility generated by winter leaf loss associated with deciduous vegetation. A variety of climatic conditions and tidal states were also observed during site visits, which afforded an understanding of the influence of these factors on the character and qualities of the landscape and the visual experience of it.

10.2.3 Assessment Process

Landscape and visual effects are determined through a comparison between the description of the impact (magnitude of change) against the existing landscape and visual environment. All effects are considered, including construction/operation/; positive/negative; short-term/long-term; direct/indirect; do-nothing; residual; cumulative; and the effects arising from interaction between environmental factors.

Landscape Assessment process

The Landscape Assessment firstly assesses how the development would impact directly on any existing landscape features or elements (e.g. removal of trees etc.). It then considers impacts on landscape character with reference to landscape character areas/types identified in published landscape character documents and analysis of the contemporary landscape character as informed through the desktop studies and site studies.

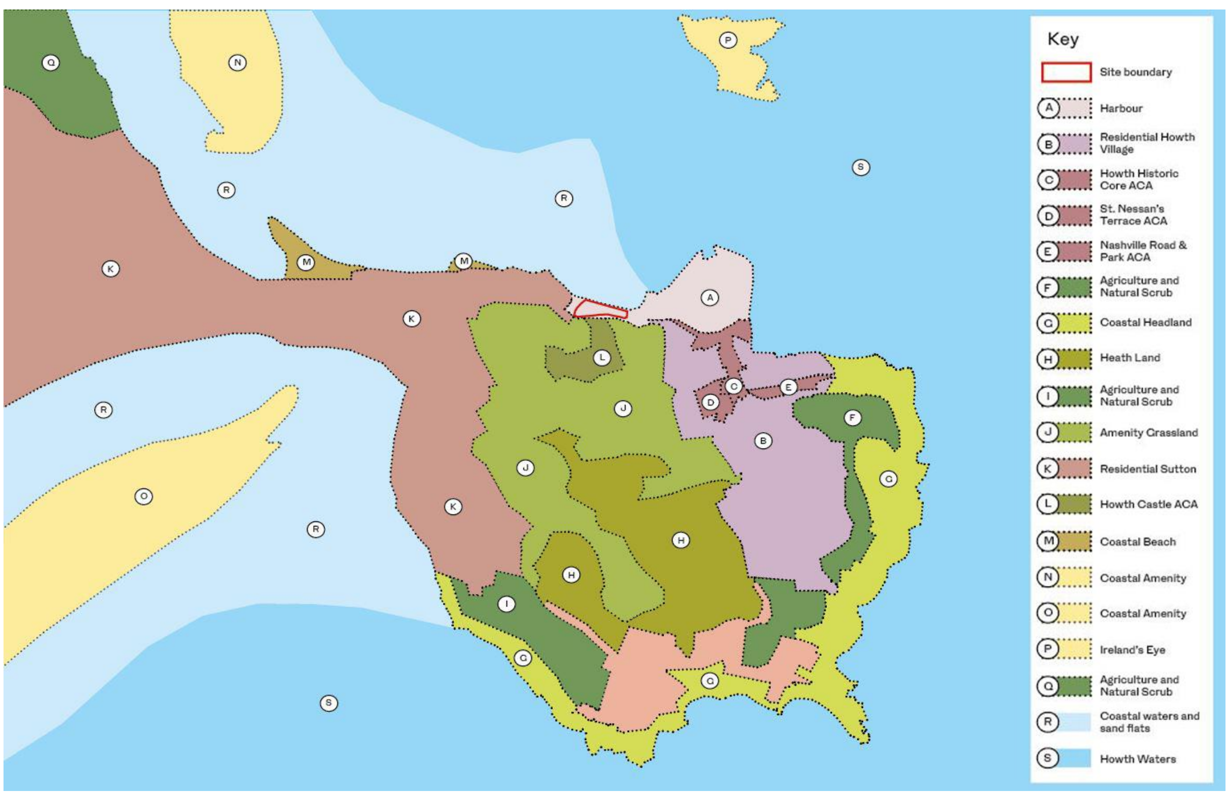
The approach to the assessment of effects on landscape character incorporates the process of Landscape Character Assessment. In the absence of more detailed published descriptions of character (over that presented in the development plan), this approach establishes a comprehensive baseline description of the receiving landscape (including townscape and seascape).

The Landscape Character Assessment process is a multi-disciplinary, consultative, and forward planning process that is potentially highly complex, going beyond the needs of what is required for LVIA.

The Landscape Character Assessment undertaken as part of the baseline for previous planning applications on the site has been adopted as a basis within this LVIA. The Landscape Character Areas (LCA) identified are considered to be proportionate to the scale of the site and the nature of the development proposals and clearly establishes the physical and visual landscape resource as it exists today. Subject to the critical review that has been undertaken to identify any key changes that may affect the baseline description of the environment, it is considered to provide an appropriate baseline against which the effects of the Proposed Development can be assessed and is consistent with previous permitted applications.

The LCA Plan is illustrated at Plate 10.1 and on Figure 10.2 included at Appendix 10.1.

Plate 10.1 – Landscape Character Area Plan (Figure 10.3a included at Appendix 10.1)



Historic Landscape Characterisation is a complimentary assessment process that seeks to identify the contribution of the past to the landscape. Again, this is a multi-disciplinary, consultative, and forward planning process that is potentially highly complex. The village is recognised as having a strong time depth character and cognisance has been had within the review of the Landscape Character Assessment and adoption of the baseline LCAs to published descriptions of character and features of recognised historic importance. As such, it has not been considered appropriate to undertake a more detailed assessment of historic character.

VISUAL ASSESSMENT PROCESS

The visual assessment has adopted a comparative visual technique to understand the impact of the Proposed Development. Accurate photomontages incorporating the Proposed Development have been prepared for thirty locations in the landscape surrounding the site. When compared to the existing corresponding baseline photograph, this has allowed the visual effects of the development to be understood.

The methodology for undertaking the photography and photomontage work has been prepared by Model Works Limited and is presented at Appendix 10.4. Photography was taken using a Canon EOS5D Mark II camera with a 21-megapixel sensor. Photomontages were subsequently produced in 3d studio max using detailed three-dimensional building information, surveyed camera positions and surveyed static objects relevant to each view. Adobe Photoshop was used as part of the finishing process to combine the photography with the 3d information.

Assessment viewpoint locations used as the basis for determining the effects on visual receptors within the study area are illustrated at Plates 10.2a and 10.2b and set out in Table 10.1.

Plate 10.2a – Viewpoint location Plan (Figure 10.3a included at Appendix 10.1)

Plate 10.2b – Viewpoint location Plan (Figure 10.3b included at Appendix 10.1)

Table 10.1: Assessment Viewpoints

Vp		Viewpoint location	Approx. Distance	Direction from the site
1	Views on the approach to village	Howth Road	0.00m	South
2		Howth Road	60m	South west
3		Howth Road	190m	West
4		Howth Road	740m	West
5a	Views from Howth Castle Protected view	View at the southern end of defined view	135m	South
5b		View at the southern end of defined view	130m	South
5c		View at the Castle Gates	95m	South
5d		View from the northern end of defined view at Howth Road	50m	South
6a	Views to/from St. Mary's Church	View from road leading to Howth Castle at its intersection with Howth Road.	25m	South
6b		View from St. Mary's Church At northern façade	60m	South
7	Views from the eastern cluster of buildings around the Station	Howth Village looking west	20m	South
8		Howth Road / Station Master's House	40m	South east
9		Junction of Harbour Road and West Pier	180m	East

Table 10.1: Assessment Viewpoints				
Vp		**Viewpoint location**	**Approx. Distance**	**Direction from the site**
10	Views from Harbour Road from the village frontage	Harbour Road / Park	280m	East
11			550m	East
12	Views from harbour piers	West Pier	610m	North east
13		East Pier	870m	North east
14		East Pier	780m	East
15		Martello Tower	740m	East
16a	Deer Park Golf Course	Deer Park Golf Course	900m	South
16b		Deer Park Golf Course	880m	South
16c		Golf Course Car Park	840m	South
16d		Between Golf Course and Castle	790m	South
17		Muck Rock	1.2km	South
18		Dungriffin villas	1.1km	South east
19		Kilrock	1.65km	East
20a	Views from the north	Baldoyle Bay and Ireland's Eye	1.77km	North
20b		Baldoyle Bay and Ireland's Eye	1.6km	North
21		Strand Road and Portmarnock	3.6km	North west
22		Strand Road and Portmarnock	2.7km	North west

Whilst the Proposed Development is inherently different to previous permitted development applications on the site, there is a strong degree of commonality between them. As such, in the same way as the previous landscape character assessment, it has been deemed appropriate to draw on viewpoints assessed as part of these previous applications and used in determining the application.

The viewpoints represent a broad variety of visual receptors and character contexts at a range of distances and directions from the site (as discussed in Paragraphs 6.16-6.20 of GLVIA3). Importantly, these viewpoints also represent several locations with development plan map-based objectives to 'Preserve Views'.

Viewpoint locations were agreed in consultation with FCC during extensive pre-application discussions, with photography taken during winter months to allow a worst-case level of visibility. Viewpoints have been ordered and grouped so as to communicate more effectively the variable and experiential changes in visual effects from certain locations and along certain routes.

10.2.4 Description and Evaluation of Effects

Effects are determined through a comparison between the description of the impact (magnitude of change) and the sensitivity of the existing landscape and visual environment. The terminology used within the assessment is based on a combination of the criteria set down in the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) with additional guidance from GLVIA3.

LANDSCAPE AND VISUAL SIGNIFICANCE / SENSITIVITY

Landscape significance and sensitivity considers aspects of the landscape that are important to defining and maintaining the character of landscape, as well as designated and notable features of the landscape. It reflects the susceptibility of landscape features and landscape character to change and any associated values.

Visual significance and sensitivity address the views available to people (i.e. visual receptors), living, working and visiting a landscape and their visual amenity. The sensitivity of a visual receptor reflects their susceptibility to change and any values associated with the specific view in question. It varies depending on a number of factors such as the occupation of the viewer, their viewing expectations, duration of view and the angle or direction in which they would see the site.

Categorisation from high, medium, low and negligible for both landscape and visual significance / sensitivity are used. Typical criteria and examples of landscape and visual receptors are presented in Tables 10.2 and 10.3.

Table 10.2 – Typical Landscape significance / sensitivity rating criteria

	Typical Criteria with examples of Landscape Receptors
High	• A landscape or townscape protected by an international or national designation, Landscape Conservation Areas, UNESCO/ICOMOS Landscape Sites (World Heritage Sites/Tentative sites & Geoparks). • A landscape widely acknowledged for its distinctive features and the quality and value of its elements and edge condition. • A landscape with distinctive character and very susceptible to change. Distinctive/unique land uses of widely acknowledged landscape quality. Very careful and considered design and mitigation required. Landscape types may include, but not limited to: • Historical townscapes and urban set pieces; • Nationally important tourism, cultural, recreational & amenity landscapes, open spaces and parklands; • Protected coastal landscapes/seascapes; • Dark sky reserve landscapes • Tranquil or remote landscapes. Absence of negative elements (e.g. volumes of traffic, noise, dereliction, unmanaged areas). • A landscape widely acknowledged as containing elements of national importance. National designation may apply. • A landscape containing features of historical, ecological, socio-cultural, or national importance. • A landscape acknowledged for its quality and value. • A landscape having the capacity to accommodate change to a certain degree. • Elements critical to maintaining the landscape/townscape character of an area (e.g. primary or characteristic landforms, landcover, landscape types; important buildings or streetscapes; distinctive but characteristic boundaries; mature tree-lined avenues; etc.). • Community, sports, and recreational landscapes which cannot be replaced locally. • Notable landscape features that could not be replaced (e.g. distinctive wooded copse, historic boundaries). • Landscape setting to cultural heritage features (archaeological and/or architectural). • May have some negative elements.
Med.	• A landscape that exhibits positive character. A landscape that is locally important. • A landscape of some quality and value but with some adverse conditions. • A landscape whose character, land use pattern, and scale would have the capacity to accommodate change.

Table 10.2 – Typical Landscape significance / sensitivity rating criteria	
	Typical Criteria with examples of Landscape Receptors
	• Some negative elements/detracting features present. • Elements important to but critical for maintaining the landscape/townscape character of an area (e.g. secondary landform, landcover, landscape types; general development; strong but not dominate boundaries; etc.). • Commonplace but not characteristic elements with recognisable structure and characteristic patterns with some sense of place. • Distinctive / unique land uses of some acknowledged landscape quality. • Landscapes with some detracting features present. • Sporting and recreational landscapes which could be replaced locally -but not readily without further effects. • Ecological or cultural landscapes or interest - but not designated. • Notable landscape elements that could be replaced.
Low	• A landscape of local importance but with some degraded elements or conditions. • A landscape where lack of management/intervention is evident. • A landscape where change is unlikely to be detrimental. • A landscape of local importance but with some degraded elements or conditions. • A landscape where lack of management/intervention is evident. • Elements not important to maintaining the landscape/ townscape character of an area (e.g. general vegetation, trees, hedgerows; contradictory landscape types; poor or discordant development; etc.). • Land uses without acknowledged landscape quality. • Industrial/post-industrial landscapes • Marginal land on urban fringe / some peri-urban landscapes • Sporting and recreational landscapes where they can be easily replaced locally.
Neg.	• A degraded landscape. • Infrastructural landscapes, including major transport corridors. • Landscape where negative elements (e.g. traffic, noise, derelict, evidence of anti-social behaviour such as graffiti, vandalism, littering etc.) dominate the overall character. • A landscape which is dominated by dereliction and neglect with evidence of anti-social behaviour such as graffiti, vandalism, and littering. • Brownfield sites. • A landscape where change is likely to be positive.

Table 10.3 – Typical visual significance / sensitivity rating criteria	
	Typical Visual criteria with examples of visual receptors
High	• Designated views, viewpoints, and vistas. Areas containing protected views as outlined in Development Plans or landscape policies. • Lack of visual clutter and absence of traffic and other elements which may cause visual degradation. • Night-time views within dark sky reserves. • Viewers with a proprietary interest and prolonged viewing opportunities such as local residents and frequent recreational users. Existing high-quality views from public open spaces, where viewers are likely to experience the type of change resulting from the proposed scheme as an adverse or positive change and/or the quality of the existing view, as likely to be perceived by the viewer, is assessed as being high. • Views from high usage public spaces, direct observers (e.g. from a restaurant) views from local residential properties, residential care units with direct views to the development. • Non-designated views of distinctive or characteristic landscapes from general road network.

Table 10.3 – Typical visual significance / sensitivity rating criteria	
	Typical Visual criteria with examples of visual receptors
	• Views to and from local ridges, hills, high-points, buildings. • Views to and from open spaces, local parks. • Views from sports and recreational facilities where views of the landscape context add to the experience. • Views to and from sites of local ecological and / or cultural interest.
Med.	• Viewers with a moderate interest in their environment such as recreational travellers and less frequent users of recreational facilities, • e.g. walkers along canal, users of any adjacent parks, who are likely to experience the type of change resulting from the proposed scheme as an adverse (or positive) change in their view and/or the quality of the existing view, as likely to be perceived by the viewer, is assessed as being medium. • Viewers within a landscape dominated by traffic. Visual condition of the landscape is degraded. • Non-designated views of distinctive or characteristic landscapes from general road network. • Views to and from local ridges, hills, high-points, buildings. • Views to and from open spaces, local parks. • Views from sports and recreational facilities where views of the landscape context add to the experience. • Views to and from sites of local ecological and / or cultural interest. • Views from general community, schools, institutional buildings, and associated outdoor areas.
Low	• Viewers with a passing interest in their surroundings or whose interest is not specifically focused on the landscape, e.g. workers who are likely to experience the type of change resulting from the proposed scheme as an adverse (or positive) change in their view and/or the quality of the existing view, as likely to be perceived by the viewer, is assessed as being low. • Viewers within an exclusively trafficked landscape (i.e. a major roadway or adjacent to one with no mitigation) • Views of typical or unremarkable landscapes from general road network. • Viewers of users of recreational facilities where the purpose of that recreation is not related to the view. • Views to and from industrial landscapes.
Neg.	• Areas of dereliction and poor visual quality due to such elements as graffiti, vandalism, derelict and run-down buildings and structures and littering. • Views to and from degraded or abandoned urban or peri-urban landscapes • Views to brownfield or damaged landscapes • Views dominated by transportation and other infrastructure.

MAGNITUDE OF CHANGE

Prior to the publication of GLVIA3, LVIA practice had evolved over time in tandem with most other environmental disciplines to consider significance principally as a function of two factors, namely: sensitivity of the receptor and magnitude of change (the term 'magnitude' being a word most commonly used in LVIA and most other environmental disciplines to describe the size or scale of an effect).

Box 3.1 on page 37 of GLVIA3 references a 2011 publication by IEMA entitled 'The State of EIA Practice in the UK' which reiterates the importance of considering not just the scale or size of the change but other factors which combine to define the 'nature of the change' including factors such as the probability of an impact occurring and the duration, reversibility and spatial extent of the change. The flow diagram on page

39 of GLVIA3 now suggests that the magnitude of change is a function of three factors (the size/scale of the change, the duration of the change and the reversibility of the change).

Criteria presented in the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) in relation to the extent, context and duration of effects are presented below.

EXTENT AND CONTEXT OF EFFECTS

- Extent - Describes the size of the area, the number of sites and the proportion of a population affected by an effect;
- Context - Describes whether the extent, duration or frequency conforms or contrasts with established conditions.

DURATION OF EFFECTS

- Temporary: Impact lasting 1 year or less;
- Short-term: Impact lasting 1 to 7 years;
- Medium-term: Impact lasting 7 to 15 years;
- Long-term: Impact lasting 15 to 60 years;
- Permanent: Impact lasting over 60 years.
- "Momentary" and "Brief" effects as defined in the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) are not considered relevant to landscape and visual assessment as effects of such short duration are extremely unlikely to generate appreciable effects.
- The criteria presented in Table 10.4 is based on those presented in the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) and are used as the basis for assessing the magnitude of change.

Table 10.4 – Magnitude of Change Criteria

	Landscape	Visual
Very High / High	Notable or longer-term change to a widespread area or a notable change in continuous or key landscape or visual characteristics or components.	A change in the view that has a dominating or overbearing influence on the overall view. A major change in the view that is highly prominent and has a strong influence on the overall view.
Medium	Moderate or longer-term change over a restricted area or view or a moderate change in key landscape or visual characteristics or components.	Some change in the view that is clearly notable in the view and forms an easily identifiable component in the view.
Low	Minor short or medium-term change over a restricted area or view or a minor change in key landscape characteristics or components.	Some change in the view that is not prominent but visible to some visual receptors.
Very Low / Negligible	Imperceptible change in key landscape or visual characteristics or components.	No change or negligible change in views.

10.2.5 ASSESSMENT OF SIGNIFICANCE

As stated in the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017), the significance of effects is understood to mean the importance of the outcome of the effects (or the consequences of the change). The significance of effects is determined through a comparison between the description of the impact (magnitude of change) against the sensitivity of the existing landscape and visual environment and is guided by the impact significance criteria presented in Table 10.5 and the chart presented in Plate 10.3 which are derived from the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017).

Plate 10.3 – Chart showing typical classifications of the significance of impacts

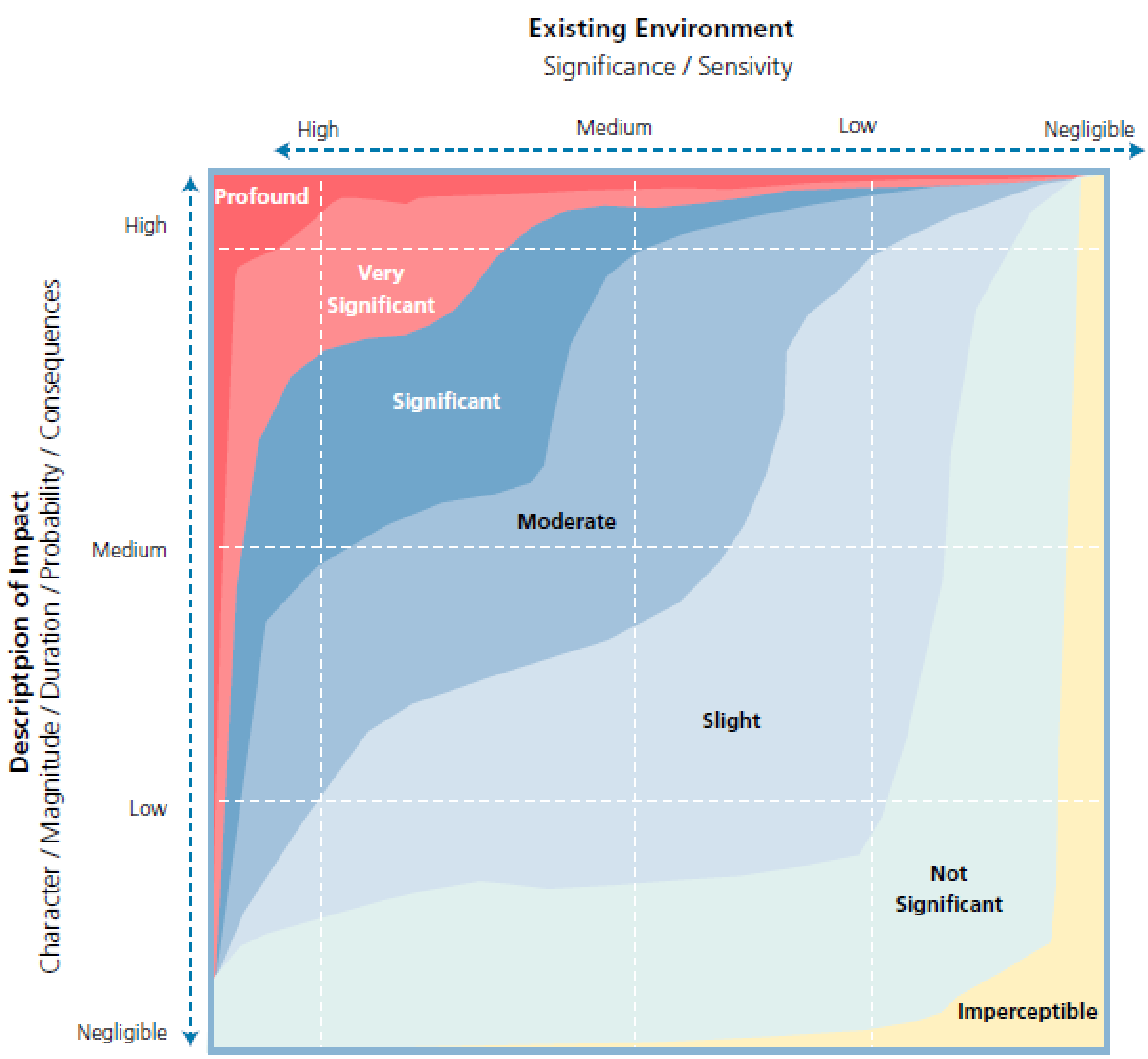


Table 10.5 – Significance of Effects Criteria		
Effect	**Landscape (additional description)**	**Visual (additional description)**
Imperceptible	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.	Although the development may be visible, it would be difficult to discern resulting in minimal change to views.
Not significant	An effect which causes noticeable changes in the character of the landscape but without noticeable consequences. There are no appreciable changes to landscape context, character or features	An effect which causes noticeable changes in the character of the visual environment but without noticeable consequences. The proposal is adequately screened due to the existing landform, vegetation or constructed features.
Slight Effects	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition or changes the view in a marginal manner.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. There are minor changes over some of the area or moderate changes in a localised area.	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area or an intensive change over a more limited area	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment. There are notable changes in landscape characteristics over a substantial area or a very intensive change over a more limited area.	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the visual environment. The proposal affects the majority of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Profound Effects	There are notable changes in landscape characteristics over an extensive area or a very intensive change over a more limited area.	The view is entirely altered, obscured or affected.

It is noted that the identification of significant effects does not necessarily mean that the effect is unacceptable in planning terms and importantly the LVIA does not determine whether effects are unacceptable or not. The assessment criteria seek to ensure that the likely effects are transparently assessed in order that the determining authority can bring a balanced, well-informed judgement to bear when making the planning decision.

10.2.6 Quality of Effects

In accordance with the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017), the quality of landscape and visual effects have been assessed as positive, neutral or negative. The following criteria will form the basis of this judgement:

- Positive Effects - A change which improves the quality of the environment e.g. will enhance

the existing view/landscape;
- Neutral Effects - No effects or effects that are imperceptible, within normal bounds of variation e.g. will neither detract from nor enhance the existing view/landscape;
- Negative/adverse Effects - A change which reduces the quality of the environment e.g. will detract from the existing view/landscape.

Developments of this nature with strong architectural components are acknowledged to give rise to a broad spectrum of opinion ranging from strongly negative to strongly positive, with a wide range of opinions lying somewhere between these two positions. In this regard, whilst some impacts are quantifiable, other impacts are qualitative in nature, where professional judgement is required.

The authors appointed to undertake the LVIA are chartered members of the Landscape Institute, who are experienced in the design and delivery of large-scale public realm and urban design projects and in the production of landscape and visual impact assessments. Experience has been calibrated across a wide-ranging portfolio of projects and landscape contexts across Ireland and the UK.

In addition, it is noted that the evolution of the scheme has been undertaken collaboratively with the wider design team, and in particular with the project architects at Henry J Lyons. The LVIA process has been an iterative point of reference throughout the design process such that the Proposed Development and architectural proposals are cognisant both of the sensitivities and opportunities present.

10.2.7 CUMULATIVE EFFECTS

Within a cumulative assessment, the baseline against which landscape and visual effects are assessed is extended to consider other relevant schemes that are not currently present in the landscape but that are subject to a valid planning application (or have been permitted) as being operational. Cumulative effects therefore represent any increased effects that may be generated by the development in a scenario where other relevant schemes in the locality are operational.

In accordance with best practice guidance GLVIA3, schemes that are at feasibility and pre-planning are not generally considered to be appropriate in the context of a cumulative assessment due to a lack of certainty that they will come forward and because of an absence of detail that enable any meaningful judgements to be made.

The permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under An Bord Pleanála Ref. ABP-301722-18), are lands under the control of the applicant and are included in the cumulative assessment.

The cumulative assessment follows the same process with the exception that the baseline is extended to assume this development is built and is present in the baseline view.

10.2.8 CONSIDERATION OF ALTERNATIVES

The EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU, requires the consideration of alternatives (refer to Chapter 2 for the consideration of alternatives). As part of this consideration, the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) suggest a ‘do nothing’ alternative which examines environmental trends both within the site and its environs in the event that the development does not proceed. This considers consequences that are reasonably likely to occur in the event that the development does not proceed. Refer to paragraph 10.6 for the ‘do nothing’ impact.

The EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) advocate that this ‘do nothing’ consideration should consider the effects of projects which have consent but are not yet implemented. Whilst this assessment considers and presents the effects of the Proposed Development on the existing landscape and visual resource, it is recognised that extant planning approvals exist on the site, including an existing proposal for 229 apartments distributed across 6 blocks, with a height of between 5 and 6 storeys.

In order to understand and compare the influence of the Proposed Development in the context of a developed baseline which could reasonably be present on the site, it has been considered useful to illustrate (through the production of comparative photomontages) this aforementioned permitted scheme at each of the representative viewpoint locations. Refer to Appendix 10.2.

Although the proposed and permitted schemes are materially different in their layout and height, there is a strong degree of commonality between the approved and proposed schemes. Comparative judgements for both landscape and visual effects are included at Appendix 10.5 that present the predicted effects of the Proposed Development when considered against a baseline containing this permitted scheme. The intention is to contextualise the predicted effects of the Proposed Development against those that were previously considered acceptable.

10.3 BASELINE ENVIRONMENT

10.3.1 SITE CONTEXT

The site is located in Howth, a village located on a peninsula 13km east-north-east of Dublin City, near the districts of Baldoyle and Portmarnock. Sutton lies at the entry to the peninsula, with Howth village and harbour located on the north facing side. The village is at the end of a regional road from Dublin City and is one of the northern termini of the DART suburban rail system. It hosts an active commercial fishing port and is set within a unique coastal context containing the offshore islands of Ireland’s Eye and Lambay Island.

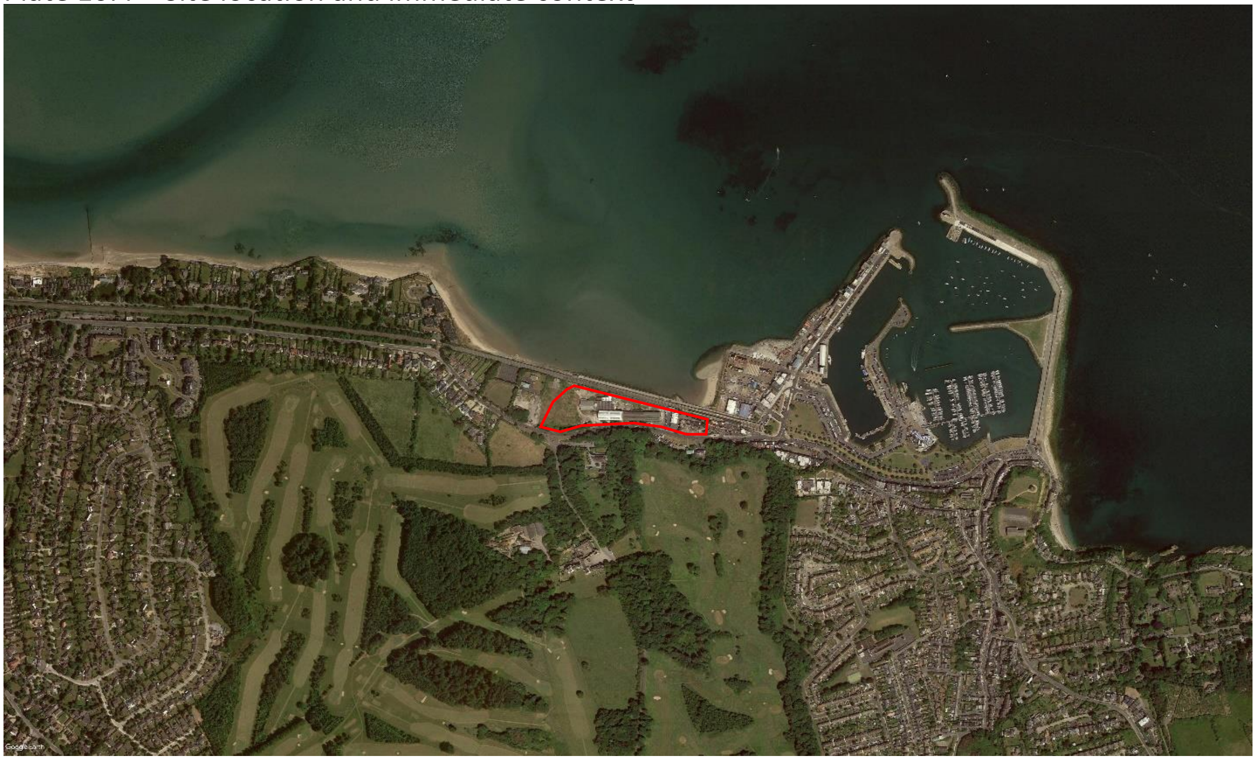
The subject lands are located on the former Techrete manufacturing facility, the former Beshoff’s Motors showroom and the former Howth Garden Centre. Collectively this lies to the west of Howth Railway Station on a strip of land between Howth Road and the DART Rail Line.

Beyond the railway line to the north of the site lies Claremont Strand (a dilapidated concrete walkway that bounds the Irish Rail Lands), Claremont Beach and the Irish Sea. To the south lies St. Mary’s Church, Howth Demesne and Deer Park Golf Course, all of which are nestled into mature vegetation that lines Howth Road.

The land immediately to the east and south east of the site, contains a small cluster of residential properties, a small number of commercial/retail buildings (including a public house) and the entrance to the Howth Railway Station. Beyond this cluster of buildings lies the village centre and the harbour area.

The land immediately to the west of the subject site comprises palisade fenced lands associated with a water pumping station, beyond which lies Baltray Park, a small area of public open space containing public tennis courts. Beyond Baltray Park, low rise linear residential development lines Howth Road to Sutton.

Plate 10.4 – Site location and immediate context



Refer to Figure 10.1 included at Appendix 10.1 for the immediate site context.

LAND USE

The majority of the subject site comprises existing derelict buildings, walls and areas of hardstanding associated with the former uses of site. These comprise a number of single storey sheds and large single volume industrial sheds which have large blank façades with an industrial character.

The site is not publicly accessible and is in poor condition. In its current state the site is a notable detractor and contributes negatively to views experienced on arrival into Howth at the principal entrance to the village.

LANDFORM

The partial infilling of Claremont Bay to accommodate the railway line in the 19th century created the lands that are now associated with the site. Successional industrial and commercial uses have resulted in large areas of hardstanding with little variation occurring across the site. The site is therefore generally flat, lying at between approximately 3.5m and 6m AOD.

To the south of the site and the adjacent Howth Road, the land rises steeply. This vegetated embankment marks the start of the upland area of Howth Head, the lower slopes of which comprise the vegetated grounds associated with Howth Castle and Deer Park Golf Course.

The landscape and landform associated with the wider peninsula is distinctive, comprising extensive areas of heath land. Peaks such as the 171 m Shielmartin Hill and 163m Ben of Howth offer panoramic views over the wider landscape and this landform generally is important in defining the coastal character of the County acting as a distinctive backdrop to many coastal views.

URBAN GRAIN

Urban grain relates to the pattern and scale of streets, buildings and open space and the rhythm of building frontages. In this regard, the urban grain of the wider peninsula is recognised to be diverse, as a result of its historical development, the influence of natural topography and land uses. The village core is characterised by linked dwellings and continuous building frontage along Harbour Road. Behind this frontage, the urban grain remains generally consistent. The urban grain of the harbour area is influenced by the marine industry, comprising a collection of larger buildings lining the harbour pier. The urban grain to the east of the site has a strongly linear quality, comprising small scale clusters of buildings lining Howth Road, albeit there are larger apartment developments at the western end of Claremont Beach (Howth Lodge Apartments) which provide contrast.

The urban grain of the site comprises large industrial built form with proportions that sharply contrast the comparatively finer grained qualities of the surrounding built up areas. Whilst also being publicly inaccessible, long blank unanimated facades present a negative frontage to Howth Road with minimal variation or rhythm to the streetscape.

VEGETATION

The site contains a number of mature and semi-mature trees, belts of non-native leylandii conifer planting and naturally regenerating vegetation. Whilst the vegetation is considered to be of some collective merit in terms of contributing to the experience of the approach into Howth and moderating the influence of the industrial buildings, a significant proportion of the vegetation on the site was found to be of poor quality because of health or defects, or growing in constrained conditions such as to compromise their long term viability. None of the vegetation on the site is considered to be of any particular individual merit or amenity value, particularly when considered in the context of the vegetation character to the south of the site.

The arboricultural survey identifies the tree stock present along Howth Road comprising mainly of Category B and C retention category. This relates to trees of moderate and poor quality respectively.

The wider peninsula plays host to a diverse variety of vegetation types including medium to large scale woodland bounding the site and present in the landscape surrounding the uplands, large areas of heathland, bogland and grasslands. This natural vegetation is interspersed by woodland plantations and highly manicured amenity grasslands associated with the various golf courses.

Street trees and planting within private garden areas contribute to the developed parts of the peninsula having a lush and highly vegetated character.

BOUNDARIES

The boundaries of the site are of varying quality. To the south, a low concrete block wall runs along the full length of the site and provides physical separation between the site and the public footpath. In conjunction with a number of corroded, gated entrances, it offers little quality or amenity on the approach into the village. This wall is bound by intermittent trees and overgrown scrub.

The western boundary of the site abuts the adjacent water pumping station site and is defined by palisade fencing. The eastern boundary is formed by the painted block wall that forms the boundary between the site and the adjacent property (Ashbury). The northern boundary of the site abuts the railway lands and is made up of a mixture of concrete panels and fencing treatments. These treatments separate the site from the railway line and its associated infrastructure.

Boundary features are not considered to be of any notable landscape quality or condition.

10.3.2 HISTORIC CONTEXT

The peninsula is recognised as having a rich and varied history and a strong time-depth character. This varied history is evidenced by numerous historic buildings and structures, including the harbour with the east and west piers, marina, lighthouse, the 12th century Abbey (and its graveyard in the heart of the village) and the 15th century Howth Castle and grounds. The peninsula also plays host to two of the many Martello Towers (c.1805) located around the Irish coast, built to watch out for the French invasion.

The historic development of the village is well documented. Having been invaded by the Norwegians in 819, it remained so until the middle of the 11th century. It remained under the control of the Irish and localised norsemen until the Anglo-Norman invasion in 1169. Howth fell to the Normans in 1177 near The Bloody Stream.

Howth was known to be a trading port from at least the 14th century, albeit the village's harbour context did not truly materialise until early in the 19th century when it was chosen as the location for the postal service ship. After the relocation of the postal service to Dún Laoghaire, the focus of harbour activities related to the fishing industry. The harbour underwent significant reconfiguration in the late 20th century with distinct fishing and leisure areas formed and today the harbour area in particular plays an important role in tourism and recreation.

As previously described, the site was reclaimed towards the middle of the 19th century to accommodate the railway line, after which it played host to successive industrial uses. This reclamation saw the culverting of the Bloody Stream which had previously flowed across the site into the bay.

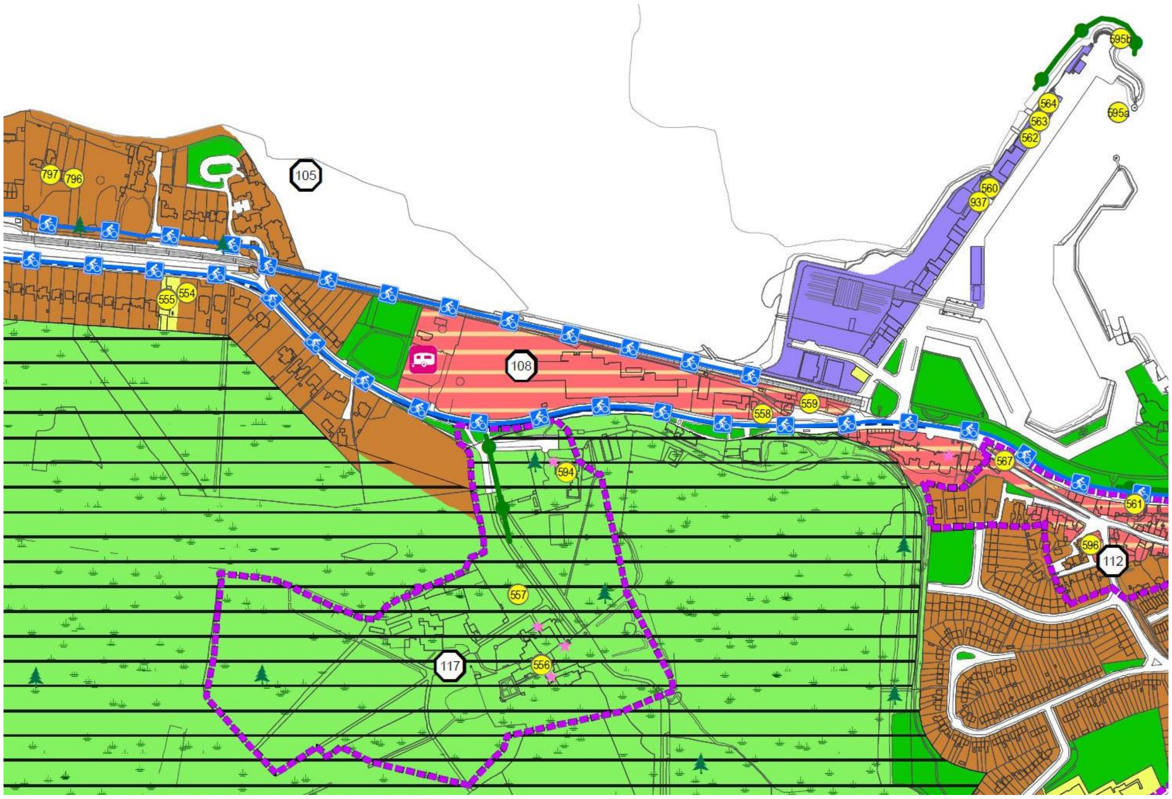
10.3.3 PLANNING AND DEVELOPMENT CONTEXT

COUNTY DEVELOPMENT PLAN

As illustrated in Plate 10.5, the site falls within the County Development Plan map-based zoning objective TC – Town and District Centre. This seeks to "Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities". The site also includes County Development Plan map based local objective 108, which advocates development on the site of between 3-5 storeys.

The planning history for the site is detailed elsewhere in the application documentation. However, it is recognised that the site has been subject to numerous previous planning applications and is subject to extant planning approval for six apartment blocks of between 5 and 6 storeys, contrary to this County Development Plan map based local objective.

Plate 10.5 – Fingal Development Plan 2017-2022 – Extract from Sheet 10



HOWTH URBAN CENTRE STRATEGY (2008)

In gaining an understanding of the site and its context, reference has also been made to the Howth Urban Centre Strategy (UCS). Although the UCS is a non-statutory document, it recognises and clearly outlines the Techrete lands as an "opportunity site" for higher density and higher scaled development.

Plate 10.6 – Indicative framework Plan for Howth (Howth UCS 2008)

The indicative framework plan for Howth (illustrated on Plate 10.6), sets out the spatial strategy for delivering the vision presented in the UCS. It recognises the significant potential to redevelop both the site and the western pier, the latter of which would incorporate a new west facing recreation focused marina, with active building frontages facing onto Claremont Beach, new areas of public footpaths and positive areas of public realm.

Plate 10.7 illustrates the indicative layout presented within the UCS for the site. This layout is informed and supported by a detailed analysis of the site and its wider context. This layout is accompanied by a site-specific brief for how the site could be developed and indicates a height range up to 7 storeys, with the potential for a landmark building (point 2 on the indicative layout).

Plate 10.7 – Indicative built form for Opportunity Site 1 (Howth UCS 2008)

The development parameters within the UCS promote a scale, density and mix of development that is different to the prevailing pattern of development or character and state that the Techrete lands (in their current form) provide an extreme contrast in scale with its surroundings and presents a negative frontage to the Howth Road.

The capacity of the local landscape to accept fundamental changes through redevelopment is clearly outlined and has previously been considered acceptable.

URBAN DEVELOPMENT AND BUILDING HEIGHTS, GUIDELINES FOR PLANNING AUTHORITIES

In the period since the Development Plan site-based height precedents have been established, statutory Urban Development and Building Heights guidelines have been published (adopted in December 2018). The guidelines set out national planning policy guidelines on building heights in urban areas in response to policy objectives set out in the National Planning Framework (NPF) which places greater emphasis on achieving a more compact urban form and delivering effective densities and greater consolidation of urban development.

The guidelines represent a strong and strategic national move away from generic set height limits in order that increased density in well serviced urban areas are capitalised on (particularly brown field sites with public transport connections). They state that an application must demonstrate compliance with the following development management criteria (summarised as follows):

AT THE SCALE OF THE RELEVANT CITY/TOWN

- Well served by public transport with high capacity;
- Successfully integrate into/enhance the character and the public realm of the area, having regard to topography, cultural context, setting of key landmarks, protection of key views. Proposals should undertake a landscape and visual assessment by a qualified

practitioner;

- Make positive contribution to place-making, incorporate new streets and public spaces, sufficient variety in scale and form, and create visual interest in the streetscape.

AT THE SCALE OF DISTRICT/NEIGHBOURHOOD/STREET

- Respond to their overall natural and built environment making a positive contribution to the streetscape;
- Not monolithic and avoids long, uninterrupted walls. The building fabric should be well considered;
- Enhance the urban design context for public uses and key thoroughfares;
- Improve legibility through the site or the wider urban area which the development is situated and integrates in a cohesive manner.

AT THE SCALE OF THE SITE/BUILDING

- The form, massing and height of the Proposed Development should maximise access to natural daylight, ventilation and minimise over-shadowing and loss of light; and
- Regard to Daylight/Sunlight assessment.
- In undertaking the design of the Proposed Development and in the assessment, attention has been made to the development management assessment criteria presented in these guidelines.
- A commentary against these criteria is presented at section 10.8.

10.3.4 LIKELY FUTURE RECEIVING ENVIRONMENT

The condition and character of the site and its wider built and natural context is as a result of a variety of natural and man-made influences. It is therefore recognised that the environment will invariably change over time.

In terms of natural influences, given the containment and protection afforded by the adjacent railway line (the land having been reclaimed because of it), it is not considered that the future receiving environment will significantly change as a result of natural processes so as to notably alter the perceived landscape and visual characteristics.

Whilst the future village environment is likely to include a number of new built interventions (including the permitted development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18)) and changes to its built fabric as a result of incremental small scale private development projects, no other developments of notable scale have been identified that would notably influence or change the character of the underlying environment in future years.

In the event that the development does not proceed it is reasonable to suggest that the site would be developed in the future for some residential and open space use in line with its zoning in the Fingal Development Plan. In this regard, it is reiterated that extant permission exists on the site for residential development.

The consideration of the likely future environment also makes reference to the Howth UCS. Whilst it is a non-statutory document and the proposals outlined are subject to further design development, it outlines the significant combined potential of the site and the western pier, to form part of the major redevelopment of this western part of the village (refer to Plates 10.6 and 10.7).

10.3.5 Landscape, Visual and Heritage designations

It is acknowledged that the site is not covered by any designation that recognises a specific landscape or visual importance. It is however recognised that the wider Howth Peninsula has unique landscape, visual and heritage characteristics and features that do have a designated importance.

The identification of designated built heritage features and ACAs is done so in order to contextualise the character of the townscape as it is experienced today.

Howth Special Amenity Area Order

In 1999 FCC recognised the exceptional character of the area of Howth by making the Howth Special Amenity Area Order (SAAO). This designation covers a total area of 547 hectares and covers the heathland, woods, cliffs and wooded residential areas on the south-eastern part of the peninsula, Ireland's Eye, the eastern harbour pier and the upland area south of Deer Park Golf Course. It recognises the special quality of the area which includes its outstanding natural beauty, special recreational value and nature conservation importance.

As well as recognising the features and habitats that collectively define this distinctive natural environment, the order also designates a 21km network of public footpaths, facilitating a high level of public access and opportunities for outdoor recreation.

The SAAO is concerned primarily with developments within the SAAO boundary and seeks to preserve and enhance the unique character and special features of the area. The site is located outside of both the SAAO boundary and its buffer zone. The impacts of the Proposed Development on the SAAO are addressed through the conservation of landscape character and visual impacts experienced from within the SAAO.

High Amenity Zoning

The majority of the Hill of Howth is also zoned "HA - High Amenity" in the County Development Plan. The zoning applies to areas which consist of landscapes of special value or sensitivity in which inappropriate development would contribute to a significant diminution of landscape amenity in the County. Of particular importance are scenic landscapes of high quality which afford expansive or interesting views of surrounding areas or which are components in important views and prospects.

The site is located outside of this zoning although it is recognised that views of the wider coastal context and the upland areas are a key feature of the landscape.

Protected views

The wider peninsula contains many locations that have a map-based objective 'to preserve views'. The objective of these views and prospects is to protect views that contribute to the character of the landscape.

These include locations on elevated ground to the south of the site, within the village, on the harbour piers and along the coastal frontage at Baldoyle from which the Proposed Development has the potential to be visible. Key amongst these and in close proximity to the site is the view from the approach road to Howth Castle.

This is indicated on the Development Plan Zoning Objectives plan as extending between Howth Road and a point equidistant between the Road and Howth Castle where the road curves. Views on the northbound exit from the castle grounds will include views over the western edge of the site towards the railway line, beyond which lies the sea.

The impacts of the Proposed Development on this view and other views that fall within the map-based objective, are addressed through the inclusion of representative viewpoint locations.

HERITAGE DESIGNATIONS

There are no protected structures within the subject lands although it is noted that those in the vicinity of the site include Howth Railway Station (including the Signal Box), Howth Station Masters House, Howth Castle (including the gates) and St. Mary's Church of Ireland Church.

The peninsula has four designated Architectural Conservation Areas that recognise distinctive architectural characteristics. These include the Howth Historic Core, Howth Castle, Howth Nashville Road and Nashville Park and Howth St. Nessan's Terrace. This designation seeks to protect the special character of these built environments and the following provides a character summary for each, extracted from the associated Statements of Character (SOC). Annotated maps presented at Plates 10.8a-d have been extracted from each for reference.

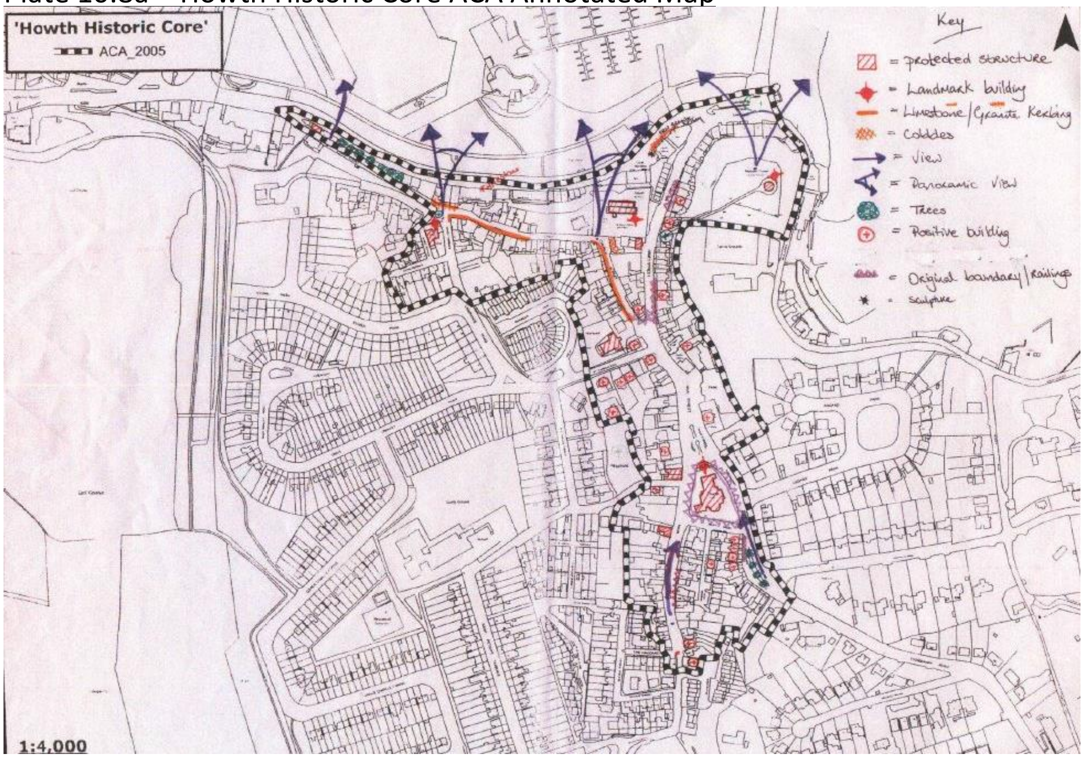
Howth Historic Core ACA

The ACA for Howth Historic Core stretches from the junction of Harbour road with Church Street along the seafront area to the East Pier, up Abbey Street and Main Street, up until the Junction with The Haggard. The area to the east of the assumptions is also included, up to Hillside Terrace and the old school building just south of this terrace. The boundary returns back to Harbour road along Church street taking in Evora Terrace, Dunbo Terrace and Howth Terrace.

Much of the special character of this ACA is due to the survival of many medieval and 19th century buildings. The mix of grand landmark structures and modest vernacular structures mark the evolution of Howth from a small fishing village to popular seaside resort. Many of the buildings still retain original features and landmark buildings include the Church of Assumption, St Mary's Abbey, the Martello Tower and the Garda Station.

Key views from the ACA are to the north over the harbour and towards Ireland's Eye, as illustrated by the annotated map at Plate 10.8a.

Plate 10.8a – Howth Historic Core ACA Annotated Map



Howth Castle

The ACA for Howth Castle extends from the Howth Road to just south of Howth Castle and includes St. Mary's Church, the formal gardens and old orchard to the castle, the ruins of an ancient church, the Howth transport museum complex, a large copse of trees to the west of the castle, as well Howth Castle.

The special character of this ACA reflects it original function as a demesne landscape as there is a secluded, quiet charm to the place despite its proximity to a busy road and Howth Village. It is not only the structures but also the designed landscape features which combine to create the character of this ACA. Many of the structures within the ACA are Protected Structures or within the curtilage of protected Structures.

As identified on the annotated map within the Statement of Character (Plate 10.8b), key views from the ACA include the view between the entrance gates towards the sea and views towards St. Mary’s Church on the approach from Howth Road. Other views identified being of importance lie within the castle grounds.

Plate 10.8b – Howth Castle ACA Annotated Map

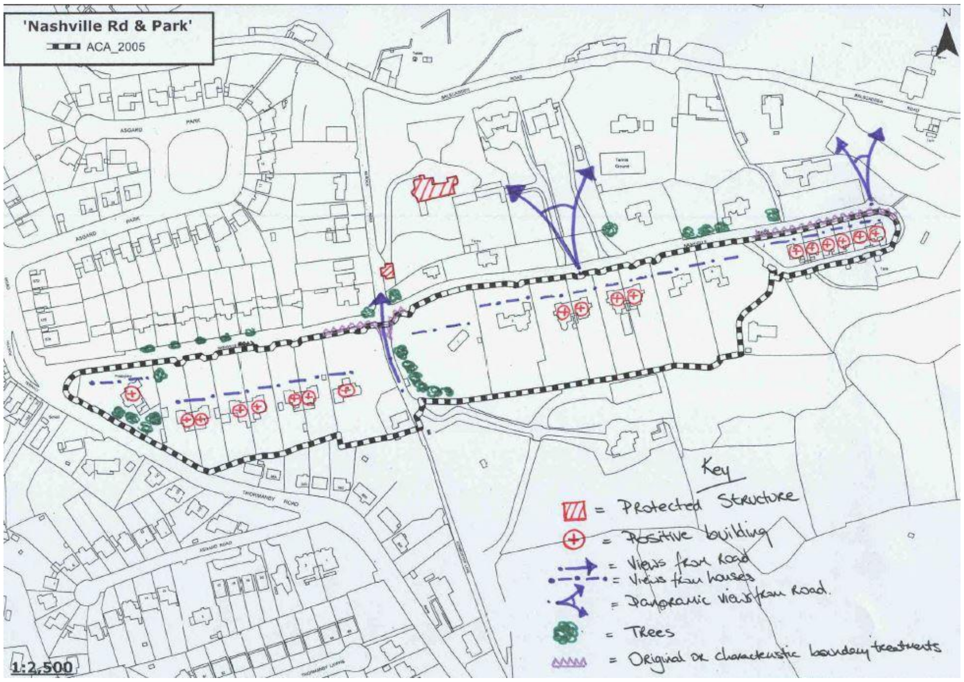
Howth Nashville Road and Nashville Park

The ACA comprises of 22 dwellings located on the southern side of both of these roads. These structures are mainly 19th century semi-detached and terraced houses of similar design. Cowbooter Lane and Kilrock Road intersect with Nashville Road and provide the physical separation between the two roads. Nos 1-8 Nashville Road comprise of a mix of detached and semi-detached houses. Nos 9-14 consist of a terrace of 6 dwelling units which form a standalone urban set-piece. The majority of houses have individual names, many of which are the original 19th century names.

The 19th century development is of a completely different scale and character to that prevailing in Howth Village. The special character of the area is primarily associated with the late 19th century semi-detached and terraced houses, which are distinctive due to their homogeneity of their architectural style and decorative detailing. These buildings have remained fundamentally unaltered since construction.

Again, key views from the ACA are to the north over the harbour and towards Ireland's Eye, as illustrated by the annotated map at Plate 10.8c.

Plate 10.8c – Howth Nashville Road and Park ACA Annotated Map



Howth St. Nessan's Terrace

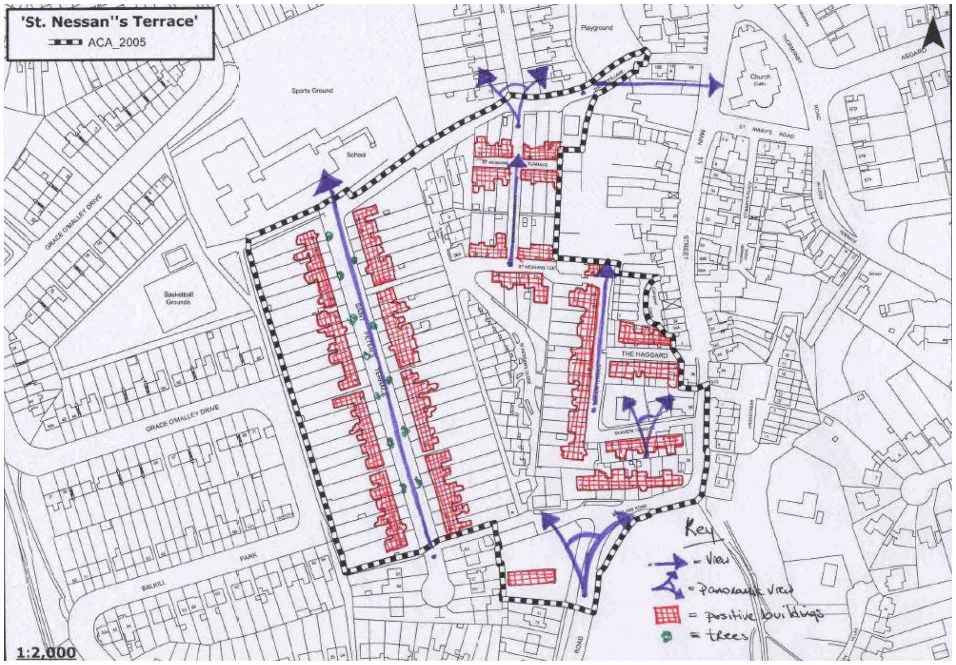
The ACA extends from St Nessan's Terrace to Seaview Terrace and No.2 to 10 The Haggard. It also includes Nos. I to 7 Balglass Road and the former school building on Balglass Road, as well as most of St Peter's Terrace. These streets slope uphill and are located on a very elevated site, overlooking the village core, with views of the harbour, Ireland's Eye, Lambay and the Coastline of North County Dublin.

The special character of this ACA is primarily associated with the early 20th century terrace cottages along St Peter's Terrace, St Nessan's Terrace, Seaview Terrace, 'The Haggard and part of Balglass Road. The low-rise, small scale terraced nature of this area has remained fundamentally unaltered since construction.

The modest nature, along with the overall uniformity of the simple design has resulted in a distinctive homogenous vernacular character that sets this area apart from the rest of Howth Village.

Key views from the ACA are to the north over the harbour and towards Ireland's Eye as illustrated by the annotated map at Plate 10.8d.

Plate 10.8d – Howth St. Nessan's Terrace ACA Annotated Map



10.3.6 Landscape Character

The Development Plan presents a Landscape Character Assessment (LCA) for the county. This assessment identifies 6 Landscape Character Types (LCTs) that represent broad areas of character that are distinctly different from each other. The assessment also places a value on each LCT and provides a judgement on its sensitivity to change.

The site is located within the 'Coastal' Character type. The description presented is:

"The Coastal Character Type forms the eastern boundary of the County and contains a number of important beaches, islands and headlands that together create a landscape of high amenity and landscape value. A number of important settlements are located within this area, including Balbriggan, Skerries, Rush, Malahide, Portmarnock and Howth. The land is generally low lying, with the exception of some prominent headlands and hills in the northern part of the area, Howth and the offshore islands. Most of the Howth peninsula is covered by the 1999 Special Amenity Area Order (SAAO).

There are a number of important demesne or estate landscapes containing important woodlands in or adjoining this area at Ardgillan, Hampton, Milverton and Portrane. Horticulture (around Rush), golf courses *and individual dwellings are prevalent land uses in the area also. Views along the coast are generally contained within headlands, ridgelines and harbours, creating a number of visual compartments.*

The Coastal Character Type is categorised as having an exceptional landscape value. This value is arrived at due to the combination of visual, ecological, recreational and historical attributes. The area has magnificent views out to sea, to the islands and to the Mourne and Wicklow mountains and contains numerous beaches and harbours. The area's importance is highlighted by the High Amenity zoning covering substantial parts of the area. The area is rich in archaeological, architectural and natural heritage and is of high ecological value."

The character type is identified as having a high sensitivity to development. Key amongst the principles for development presented are:

- Skylines, horizon and ridgelines should be protected from development;
- The use of trees and woodlands to contain new development should be encouraged. Strong planting schemes using native species, to integrate development into these sensitive landscapes, will be required. New planting needs to be carefully located and selected;
- The special character of the coast should be protected by preventing inappropriate development on the seaward side of coastal roads; and
- The character of the coastal visual compartments should be retained by preventing intrusive developments on headlands, promontories and coastal lands within the compartments. The coastal skyline should be protected from intrusive development.

The coastal character type is extensive in its geographic coverage and does not wholly reflect the variability in landscape character and landscape characteristics that occurs at a more localised level. In addition, due to their extensive coverage, the key principles outlined are inherently generic in nature, an example being the protection of skylines which is a principle for development across all the LCTs presented.

In a localised context, the understanding of 'skyline' is taken to relate primarily with the distinctive landform of the peninsula and its hills where this is seen against the sky. Its outline is comprised of a 'sharper' and more clearly defined topographical outline relating to the upland areas (comprised of heathland and rock outcrops), and by a 'softer' outline on the lower coastal lands (comprised of vegetation and built form). In places, it is noted that the natural topography of the peninsula has been breached, such as the upper parts of the village itself which sits on the natural ridgeline when viewed from locations around the harbour and to the north.

LOCAL SCALE LANDSCAPE CHARACTER

When compared to the village centre to the east, the linear residential suburban area to the west and the demesne lands to the south, the site is unique and contrasting. As described, the successional industrial uses on the site did not reflect the surrounding characteristics and in its current condition contributes negatively to the character of the area.

The character assessment produced to assess the effects of previous development proposals on landscape character has been adopted as the basis of this assessment. It is comprehensive in nature and includes distinct physical units/landscape character areas within the existing landscape, townscape and seascape that demonstrate consistent characteristics at a more appropriate scale.

Refer to Figure 10.2 at Appendix 10.1 for a plan illustrating the locations of the LCAs described below. A judgement on the sensitivity of each character area is provided.

Landscape Character Area A - Harbour

This area is characterised by the stone-built harbour quays and jetties, marinas, the busy harbour waters and the associated village frontage where this lies to the north of Howth Road and Harbour Road. Built form is arranged along the western quay in a strong linear arrangement with buildings relating strongly to the fishing industry and the coastguard context. The harbour area plays host to the Howth Yacht Club and contains numerous restaurants and fishmongers. The LCA extends west along the coast to include the railway line, the train station as well as the strip of inaccessible land situated between the sea and Howth Road (the site) which plays host to large derelict built form. The southern boundary of the LCA is defined by the village frontage and the key arrival road into Howth. Within the central area of the harbour and defining the village frontage, a generously proportioned area of open green space containing a tree avenue defined the boundary between the village frontage and the harbour areas This area is heavily influenced by vehicular and pedestrian activity. The built context contrasts strongly with the residential parts of Howth, being of a comparatively large scale and including a diverse range of commercial, industrial and marine industry related uses.

The sensitivity of LCA A is considered to be medium.

Landscape Character Area B - Residential Howth Village

A predominately built up area comprising a mix of residential development that includes medieval through to 19th century small scale dwellings with a small amount of 20th century infill. It has a loose urban grain arranged around an organically arranged road system. Housing is predominantly semi-detached or terraced 2-3 storey stone and brick-built dwellings. Within this area a number of distinctive areas have been identified and assigned as Architectural Conservation areas, containing a large number of both protected structures and Recorded Monuments.

The sensitivity of LCA B is considered to be High.

Landscape Character Area C - Howth Historic Core ACA

This character area relates to the Howth Historic Core ACA, an area of built up land-scape that has early origins in the context of the village and diverse built form that includes several medieval and 19th Century buildings and landmark buildings of the Church of the Assumption, St. Mary’s Abbey, the Martello Tower, and the Garda Station. Built form is varied, ranging in height and architectural style with many along the frontage being 4 to 5 storeys in height and displaying a variety of colourful painted finishes. Typical uses are retail, commercial and residential. Many buildings having undergone contemporary retail and residential refurbishments and adaptations with a diverse material treatment evident (ranging from stone to brick to panel cladding). Vegetation is generally confined to front garden areas and car parking areas with occasional street trees.

The sensitivity of LCA C is considered to be High.

Landscape Character Area D - St Nessan's Terrace ACA

This character area relates to the ACA the special character which relates to the early 20th century single storey, 3 bay terraced cottages with pitched slate roofs and red brick chimneys, arranged along St Peter's Terrace, St Nessan's Terrace, Seaview Terrace, The Haggard and part of Balglass Road. The low-rise, small scale terraced nature of this area has remained fundamentally unaltered leading to a distinctive character in its wider urban setting.

The sensitivity of LCA D is considered to be High.

Landscape Character Area E - Nashville Road and Park ACA

This character area relates to the ACA and relates specifically to a series of late 19th century semi-detached and terraced houses, which are distinctive due to the homogeneity of their architectural style and decorative detailing. Buildings, architectural detailing and cast-iron boundary treatments have remained fundamentally unaltered, hence its distinctive character.

The sensitivity of LCA E is considered to be High.

Landscape Character Area F - Agriculture and Natural scrub

This LCA comprises the agricultural context along the eastern edge of the village between the cliffs lining the eastern side of the peninsula. Farmland is interspersed with scrub and heath land that occurs around rock outcrops. This LCA is included within the Howth Special Amenity Area Order.

The sensitivity of LCA F is considered to be High.

Landscape Character Area G - Coastal Headland

This LCA comprises the natural eastern and southern extents of the peninsula which play host to dramatic rugged coastal cliffs, heathland and scrub. It has a sense of remoteness given the prevailing natural characteristics and detachment from urban areas. This LCA is included within the Howth Special Amenity Area Order.

The sensitivity of LCA G is considered to be High.

Landscape Character Area H - Heath Land

This LCA comprises of an area of elevated heath land located on the upper slopes of Howth Hill and Shielmartin Hill. It includes an area of raised peat bog and on the north extent of the LCA a large area of

broad-leaved woodland. It includes locally distinctive landform associated with Muck Rock, Dunhill, Shielmartin Hill and Black Linn. This LCA is included within the Howth Special Amenity Area Order.

The sensitivity of LCA H is considered to be High.

Landscape Character Area I - Agriculture and Natural scrub

This LCA comprises a mixed vegetated area including elements of farmland, pasture, rough scrub natural heath land and coastal cliffs. Located to the south west of Shielmartin Hill, extending from Carrickbrack Road down to the coast. This LCA is included within the Howth Special Amenity Area Order.

The sensitivity of LCA I is considered to be High.

Landscape Character Area -J Amenity Grassland

This LCA comprises of an extensive area of intensively managed Golf course landscape interwoven into areas of heath land and woodland. Located centrally on the peninsula and occupying the upper and lower northern and western slopes of Howth Hill.

The sensitivity of LCA J is considered to be Medium.

Landscape Character Area K - Residential Sutton

This LCA comprises of an extensive area of residential development that extends from the mainland, across the tombola and down the western coast of the Peninsula.

The sensitivity of LCA K is considered to be Medium.

Landscape Character Area L - Howth Castle ACA

This character area relates to the Howth Castle ACA, the character of which reflects it original function as a demesne landscape. The manicured fairways and greens of the golf course as well as the hotel complex now cover most of the former demesne lands. The ACA includes notable built features such as Howth Castle and the 19th century St. Mary's Church but also includes designed landscape features. Accessed off Howth Road through large impressive Neo-Gothic gates, Howth Castle is situated at the end of a long yew tree-lined avenue. The heavily vegetated character of the ACA leads to a secluded, quiet charm whilst also being influenced by the audible and visual influence of traffic and the surrounding golf course use.

The sensitivity of LCA L is considered to be High.

Landscape Character Area M - Coastal Beach

This LCA comprise of a narrow section of coast along the north-west section of the peninsula and extending out across the tombolo.

The sensitivity of LCA M is considered to be High.

Landscape Character Area N - Coastal Amenity

This LCA comprises of Portmarnock Point and consists of an area of low-lying coastal sand dunes and beaches with elements of rough scrub and including golf course fairways.

The sensitivity of LCA N is considered to be Medium.

Landscape Character Area O - Coastal Amenity

This LCA comprises Bull Island, an area of low-lying coastal sand dunes and beaches with elements of rough scrub and including golf course fairways.

The sensitivity of LCA O is considered to be Medium.

Landscape Character Area P - Ireland's Eye

This LCA covers Ireland's Eye, an uninhabited island that plays host to a Martello tower and the remains of an 8th century church. With its distinctive landform and proximity to the coastline it is a highly visible landmark feature from many locations in the wider landscape and is a tourist attraction.

The sensitivity of LCA P is considered to be High.

Landscape Character Area Q – Agriculture and natural scrub

This LCA comprises a mixed vegetated area including elements of farmland, pasture, rough scrub natural grasslands west of Coast Road in the vicinity of Mayne River.

The sensitivity of LCA Q is considered to be Medium.

Landscape Character Area R – Coastal waters and sand flats

This LCA comprises the extensive coastal seascape that is defined by shallow waters and at low tides large sand flats, rocky beaches and estuarine environments. This seascape has a highly dynamic and changing character due to the constant influence of tides, coastal processes and climatic influences.

The sensitivity of LCA R is considered to be medium tending to low.

Landscape Character Area S - Howth Waters

Expansive seascape associated with the Irish Sea that surrounds the wider peninsula. This LCA relates to deeper waters that surround the peninsula which by merit of their relative depth have a more permanent open water character. This LCA has an inherently natural and dynamic character that is heavily influenced by marine traffic and distant landforms against which it is seen.

The sensitivity of LCA S is considered to be medium tending to low.

10.3.7 General visibility

Relative to the scale of the site, the geographical area from which it is visible is very restricted due to the screening provided by the railway line, built form and vegetation in the wider landscape. The most notable visual relationship with the site is experienced when travelling into (and out of) Howth via Howth Road or the DART railway, in the section of Howth Road between Baltray Park and Station Master's House.

The industrial built form however, and to a lesser degree the vegetation on the site, is visible from the wider landscape and particularly in views from the sea to the north, from elevated locations to the south and east, and locations to the west and north west, where intervening topography and built form do not preclude views.

With distance, the extent to which the built form on the site is discernible reduces and other more notable influences such as the expansive seascape, the wider developed coastline and the distinctive topographical outline of the uplands and Ireland's Eye prevail as the primary foci in views.

Contained by both the railway line and Howth Road and bound by mature vegetation and built form in the vicinity of the Station Master's House, despite its proximity to the village, there is little in the way of a visual relationship between the site (and the existing development on it) and the village core. In this respect the site has a degree of visual detachedness from the village.

In other locations on the Peninsula, the combined influence of vegetation, built form and elevation result in a high degree of variability in the visual character. In the built-up parts of the village, views are often intimate in character or channelled. With elevation and reduced tree cover, views become more expansive over the wider landscape and seascape. The degree to which the site is visible and noticeable also changes due to the influences of other more prominent features in the view, and naturally, the visual relationship with Ireland's Eye and the bustling harbour areas form a focus in many views.

10.3.8 Visual character

Where visible, the vacant industrial block form is incongruous with the adjoining residential areas and its derelict and unmanaged condition negatively impacts views. From Howth Road, the visual character of the approach to the village is dominated by low rise 19th / 20th century residential development and the existing road context. Views to Ireland's Eye are limited to the entrance to the pumping station, immediately to the west of the site. At this point the spire of St. Mary's church also becomes visible, albeit to varying degrees along this route due to the screening provided by intervening vegetation.

In addition to those who live and work in the village, the recreation value of Howth is noted with visitors wishing to avail of the locally sourced seafood, visit historic destinations and experience the bustling harbour. Recreationally it is also a destination for birdwatching and shore fishing and more active pursuits such as golf, sailing, cycling, jogging and hillwalking.

With the exception of the views to Ireland's Eye and St. Mary's Church spire, the visual amenity of Howth Road on the approach to the village is poor with few features of aesthetic quality to generate a positive sense of approach and arrival to the village, commensurate with the recreational potential of the headland and village. Currently, the sense of arrival into the village is marked by the cluster of buildings at the entrance to the railway station.

10.3.9 VIEWPOINTS

In order to communicate the potential visual effects of the Proposed Development, a series of assessment viewpoints have been used. The location of these viewpoints represents a broad variety of visual receptors and character contexts and have been considered in terms of demonstrating the range of visual effects throughout the landscape. As mentioned previously, these viewpoints also represent several locations with a Development Plan, map-based objective to 'Preserve Views'.

Assessment viewpoint locations are set out in Table 10.1 with locations illustrated on Figure 10.3 (at Appendix 10.1). The following paragraphs provide an outline of the baseline views available towards the site.

Viewpoint 1-4 – Howth Road

Views from viewpoints 1-4 are representative of views experienced from Howth Road on the approach into the village. Views 3 and 4 demonstrate that beyond a short distance, the site and the industrial built form on it are not visible due to the influence of roadside vegetation. Whilst it is recognised that views of Ireland's Eye and St. Mary's Church are possible, these are intermittent with only a small number of locations between Baltray Park and the entrance to the pumping station site (viewpoint 2) where filtered oblique views are possible. Views when travelling along the road are negatively influenced by the industrial and derelict character/condition of the site environs. In addition, the quality and consistency of the roadside vegetation (and the road surface) itself is of variable quality, contributing to a tangible sense of neglect. Visual receptors when travelling along the Howth Road are considered to have a passing interest in the landscape, with views being more heavily influenced by the immediate road context.

Visual receptors are considered to be of medium to low sensitivity.

Viewpoint 5a-5d – View north on the exit from Howth Castle

Views from viewpoints 5a-5d form part of the zoned objective 'To preserve views'. The focus of views from the approach to the gates is with the ornate gate pillars and the views between them which include longer distance views across the site to the sea and distant coastline. Views from the most southerly part of the route (5a and 5b) are strongly channelled in nature due to the vegetation bounding the route and the gate pillars which act to frame the views towards the sea. As the visual receptor approaches the gates, views become increasingly less channelled and more influenced by Howth Road, the railway line and the unmanaged character of the site. Also, with reduced elevation, the visual relationship with the sea diminishes as vegetation on the site and the railway line act to preclude views.

Visual receptors are considered to be of high sensitivity, reducing to medium close to Howth Road.

Viewpoint 6a – View from road leading to Howth Castle at its intersection with Howth Road.

Views from 6a reflect views east in the direction of the village and St. Mary's Church along Howth Road from the most northerly part of the zoned objective 'to preserve views' (associated with viewpoints 5a-d). Views of the site are available to the north with the large uncharacteristic conifer stand, the concrete block walling and the large industrial built form negatively influencing the character of the locality. Views are heavily influenced at this location by vehicle movements along Howth Road.

Visual receptors are considered to be of medium sensitivity.

Viewpoint 6b – View at the northern façade of St. Mary's Church

This viewpoint is located within the Special Amenity Area Buffer Zone and Architectural Conservation Area adjacent to a protected structure. From within the grounds of the church, intervening vegetation between the church grounds and Howth Road preclude any visual interrelationship with the site, the sea or the coastline. The focus of views therefore lies primarily with the church building and its grounds.

Visual receptors are considered to be of medium to high sensitivity.

Viewpoint 7 and 8 - Howth Village looking west

Views from viewpoints 7 and 8 are reflective of views that would be experienced close to the eastern boundary of the site, adjacent to the small group of properties set back from Howth Road. Views are at close proximity and are currently influenced by large derelict and unmanaged built form that contribute negatively within views. Visual amenity from this location is poor with views being heavily influenced by traffic on the intervening Howth Road, low quality vegetation and other detracting features such as overhead electricity cabling, large scale street lighting and infrastructure associated with the railway. There is no visual relationship with the sea with these precluded by foreground built form.

Visual receptors are considered to be of medium to high sensitivity.

Viewpoints 9, 10 & 11 – Harbour Road

Views from viewpoints 9-11 are representative of views that would be experienced from locations within the main village frontage along Harbour Road and within the central area of public open space. Views of the site are precluded by built form to the east of the railway station entrance and vegetation present within the central area of open space. Given these locations are more central, the focus of views is with the immediate village frontage, the surrounding areas of open space and activity associated with the harbour areas.

Visual receptors are considered to be of medium sensitivity, increasing to medium to high with proximity to the central village area. Viewpoint 12 – West Pier

Viewpoint 12 is taken from the west pier, close to the mouth of the harbour. Whilst this view is recognised as falling within part of the zoned objective 'To preserve views', it is only available by climbing the stepped wall at the end of the pier. The large built form on the site is visible beyond the railway line that bounds the northern edge of the site and views are heavily influenced by the urban and maritime development in the immediate part of the view as well as the wider developed coastline that sweeps across the horizon to the west. Whilst views are available, the predominant focus of views are with Ireland’s Eye and the activities within the harbour.

Visual receptors are considered to be of medium to high sensitivity.

Viewpoints 13 & 14 – East Pier

Views from viewpoints 13 and 14 are taken from two separate locations on the east pier, looking across the harbour. Whilst the site is not visible, the large industrial built form is visible, albeit it is seen in the context of built form lining the western pier. It is recognised that views from the east pier fall within the zoned objective ‘To preserve views’ and in this regard, views are influenced by the pier itself (and the lighthouse), the busy harbour and marina areas, the surrounding seascape to the north and east and Ireland’s Eye.

Visual receptors are considered to be of high sensitivity.

Viewpoint 15 –Martello Tower

This view is taken from a location close to the Martello tower. The elevated nature of the viewpoint allows views over the wider harbour area and village frontage as well as affording extensive seascape views and views to distant coastal horizons. Whilst the large built form on the site is visible, it is difficult to discern in the context of the wider panorama and built form in the immediate village frontage and harbour area are more prominent in views.

Visual receptors are considered to be of high sensitivity.

Viewpoints 16a-d –Deer Park Golf Course

Views from viewpoints 16 a-d are taken from various points within the Deer Park Golf Course within the zoned objective ‘to preserve views’. At each of these locations, views of the site and existing built form on it are precluded by dense intervening woodland. Views are defined by the extensive foreground golf course context (including the adjacent car park and surfaced tracks) as well as views over the wider seascape and distant coastal horizons (particularly to the west). Howth Castle occurs in views in the middle distance to the north set against the tree line bounding Howth Road. As in many locations in the wider landscape, views are heavily influenced by the extensive interplay between built, amenity and natural environments.

Visual receptors are considered to be of high sensitivity.

Viewpoint 17 –Muck Rock

Views from Muck Rock fall within the zoned objective ‘to preserve views’. Views are defined by expansive panoramic views over the wider landscape and seascape, views of the islands and distant horizons as well as the extensive surrounding Golf Course context. Howth Castle and the spire of St. Mary’s Church are visible features in the middle distance and whilst the site is not visible, the industrial built form is visible above St. Mary’s Church and within the context of the tree line. Although visible, the panoramic nature of views from this location are heavily influenced by the extensive interplay between built, amenity and natural environments, and views to the west in particular take in the wider Dublin and Baldoyle Bays, Bull Island and the Dublin urban area. It is noted that whilst representing views from the exposed area of rock, views obtained on the approach to it are heavily restricted by vegetation. Refer to Figure 10.5 at Appendix 10.1 for context photography.

Visual receptors are considered to be of high sensitivity.

Viewpoint 18 – Dungriffin Villas

Views from this location fall within the zoned objective ‘to preserve views’ and are representative of locations in the more elevated parts of the village from which there is potential for visibility. Neither the site nor the industrial built form on it are visible due to the dense vegetation present within the eastern parts of the golf course. The focus of views lies with the surrounding upland landscapes, panoramic views over the lower part of the village towards Ireland's Eye, the harbour area and distant coastal horizons.

Visual receptors are considered to be of high sensitivity.

Viewpoint 19 – Kilrock

Views from this location are representative of elevated locations to the east of the site. The elevated nature of the viewpoint allows views over the wider harbour area and village frontage as well as affording extensive seascape views and views to distant coastal horizons. Although the site and built form on it are visible, it is barely discernible in the context of the wider panorama in which the harbour, the surrounding coastal landscape and seascape are more prominent.

Visual receptors are considered to be of high sensitivity.

Viewpoints 20a & 20b – Baldoyle Bay and Ireland's Eye

Views from viewpoints 20 a and b are representative of views obtained from the local waters to the north of the site. Built form on the site is conspicuous due to its industrial and uniform character, its degree of isolation between the developed village and the development to the west of the bay at Claremont Church Tower, and because of its naturally vegetated backdrop. In views from the sea, the coastal edge is extensively developed and provides a strong contrast to the undeveloped upland areas, the distinctive outline of which form the primary focus in views.

Visual receptors are considered to be of high sensitivity.

Viewpoint 21 – Strand Road, Baldoyle

Views from this location fall within the zoned objective 'to preserve views' and are focused on the immediate Baldoyle Estuary to which the distinctive outlines of the uplands and Ireland's Eye form a distinctive backdrop. The site is not visible due to the screening provided by built form and vegetation bounding the railway track to the west of the site.

Visual receptors are considered to be of high sensitivity.

Viewpoint 22 – Portmarnock Golf Course

Views from this location are representative of users of the coastal environment and the adjacent golf course. Views are available towards the site where the existing built form appears as part of the developed coastal edge within the foreground to the village which sprawls up the hillside. From this location, the primary focus of views is with the extensive foreground coastal dune context, the distinctive outline of the uplands, and Ireland's Eye.

Visual receptors are considered to be of high sensitivity.

10.4 IMPACT OF PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

Landscape and visual effects during construction will be highly variable as features on the site are removed and proposed new features are built as part of the phased redevelopment of this brownfield site. Site entrances, compound areas (with associated buildings, car parking, material stores), tower cranes, scaffolding and the increased activity at the site, will result in landscape and visual effects as is an inevitable consequence of any development proposal of this nature.

Construction effects from a landscape and visual perspective will comprise a series of temporary and short-term effects that are not considered to differ in any meaningful way from those that have been found to be previously acceptable at the site. In addition, the site's zoning objective demonstrates an acceptance in principle that construction activities of a comparable nature will occur.

The approach to the design of the proposed development has been to iteratively incorporate mitigation measures into the proposed scheme being assessed. In terms of the construction stage, measures that would ordinarily be proposed to mitigate landscape and visual effects, include site management procedures such as the control of lighting, storage of materials, placement of compounds, control of vehicular access, effective dust and dirt control measures and hours of working.

The construction phase and appropriate mitigation has been considered collectively within the design team. Whilst this included the review of the proposed construction stage activities in regard to landscape features, landscape character areas, and views from each of the viewpoint locations, this stage is driven primarily by physical site constraints, practical construction related constraints and the proposed phasing of the built form from east to west. From a landscape and visual perspective, mitigation that would ordinarily be proposed is inherent within the proposed Construction Management Plan and are generally considered to be features of best practice employed on most construction sites.

Extensive pre-application discussions with FCC was undertaken during the design stage, during which no concerns were raised in relation to the construction stage landscape and visual effects. A greater degree of focus was placed on the permanent features of the development.

Whilst the effects of construction activities are recognised and will be adverse in nature, it is temporary, no additional mitigation is therefore proposed, and a proportionate degree of focus is made on the long-term effects of the Proposed Development. In reading this section, it is noted that all measures to avoid and reduce the landscape and visual effects of the Proposed Development during construction are incorporated. Section 10.7 discusses mitigation in more detail, with residual impacts presented at section 10.8.

10.4.1 DIRECT LANDSCAPE EFFECTS

Landscape Features

The construction phase would involve the comprehensive removal of existing features on the site, including built form, boundary walls and railings (where in ownership) and extensive groundworks involved in the installation of those parts of the Proposed Development that are below existing levels (including services and foundations). Although it is recognised that some of the vegetation on the site has a degree of collective merit in its current form, due to its limited collective longevity and the realistic viability of this vegetation in the context of demolition and construction activities, the construction phase will also require the removal of all existing vegetation on the site.

Whilst the construction stage will result in the comprehensive loss of existing landscape features, this is restricted to the land within the boundaries of the site and will influence only the character of the immediate site environs and views from the immediate locality. These effects should be considered alongside the opportunity to establish a more robust and high-quality framework of vegetation as well as the introduction of context sensitive high-quality materials and boundary interfaces.

Landscape Character

Effects to Landscape Character Area A (Harbour) within which the site is located, would be direct in nature as a result of the removal of the built form and features on the site, and the construction phase activities. Change to the key landscape or visual characteristics and components would substantially be confined to the immediate environs of the site, with other areas of the LCA being influenced mainly by the sight of cranes.

It is recognised that the influence of construction activities would be considerable at an immediate site level and would represent a comprehensive change to the character of the site. However, in applying the criteria presented in the methodology, it is considered that direct effects on Landscape Character Area A would be moderate.

Direct landscape effects are considered to be adverse during construction although it is acknowledged that the construction phase would include the removal of landscape detractors.

10.4.2 INDIRECT LANDSCAPE EFFECTS

Indirect effects to landscape character are presented in relation to other identified areas of landscape character presented within the baseline. Indirect effects in this regard would occur as a result of features or elements present during the construction stage that influence the experiential qualities of the landscape that contribute to a recognised area of character.

Indirect effects on landscape character would arise primarily as a result of the removal of built features on the site, crane activity and the emerging built form, with the remainder of activities on the site having minimal influence on the wider landscape character due to degree to which these would be visible. Cranes are inherently prominent and visually conspicuous elements due to their scale, height and movement and have the potential to contrast strongly with the natural and scenic qualities of the landscape and interfere with views that are important to landscape character.

Crane activity would have a strong degree of influence where they are seen at close proximity and would contrast in scale and form with the surrounding built and natural context. With distance, the effects of crane activity on landscape character will proportionately reduce as the light lattice character of these structures become more visually recessive and other more dominant influences on landscape character prevail.

The landscape character of the wider peninsula is highly varied, comprising working harbour areas, recreational golf courses, residential areas, marinas, historic built heritage, coastal sands and natural upland habitats. The character of the wider landscape therefore is defined by (and is resilient to) the interaction between human activity and the natural environment.

In applying the criteria presented in the methodology, it is not considered that short term, temporary effects to any of the identified landscape character areas would be any greater than moderate during construction.

Features of construction (such as cranes) would occur over a comparatively restricted area in relation to the wider landscape, the influence of which would be consistent with existing and emerging baseline trends.

Moderate indirect effects are considered to relate to LCAs B-E, J, K (albeit only a small part), L and R. Indirect effects on other LCAs would be Slight or lower.

Indirect landscape effects are considered to be adverse during construction.

10.4.3 SECONDARY LANDSCAPE EFFECTS

Secondary landscape impacts are not considered to differ from those described for the indirect effects.

10.4.4 CUMULATIVE LANDSCAPE EFFECTS

It is not considered that the construction phase would result in any additional effects over those reported in light of a baseline that considers the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18) built and operational. The built form included as part of this permitted application would be assimilated into the wider developed built fabric of the village and would have little influence on the baseline against which effects are assessed.

Visual

10.4.5 DIRECT VISUAL EFFECTS

Effects during construction will be highly variable depending on a variety of factors including the construction activity taking place, the angle of the view, the distance at which activities are seen and the degree to which features of construction would be visible.

Visual effects during construction will comprise a series of temporary and short-term effects, that are not considered to differ in any meaningful way from those that have been found to be previously acceptable at the site. These will arise primarily as a result of crane activity and views of the built form as it is being built, with other features of the construction activities being more localised in their influence on views.

Cranes inherently dominate the skyline due to their scale, height and movement. In close proximity views (where visible) cranes would appear prominently overhead above the foreground-built context.

With distance, visual effects will reduce as these features become more visually recessive and other more dominant influences on views prevail. Where cranes are visible, although their form will inherently contrast the natural qualities of the landscape, their light lattice structure would not preclude an understanding of the wider coastal context.

The most notable effects would relate to views obtained from nearby locations along Howth Road and within the immediate locality where the influence of construction related activities on the site and the prominence of cranes would be most notable. At viewpoints 1, 2, 5c, 5d, 6a, 6b, 7 and 8, views of construction activities would be seen at close proximity where the scale of the plant and the intensity of the activity would inherently have a strong influence on views experienced. Viewpoints 2, 5c, 5d and 6a are located close to the western end of the scheme which would form the basis of the construction compound and would be completed last.

At this proximity, due primarily to the intensity of the activities and the scale of the construction plant, the magnitude of change is assessed as high resulting in significant effects at these viewpoints.

At other viewpoints, whilst features of the construction activities would be partially visible or seen at distance, this would generally be consistent with emerging trends for the site and would alter a small part of the overall visual composition.

At viewpoints 3, 5a, 5b, 9, 12, 16b, 17, 18 and 20a/b, the magnitude of change is assessed as medium resulting in a moderate effect.

At other viewpoints, effects would be moderate tending to slight or less.

Visual effects as a result of construction activities would detract from the existing views and are therefore considered to be adverse.

Whilst the effects of construction activities are notable and will be adverse in nature, these effects are an inevitable consequence of any development proposal. As such, a proportionate degree of focus is made with the long-term effects of the Proposed Development.

10.4.6 INDIRECT VISUAL EFFECTS

Visual effects by their nature are direct, as a result of the Proposed Development. As such, no indirect visual effects have been identified.

10.4.7 SECONDARY VISUAL EFFECTS

Secondary visual impacts are not considered to differ from those described for the indirect effects.

10.4.8 CUMULATIVE VISUAL EFFECTS

Of the assessment viewpoints, the main location where construction activities and the evolving scheme would be visible in combination with permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), would be viewpoint 19 due to the angle at which these views are obtained. This permitted residential development would be seen at distance and would assimilate into the wider developed built fabric of the village. In terms of its influence on the cumulative baseline, whilst noticeable, this would not notably detract from the prevailing focus of views which would remain with the immediate coastal edge, the upland landscape and the wider seascape.

The magnitude of change as a result of the construction activities associated with the Proposed Development within this cumulative scenario, is assessed as Low, resulting in a Slight effect.

Whilst views are possible from other locations, both of the permitted scheme and the construction activities associated with the Proposed Development, these are seen partially, in opposing parts of the view and often at distance. Given the limited change to the baseline views brought about by the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), it is not considered that effects at any of the other viewpoints would differ from that presented within the main assessment of effects during construction.

Visual effects as a result of construction activities would detract from the existing views and are therefore considered to be adverse.

10.5 IMPACT OF PROPOSED DEVELOPMENT – OPERATIONAL PHASE

The impact of the Proposed Development during the operational phase is presented in the following section.

Reference should be made to the photomontages included at Appendix 10.2 and 10.3 that illustrate the Proposed Development from a variety of locations in the wider landscape during winter conditions and summer conditions respectively.

It is acknowledged that the Proposed Development includes a considerable amount of new planting. Newly planted vegetation takes a number of years to mature and the effectiveness of vegetation will improve over time. In addition to the stock sizes at which planting (and particularly tree planting) would be implemented, growth rates are dependent on a number of species related, climatic and management factors.

The photomontages produced to support the assessment, have modelled vegetation to reflect the anticipated condition of this vegetation 15 years after implementation, by which time planting will have benefitted from a period of establishment and growth. Conservative growth rates of 250-300mm growth per year after an initial 2-year establishment period are reflected in the illustrated material and this is considered to be realistic and achievable. Importantly, when reading the montages, it should be acknowledged that vegetation will continue to grow beyond that shown.

It was considered that providing a photomontage at 5 years post-implementation would not demonstrate the influence or benefits that vegetation would have, and 15 years marks the time at which methodologically effects become long term.

The winter conditions presented in the photomontages ensure the development is seen in the absence of leaf cover. Reference should therefore also be made to the comparative summer views that illustrate the influence of vegetation when in leaf. It is important to note that none of the planting proposed throughout the Proposed Development has sought to fully screen the development. Given the parameters of the site, achieving this would be incompatible with the landscape and visual context and the opportunities to retain and create new views.

As mentioned previously, the approach to the design of the proposed development has been to iteratively incorporate mitigation measures into the Proposed Development being assessed. Appropriate mitigation (in the form of design responses) have been considered in regard to landscape character areas, and views from each of the viewpoint locations (as well as more widely).

The evolving proposal has been subject to extensive consultation with FCC with issues of concern that were expressed during this consultation considered and incorporated as part of design development. These concerns have been collectively discussed within the design team and subsequently incorporated into the Proposed Development being assessed.

The culmination of the pre-application consultations, and the subsequent design responses, was a Pre-Application Consultation submission to The Board which they considered to constitute a reasonable basis for an application. The evolution of the Proposed Development is presented in more detail in Chapter 2 – Project Description and Description of Alternatives.

In reading this section, it should be noted that with the exception of the tree avenue along Howth Road and tree planting along the western edge of the western parkland, all measures to avoid and reduce the landscape and visual effects of the Proposed Development are incorporated within the scheme that forms the basis of the assessment. Section 10.7 discusses mitigation in more detail, with residual impacts presented at section 10.8.

Landscape

In order to present the landscape effects of the Proposed Development, the baseline against which judgements have been made, assume the conditions at the time of survey. It is noted however, that the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) in their reference to "Describing the Significance of Effects", does make reference to "existing and emerging trends". In this regard, the effects of the Proposed Development have been considered in line with a reasonable expectation that the site and the wider environment would be influenced by development in line with its zoning objective in the Fingal Development Plan and the extant planning permission on the site.

Comparative judgements are presented at Appendix 10.5 that seek to help in an understanding of the effects of the Proposed Development against a baseline that has previously been considered acceptable.

10.5.1 DIRECT LANDSCAPE EFFECTS

Landscape Features – land use

Due to the site's derelict, unmanaged and inaccessible character, the sensitivity of the existing land use is considered to be negligible. The Proposed Development will result in a comprehensive change in the land use of the site, as is an inevitable consequence of any similar development project. The magnitude of change is therefore assessed as high resulting in a moderate effect.

The Proposed Development would result in a notable improvement to the site, incorporating opportunities for public recreation and views of the coastline that were not previously available. It also considers the creation of a high-quality sense of arrival into the village. Effects are considered to be positive.

Landscape Features – landform

The landform is recognised to be artificial, by merit of the partial infilling of Claremont Bay to accommodate the railway line in the 19th century and the successional industrial areas of hardstandings. Nonetheless, the generally flat character of the site is typical of the coastal lands at the base of the sloping upland areas. The sensitivity of the topography is considered to be low.

The existing landform of the site will be modified by the Proposed Development, accommodating below ground level infrastructure and changes in level between Howth Road and the walkway implemented along the northern edge of the development. The topography of the site will include interesting topographical landform features in the western parkland and level changes have been used creatively within the Riparian Strip and the Civic Plaza to generate a high quality civic and recreational opportunities. Whilst there will be a greater differentiation in levels across the site, the perception of this will not be notable and would not conflict with the site's relationship with the wider topographical character. All impacts on landform and topography are contained within the site. The magnitude of change is assessed as medium resulting in a slight effect. Effects are considered to be positive.

Landscape Features – urban grain

The built form on the site is of a much larger scale and massing than the urban grain of the surrounding area. Its relative detachedness from the rest of the village, its long blank unanimated facades and negative frontage provides little variation or rhythm to the streetscape. The urban grain is therefore considered to be of negligible sensitivity.

The Proposed Development will replace the existing industrial buildings with new development that is more appropriate to the character of the harbour context to the east of the site. The activation of the street frontage through ground floor entrances, the implementation of a tree lined avenue and the consideration given the staging of the built form along the Howth Road frontage draws reference to the terrace character of the village frontage and provides a sense of legibility across the urban area. The development is also broken down into a series of distinct blocks, with public accessibility available between Howth Road and the northern walkway at several locations along the new street frontage. Through a consideration of the public spaces and the integration of universally accessible routes through the site, the development would be easy to move through and understand.

The magnitude of change to the urban grain of the site is assessed as medium tending to high resulting in a moderate effect. Effects are considered to be positive.

Landscape Features - Vegetation

Vegetation is inherently of high sensitivity to development of this nature. However, in recognition of the unmanaged character and limited quality, vegetation on the site is considered to be of Low sensitivity.

The Proposed Development would result in the comprehensive loss of existing vegetation on the site. This loss is however considered alongside the comprehensive landscape scheme proposed that includes plentiful new tree and shrub planting that will significantly increase the extent of vegetation cover on the site. The soft landscape proposals seek to generate a positive character to the development, create seasonal interest and assist in assimilating the Proposed Development into the surrounding area. The magnitude of change to the vegetation on the site is assessed as high resulting in a moderate effect.

The planting seeks to complement its local context and will provide a successional tree stock, important to the long-term character of Howth Road. In addition, the coherent design-led approach to the planting character, will provide wider public amenity as well as biodiversity benefits. The quality of the effect is considered to be positive.

Landscape Character Area A - Harbour

By merit of its location within the LCA A, the Proposed Development would result in a direct change to the perceived character of this LCA through the replacement of existing derelict industrial built form and areas of unmanaged vegetation with new built form that has been sensitively integrated within a comprehensive landscape scheme. The change in key landscape or visual characteristics and components would substantially be confined to the environs of the site, with other areas of the LCA being influenced more heavily by activity and built form present within the harbour area.

The magnitude of change to the LCA is assessed as medium resulting in a moderate effect. The quality of the effect is considered to be positive owing to the replacement of derelict large scale, industrial buildings with high quality development and public realm that complements the character of the LCA and offers public accessibility and opportunities to obtain views of the sea.

10.5.2 INDIRECT LANDSCAPE EFFECTS

Indirect effects to landscape character are described with reference to other identified areas of landscape character. Effects are not as a result of direct changes to the physical fabric of the landscape but due to the introduction of new features that indirectly influence the perception of landscape character.

From several of the identified landscape character areas, the Proposed Development would not be visible, or would be to such a minimal extent, that it would not result in any discernible change to the prevailing landscape and visual characteristics that define character. For these, the magnitude of change was assessed as negligible resulting in no greater than an imperceptible significance of effect. The quality of these effects was considered to be neutral.

Those for which this judgement was made include:

- Landscape Character Area C Howth Historic Core ACA;
- Landscape Character Area D - St Nessan's Terrace ACA;
- Landscape Character Area E - Nashville Road and Park ACA;
- Landscape Character Area F - Agriculture and Natural scrub;
- Landscape Character Area G - Coastal Headland;
- Landscape Character Area I - Agriculture and Natural scrub;
- Landscape Character Area M - Coastal Beach;
- Landscape Character Area O - Coastal Amenity; and
- Landscape Character Area S - Howth Waters.

A proportionate degree of focus is made with those landscape character areas from which the Proposed Development has the potential to more notably affect character.

Landscape Character Area B - Residential Howth Village

The Proposed Development would only be partially visible from a select number of locations within the village. In these locations, due to the prevailing urban character and the minimal extent to which the development is visible (when considered in the context of other more prominent influences on character), the addition of the new development would not result in any notable change.

The magnitude of change to the LCA is assessed as very low resulting in a Not Significant indirect effect. It is not considered that there would be any readily appreciable influence on the quality of the effects. As such, the quality of the effect is considered to be neutral.

Landscape Character Area H - Heath Land

Whilst partially visible and noticeable from several locations, the development would result in limited change to the perceptual characteristics of this upland area which would remain influenced by the surrounding upland context, climatic conditions and its diverse coastal setting. The development would always be seen at distance and in views over the wider landscape and seascape, the context of which is extensively developed and readily displays evidence of longstanding human intervention in the landscape.

The magnitude of change to the LCA is assessed as low resulting in a slight indirect effect. It is not considered to have the potential to notably alter an appreciation of the upland heathland character or the ability to obtain panoramic views over the wider landscape. As such, the effect is considered to be neutral.

Landscape Character Area - J Amenity Grassland

Whilst visible from certain locations within the LCA, new development would always be seen partially and in the context of a manicured recreational landscape associated with the golf course and other built features present (both within the course grounds and in the wider landscape).

The magnitude of change to the LCA is assessed as low resulting in a slight indirect effect.

Whilst views are heavily influenced by human intervention in the landscape, where the development is visible from the golf course, it is usually seen above the tree line in views towards the sea and Ireland's Eye. As such, effects are considered on balance to be negative.

Landscape Character Area K - Residential Sutton

The Proposed Development would only be partially visible from the immediate locality of Baltray Park and from other more remote locations along the Coast Road. At distance and in the context of other more prominent influences on character (such as the coastal landscape and sea views), the Proposed Development would not result in any notable change to the perception of this extensively developed area.

The magnitude of change to the LCA is assessed as very low resulting in a not significant indirect effect. The quality of the effect is considered to be neutral.

Landscape Character Area L - Howth Castle ACA

Whilst partially visible from the lands surrounding St Mary's Church and in views to the north through the main gates, these would be partial in nature. The large proportion of the LCA would not be influenced due to the degree of vegetative screening and the height of the proposed built form. Where visible, the secluded and quiet characteristics of the LCA would remain unchanged and influenced more heavily by the castle grounds and associated built form.

The greatest influence on landscape character relates to the junction at Howth Road due to the extent to which the built form would be visible. In these locations however, the audible and visual influence of Howth Road and planes on their approach or to Dublin airport are notable in their influence on the time depth character.

The magnitude of change to the LCA is assessed as medium tending to low resulting in a moderate tending to slight indirect effect. This affects only a very small extent of the wider LCA in that part close to Howth Road where the development is visible. Whilst visible, the development would replace a notable landscape detractor in the landscape and would improve the character of views available to the sea through the gates. The quality of the effect is considered to be positive.

Landscape Character Area N - Coastal Amenity

The Proposed Development would be visible at considerable distance and in the context of the Hill of Howth, the wider seascape and Ireland's Eye. Whilst visible, it would result in a very minor change in the prevailing landscape or visual characteristics which would remain more heavily influenced by the coastal environment and these more dominant visual features.

The magnitude of change to the LCA is assessed as very low resulting in a not significant indirect effect. The quality of the effect is considered to be neutral.

Landscape Character Area P - Ireland's Eye

The Proposed Development would be visible at distance, seen in the context of the Hill of Howth, the wider seascape and Ireland's Eye. It would influence the visual interrelationship between the island and its nearest coastline, but this would have a very minor change to the prevailing landscape or visual characteristics which would remain more heavily influenced by its detached, remote character and the qualities of the surrounding coastal environment.

The magnitude of change to the LCA is assessed as low resulting in a slight indirect effect. Whilst visible and noticeable, the replacement of large homogenous industrial built form with a more visually permeable sea fronting development is considered to have a positive influence on the quality of the effect.

Landscape Character Area Q – Agriculture and natural scrub

The Proposed Development would be only partially visible from a negligible proportion of the LCA where it would be seen within the wider urban area of Howth. It would not result in any change to the prevailing landscape or visual characteristics.

The magnitude of change to the LCA is assessed as very low resulting in a not significant indirect effect. The quality of the effect is considered to be neutral.

Landscape Character Area R – Coastal waters and sand flats

This area of character is heavily influenced by natural tidal movements, coastal sand flats and climatic influences as well as active use of this environment. The physical and visual relationship between these coastal waters and the shoreline is heavily influenced by the presence of development along its length.

The magnitude of change to the LCA is assessed as low resulting in a slight indirect effect. Whilst visible and noticeable, the replacement of large homogenous industrial built form with a more visually permeable sea fronting development is considered to be positive.

10.5.3 SECONDARY LANDSCAPE EFFECTS

Secondary landscape effects are not considered to differ from those described for the indirect effects.

10.5.4 CUMULATIVE LANDSCAPE EFFECTS

It is not considered that the Proposed Development would result in any additional effects over those direct and indirect effects reported in light of a baseline that considers the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18) built and operational. The built form included as part of this permitted application would be assimilated into the wider developed built fabric of the village and would have little influence on the baseline against which effects are assessed.

Effects are therefore considered to be consistent with the direct and indirect effects reported for the Proposed Development during operation.

Visual

As with the assessment of landscape effects, the baseline against which judgements have been made, assume the conditions at the time of survey. The effects have been considered in line with a reasonable expectation that the site and the wider environment would be influenced by development in line with its zoning objective in the Fingal Development Plan and the extant permission on the site.

Comparative judgements are presented at Appendix 10.5 that seek to help in an understanding of the effects of the Proposed Development against a baseline that has previously been considered acceptable.

10.5.5 DIRECT VISUAL EFFECTS

Viewpoint 1 – Howth Road

The Proposed Development would create a strong urban edge to the views into and out of the village. Development would be at closer proximity to that present on the site already which is set back. At this proximity the scale of the development inherently represents a notable change to existing views and affects a large proportion of the overall visual composition. The lower staged frontage significantly reduces the prominence of the built form, with taller elements being set back further. In addition, the proposed tree line, together with the activated frontage, allows the primary visual relationship at these proximate locations to be with the ground floor, rather than the more elevated parts of the Proposed Development. At this location, oblique views to the north along the Riparian Strip between blocks A and B would be possible and the separation afforded between the built form would ensure a light open character.

At this proximity, the magnitude of change is assessed as high resulting in a significant effect.

The development frontage on Howth Road has a high design and material quality, commensurate with its gateway location. The lower staged frontage is reflective of the scale of the village frontage along Harbour Road and generates a strong sense of approach into Howth. The high-quality tree avenue (set within a generously proportioned bulb planted verge) would provide a degree of screening to upper parts of the built form, enhance the sylvan character of Howth Road, create strong seasonal diversity and complement the existing tree avenue present within the village core. When considered in the context of the existing visual composition which is adversely influenced by vacant unmanaged commercial/industrial built form, effects are considered to be positive.

Viewpoint 2 – Howth Road

The Proposed Development would represent a notable addition to the existing view. Views would comprise the western elevation of Block A which would appear above the new planting employed along the western edge of the site. Whilst not screening the development, this planting acts to moderate the prominence and perceived scale of the built form and introduce it more gently within views.

Although the scale of the development is notable, particularly in relation to the nature of the built form lining Howth Road to the west, its scale draws reference to (and appears within) the tree line marking the southern edge of Howth Road and the foreground vegetation along the Northern edge of Howth Road. Its scale, whilst prominent at this proximate location, has been considered such that it does not dominate the view. The change to the view would be consistent with trends for development on the site.

The magnitude of change is assessed as medium tending to high resulting in a moderate effect.

The built form through its scale and architectural character would generate a high-quality frontage to the village and generate a strong gateway character. Views to Ireland's Eye would be retained at this nodal location through the consideration given to the disposition of planting which would soften views of the development and enhance the vegetated composition of the view in a way that is characteristic with the vegetation character of the peninsula. Effects are considered to be positive.

Viewpoint 3 – Howth Road

Although the western end of Block A is noticeable through the intervening tree line (in winter), the built form would appear within the context of the natural treeline which provides a moderating reference scale for the development. Views of the Proposed Development would be heavily screened by intervening vegetation in summer months. From this location, the Proposed Development would result in a small change to the overall visual composition which would remain more heavily influenced by the immediate streetscape and the vegetated uplands to the south. The magnitude of change is assessed as medium resulting in a moderate – slight effect.

Whilst the scale of the building is notable, its scale facilitates a strong sense of approach and destination where this is not present. The changes do not result in any readily appreciable influence on the quality of the effects. Effects are considered to be neutral.

Viewpoint 4 – Howth Road

The Proposed Development is not visible from viewpoint 4. As such there is an imperceptible effect.

Viewpoint 5a-5b – View north on the exit from Howth Castle

At the most southerly point of the protected view (as illustrated by viewpoint 5a), although the western parkland would be visible, views of Block A are screened by the intervening vegetation. With increasing proximity to the gate (as illustrated by viewpoint 5b), the Proposed Development becomes more visible but is partially screened by existing and proposed vegetation in such a way as to moderate its scale and influence on the overall visual composition.

The western edge of Block A has been set back so as to retain views to the sea and afford the gate pillars, and the space between them, a strong degree of prominence. Visual connectivity with the sea is retained to the same extent to which it is currently.

The development would bring about a small change in the overall visual composition, resulting primarily from the changes to the western parkland which is visible in the space between the gate pillars. The proportion of the view influenced by the development would be consistent with approved development on the site.

The magnitude of change is assessed as low resulting in a slight effect.

The area of open space enhances views and affords improved visual relationship with the sea through the gate pillars. Effects are considered to be positive.

Viewpoint 5c-5d – View north on the exit from Howth Castle

At viewpoints 5c and 5d, Block A would become increasingly present in the view. At this proximity, the scale of the development would inherently represent a notable change to existing views and would affect a large proportion of the overall visual composition (albeit consistent in extent with approved scheme on the site). However, its scale would not have an overbearing or dominant influence on the view, and from the gates, the materiality and character of the built form would ensure that the primary focus of the view remained with the gate pillars.

Visual connectivity with the sea is retained to the same extent to which the extant permission does currently, and views still retain a partial sea view. With increasing proximity to the road, whilst the development comprises a larger proportion of the view, the visual relationship with the gate's ceases (in views to the north) and the relative visual connectivity with the sea decreases. With proximity, the integrity of the visual experience is heavily influenced by the audible and visual influence of Howth Road.

The magnitude of change is assessed as medium tending to high resulting in a moderate effect.

The frontage of the Proposed Development and the western area of public open space has a high design and material quality. The rounded forms within the building complement the character and materiality of the gate pillars. The area of open space facilitates an improved visual relationship with the sea from more elevated locations and an improved relationship with the landscape between the gates and the coastline which is currently unmanaged. Effects are considered to be positive.

Viewpoint 6a – View from road leading to Howth Castle at its intersection with Howth Road.

At this proximity, the Proposed Development would represent a notable change to the existing view given the screening provided by the large conifers on the site and the relationship between the development and the road. The scale and proportionality of the built form has been moderated by the approach taken to a staged height along Howth Road and with the recurring finger blocks creating a simple and consistent rhythm to the streetscape. The scale of the development ensures that the spire of St. Mary's Church retains a strong degree of prominence. The scale of the development would not have a dominating or overbearing influence on the overall view with a reference scale that is consistent with the tree line lining Howth Road. The magnitude of change is assessed as medium to high resulting in a moderate effect.

The development frontage on Howth Road has a high design and material quality, reflective of the town frontage character present in the village. It provides a strong sense of approach into Howth, with the high-quality tree avenue (set within a generously proportioned verge) enhancing the sylvan character of Howth Road. Effects are considered to be positive.

Viewpoint 6b – View at the northern façade of St. Mary's Church

The development would be partially visible through (and in places above) the intervening tree line bounding Howth Road to the north. This tree line filters views and moderates the scale and prominence of the built form. Whilst visible, the finger block structure and light materiality reduces the mass and prominence of the built form, ensuring a key visual focus would remain with the church and its grounds. Although of marginally increased height over that approved, the change would be consistent with development on the site which would be visible through and in places above the tree line.

The magnitude of change is assessed as medium resulting in a moderate effect. Effects would be further moderated by the screening provided by the intervening vegetation in summer.

The inclusion of development is considered by default to be negative given the absence of development in the existing view. However, the simple form and materiality ensures the focus of views remains with the church building and the horizontal features within the built fabric provides subtle and sensitive continuity with the architectural character of the church.

Viewpoint 7 and 8 - Howth Village looking west

At this proximity, the scale of the development would inherently represent a notable change to existing views and would affect a large proportion of the overall visual composition (albeit consistent in extent with approved scheme on the site). However, the prominence of the built form and its relationship with the surrounding built context would be moderated by the clear architectural definition between the upper and lower building levels, this feature acting to break up the volume of the built form. In addition, the activation of the ground floor frontage, together with the proposed tree planting and civic space, make the primary visual relationship at these proximate locations with the ground floor, rather than the more elevated parts of the Proposed Development.

Trees planted along Howth Road will also provide an intermediary scaling reference, acting to buffer to the difference in scale. Whilst notable, its scale would not have a dominating or overbearing influence on the overall view with a reference scale that is closely related to the surrounding tree line.

In locations between the site and Howth Railway Station where the Former Station Master's House is visible (as represented by viewpoint 8), through the consideration of architectural treatments and the subdued material character, the influence of the Proposed Development is moderated and allows the built heritage to retain a strong degree of prominence.

The magnitude of change is assessed as medium to high, resulting in a significant-moderate effect. Whilst notable, due to the proximity of the views, the change and effects are considered to be consistent with emerging trends for development on the site and so effects are considered to be at the Moderate end of Significant.

In locations closer to the Railway Station, views would be influenced less by the Proposed Development due to the screening afforded by the intervening built form.

The high-quality nature of both the architecture and public realm would significantly enhance views which are currently dominated by vacant derelict buildings and areas of hardstanding. The development would generate a positive new street frontage that would bring the surrounding built form into a defined streetscape. There would be a strong ground floor relationship between the existing and proposed built form through the incorporation of civic space and retail units. The recurring blocks create a simple and consistent rhythm to the streetscape with changes in building height being indiscernible due to the effects of distance. The contemporary architectural character and high-quality materiality would provide positive enhancements to views and would complement the character of existing built form.

Effects are considered to be positive.

Viewpoints 9 – Harbour Road

At the junction between Howth Road, Harbour Road and West Pier, whilst the development would be visible, it would form a minor part of a wider urban context and bring about a small change in the overall visual composition. Its scale would be moderated by the three-storey commercial building in the foreground and would (in conjunction with this building) providing a degree of continuity to the streetscape in views to the west. The magnitude of change is assessed as low resulting in a slight effect.

The quality of the effect is considered neither positive nor negative. Effects are considered to be neutral.

Viewpoints 10 & 11 – Harbour Road

From viewpoint 10, whilst the development is visible, the overall change in the view is barely discernible in the wider urban context. The magnitude of change is assessed as very low resulting in a not significant effect. The quality of the effect is considered neither positive or negative and so is considered to be neutral.

The Proposed Development is not visible from viewpoint 11. As such there is an imperceptible effect.

Viewpoint 12 – West Pier

The development would be a notable new feature in the existing view. Although of a notable scale, the prominence of the Proposed Development is moderated by coastal development (such as the Howth Lodge Apartments to the western end of Claremont Beach) and that which occurs along the entirety of the coastal horizon to the west. Although the development is acknowledged to marginally break the tree line, this is comparable in extent to other development along the coast and would not significantly alter an understanding of the general topography from this location.

It is recognised that the development would obscure views of St. Mary's Church Spire. Whilst this is an adverse impact, it is noted that because of its vegetated backdrop, the spire holds a limited degree of prominence than in other locations to the west and to the south of the church. It is also not considered that the appreciation of the spire is particularly valued influence from this location as opposed to views of the harbour area, the wider coastal context and Ireland's Eye (refer to Figure 10.5 at Appendix 10.1 for context photography).

The Proposed Development would not detract from the overall visual experience, the scale and sweeping character of the coastal environment, with views retaining a strong focus with the wider seascape and harbour contexts.

The magnitude of change is assessed as medium resulting in a moderate effect.

Whilst there are aspects of the Proposed Development that may be considered negative, the scale and quality of the built form facilitates a strong seafront character that notably improves the character of views in this direction which are currently defined by large vacant industrial units and the rear working areas of buildings that line the western pier. Effects are considered to be neutral.

Viewpoints 13 & 14 – East Pier

Whilst the development would be partially visible, the extent to which it would influence views is heavily moderated by the foreground-built context on the western pier and the marina environment that is dominated by yacht masts. The primary focus of views would remain with the immediate harbour, lighthouse and pier and with the wider seascape and the development would not restrict an appreciation of these features. The development would bring about a small change in the overall visual composition. The magnitude of change is assessed as low resulting in a slight effect.

The quality of the effect is considered neither positive nor negative. The development would be amalgamated within the urban context. Effects are considered to be neutral.

Viewpoint 15 –Martello Tower

Although noticeable in the view, the extent to which the development would alter the overall composition of views is minimal. The scale and light finishes allow it to integrate into its wider urban context. Other built foreground elements would be comparatively prominent, and the prevailing focus would remain with the immediate village setting and the wider seascape/coastal landscape.

The magnitude of change is assessed as low resulting in a slight effect.

The quality of the effect is considered neither positive or negative and the development would be amalgamated within the urban context. Effects are considered to be neutral.

Viewpoints 16a – Deer Park Golf Course

The upper parts of the built form in the westernmost part of the site would partially appear above the tree line that forms the backdrop to Howth Castle. The extent of the built form visible would be negligible and Howth Castle would remain the predominant visual feature. As vegetation comes into leaf, it is anticipated that the development would be screened. The Proposed Development would bring about a minimal change in the overall visual composition which may not readily be appreciated. The magnitude of change is assessed as very low resulting in a not significant effect.

From this location, the addition of built form is not considered to result in any improvement to the view. Due to its visual relationship with the castle, effects are considered by default to be negative.

Viewpoints 16b – Deer Park Golf Course

A very small part of the Proposed Development would be visible above the tree line. In the context of the immediate golf course context which includes the car park and clubhouse, the minimal extent to which the development would be visible would not result in any meaningful change to the overall visual composition. The magnitude of change is assessed as very low resulting in a not significant effect. Effects are considered to be neutral.

Viewpoints 16c-d –Deer Park Golf Course

The Proposed Development is not visible from viewpoints 16c and 16d. As such there is an imperceptible effect.

Viewpoint 17 –Muck Rock

The elevation and exposure afforded by this location allows expansive panoramic views over the wider peninsula with views extensively influenced by urban development and man-made features (refer to Figure 10.5 at Appendix 10.1 for context photography). The development would be seen in views to the north above the tree line bounding Howth Road within the backdrop to views of Howth Castle and St. Mary's Church.

Whilst the finger block form of the development would form an easily identifiable component in the view, the visual permeability afforded by the slender finger blocks allow views through to the coastal backdrop. The degree to which the built form is noticeable is strongly influenced by the tidal state, with low tide conditions and a sand backdrop resulting in a comparatively reduced visual effect (reference should be made with the summer photomontage included at Appendix 10.3). At all times, the Proposed Development is set within the context of extensive developed coastal lands and is not considered to notably alter the scale and composition of the wider panoramic view.

The magnitude of change is assessed as medium to high resulting in a moderate effect.

From this location, the addition of built form is not considered to result in any notable improvement to existing views. By merit of its visibility above the tree line that forms the backdrop to Howth Castle and St. Mary's Church, effects are considered by default to be negative. This finger block form and the consideration given to materiality allow both Howth Castle and the spire of St. Mary's Church to maintain a degree of prominence.

It is acknowledged that development above the tree line is consistent with change on the site including that previously approved.

Viewpoint 18 – Dungriffin Villas

A very small part of the Proposed Development would be visible above the tree line. Whilst resulting in some change, this would not be readily discernible and would have minimal influence on the overall composition of the view. Views in summer would be further minimised. The prevailing focus remains with wider seascape/coastal views, the immediate heathland and the harbour.

The magnitude of change is assessed as low resulting in a slight effect.

The quality of the effect is considered neither positive or negative and the development would be amalgamated within the urban context. Effects are considered to be neutral.

Viewpoint 19 – Kilrock

Although noticeable in the view, the extent to which the development would alter the overall composition of views is minimal. The scale of the development and the muted materiality allow it to integrate into its wider urban context. Other built foreground elements would be comparatively prominent, and the prevailing focus would remain with the immediate coastal edge, the upland landscape and the wider seascape.

The magnitude of change is assessed as low resulting in a slight effect.

The quality of the effect is considered neither positive or negative and the development would be amalgamated within the urban context. Effects are considered to be neutral.

Viewpoints 20a & 20b – Baldoyle Bay and Ireland's Eye

In views from the sea to the north, the Proposed Development would be seen at the base of the distinctive upland landscape that dominates the skyline in this direction. It would also appear along the developed coastal edge, replacing the derelict industrial infrastructure. The slender nature of the built form would allow a high degree of visual permeability to the background vegetation which would act to reduce the mass and prominence of the built form.

Although noticeable, the extent to which the development would alter the overall composition of the coastal views is not considered to be notable and it would bring about a small change in views which are dominated by the expansive seascape context and the distinctive landform of Ireland's Eye and the Hill of Howth. The magnitude of change is assessed as medium to low resulting in a moderate effect.

At distance, the character and quality of the development would contribute minimally to the quality of the view. However, the character of the development when viewed from the sea would provide structure and consistency to this part of the coastal frontage that is currently defined by large derelict industrial infrastructure. Effects are considered to be neutral.

Viewpoint 21 – Strand Road, Baldoyle

The Proposed Development is not visible. As such there is an imperceptible effect.

Viewpoint 22 – Portmarnock Golf Course

Although noticeable in the view, the extent to which the development would alter the overall composition of the coastal views is minimal. At this distance (and without breaking the landform), the expansive seascape context and the distinctive landform of Ireland's Eye and the Hill of Howth prevail. Although development would be both visible and noticeable, it would bring about a small change in the overall visual composition and as such this change is not considered to be notable. The magnitude of change is assessed as Low resulting in a Slight effect.

At distance and in the context of a wider developed coastline and other more prominent visual characteristics, the development would have neither a positive nor negative influence on the view. Effects are considered to be neutral.

Cluster of properties to the east of the site.

In addition to the viewpoint assessment produced for viewpoints 7 and 8, given the proximity of the small cluster of residential properties to the eastern end of the site, visual effects are presented. Refer to Figure 10.1 at Appendix 10.1 for locations.

Dwelling 'Ashbury' and Former Station Master's House

Dwelling 'Ashbury' is the closest residential building to the site and is 12.9m from the edge of Block D. It is separated from Block D and the public walkway by a secured green space which is afforded passive surveillance from the retail unit and residential units. The only window facing the site is a frosted glass window, the scale and nature of which is assumed to relate to a bathroom / utility room rather than a primary habitable room or living space. Other windows orientate away from the Proposed Development.

The Former Station Master's House is orientated on a south west to north east angle with no façade directly facing towards the site. Views are likely to be available from a single window on the south western façade and a single window on the north west facing façade (the latter of which would be partially screened by the adjacent property) although views would be oblique in nature.

At this proximity, the development would be prominent, however views would be oblique in nature with the scale of the development moderated by the staging employed at the eastern edge of Block D such that it is not dominant or overbearing.

The magnitude of change is assessed as medium to high, resulting in a significant-moderate effect. Whilst the Proposed Development would have a strong influence on the views due to its proximity, the change and effects are considered to be consistent with emerging trends for development on the site and so effects are considered to be at the Moderate end of Significant.

Considering the proximity at which views would be obtained, and the comparatively limited contribution the site currently plays in terms of views from these properties (relative to properties opposite which face towards the site), the Proposed Development is not considered to offer any noticeable enhancement to views from within these properties or their curtilages, relating primarily to the eastern elevation of Block D.

Nonetheless it is recognised that the high-quality contemporary nature of the architecture would improve the character of the built form from the derelict built form that occupies the view and would be

Effects are considered on balance to be adverse.

Dwelling 'Evor Loder' and 'Aberdelgie'

These properties are located between approximately 22 and 30m distant from Block C. They are separated from the development by the intervening grass area in front of the properties, Howth Road, the proposed 3m tree lined verge and the civic space in front of the Anchor Retail Unit.

The front elevation of these properties orientates directly towards the site. Whilst the trees planted along Howth Road would provide an intermediary scaling reference and a degree of screening towards the development, the development would appear prominently in views to the north.

The architectural approach to the slender finger blocks would allow the development to have a lighter and less dominant influence on views when compared to the extant scheme that presented a block mass of built form. This approach would also draw a greater degree of prominence to the lower staged frontage and Civic Plaza.

The magnitude of change is assessed as medium to high, resulting in a significant-moderate effect. Whilst the Proposed Development would have a strong influence on the views due to its proximity, the change and effects are considered to be consistent with emerging trends for development on the site and so effects are considered to be at the Moderate end of Significant.

Whilst the Proposed Development occurs in close proximity, the high-quality contemporary nature of both the architecture and public realm would significantly enhance views which are currently dominated by vacant derelict buildings and areas of hardstanding. The development would generate a positive new active street frontage with a strong ground floor relationship between the existing and proposed built form through the incorporation of civic space and planting. Views from these properties would be over the Civic Plaza with views created towards the Howth Railway Station Signal Box where this is obscured.

Effects are considered to be positive.

Dwelling 'Oakdene' and Marine Villas Apartments

These properties are located approximately 45m distant from the south western corner of Block D and orientate directly towards the site. Views of Block D would be seen in the context of the intervening grass area in front of the properties, Howth Road and the civic space in front of Retail Unit 01.

The prominence of the built form would be moderated by the clear architectural definition between the upper and lower building levels, this feature acting to break up the volume of the built form and draw the focus of the view to the ground level.

Whilst notable, its scale would not have a dominating or overbearing influence on views from the properties and effects are considered to be consistent with those described for viewpoint 7 given its location.

The high-quality nature of both the architecture and public realm would significantly enhance views which are currently dominated by vacant derelict buildings and areas of hardstanding. The development would generate a positive new active street frontage with a strong ground floor relationship between the existing and proposed built form through the incorporation of civic space and tree planting. The contemporary architectural character and high-quality materiality would provide positive enhancements to views and would complement the character of existing built form.

Effects are considered to be positive.

10.5.6 INDIRECT VISUAL EFFECTS

Visual effects by their nature are direct, as a result of the Proposed Development. As such, no indirect visual effects have been identified.

10.5.7 SECONDARY VISUAL EFFECTS

Secondary visual impacts are not considered to differ from those described for the indirect effects.

10.5.8 CUMULATIVE VISUAL EFFECTS

Of the assessment viewpoints, the main location where the Proposed Development would be seen in combination with permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), would be viewpoint 19 due to the angle at which these views are obtained.

This permitted residential development would be seen at distance and would assimilate into the wider developed built fabric of the village, with much of the village frontage separating this development from the Proposed Development. In terms of its influence on the cumulative baseline, whilst noticeable, this would not notably detract from the prevailing focus of views which would remain with the immediate coastal edge, the upland landscape and the wider seascape.

The magnitude of change as a result of the Proposed Development within this cumulative scenario is assessed as remaining Low and resulting in a Slight effect.

At distance and in the context of a wider developed coastline and other more prominent visual characteristics, the development would have neither a positive nor negative influence on the view. Effects would be neutral.

Whilst views of both this permitted scheme and the Proposed Development from other locations are possible, these are seen partially, in opposing parts of the view and often at distance. Given the limited change to the baseline view brought about by the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), it is not considered that effects at any of the other viewpoints would differ from that presented within the main assessment of effects.

10.6 'DO NOTHING' IMPACT

The 'do nothing' impact presents the situation or environment that would exist if the Proposed Development were not carried out. The invariable consequence of this would be that the impacts and effects identified would not occur. The site would continue to exist as a vacant and inaccessible brownfield site at the entrance to Howth and continue to contribute negatively to the landscape and visual amenity of the locality.

Little evidence of any management regime and the deteriorating nature of the buildings and features on the site would also strongly suggest that the site, and features within it, would remain minimally managed. In such circumstances existing vegetation (as well as weed and pioneer vegetation species) are likely to continue to establish and existing features and built form likely to deteriorate further.

This neglected and unoccupied condition would not only continue to be detrimental to the character of the village at its primary entrance but like many similar vacant sites may provide opportunities for antisocial behaviour and illegal waste disposal.

In the event that the development does not proceed, it is likely that the subject site would be developed in the future for some residential and open space use, in line with its zoning in the Fingal Development Plan.

A comparative LVIA is presented at Appendix 10.5. This considers the comparative influence of the Proposed Development in the context of a developed baseline which could reasonably be present on the site.

10.7 MITIGATION MEASURES

10.7.1 CONSTRUCTION PHASE

Effects during construction will be highly variable as features on the site are removed and proposed new features are built. Site entrances, compound areas (with associated buildings, car parking, material stores), tower cranes and scaffolding will be visible during the construction phase as is an inevitable consequence of any development proposal of this nature and will result in landscape and visual effects. So too will the increased activity at the site as a result of deliveries, the importation of materials, and the arrival of workers and site personnel.

Construction phase mitigation measures that would ordinarily be proposed to mitigate landscape and visual effects relate to the implementation of appropriate site management procedures, such as the control of lighting, storage of materials, placement of compounds, control of vehicular access, effective dust and dirt control measures, hours of working etc. These procedures are industry best practice construction standards and are inherent within the proposed Construction Management Plan.

It is noted that standard site hoarding proposed through the Construction Management Plan will moderate the degree to which the ground level works, and excavation can be seen from close proximity receptors. In itself, site hoarding is not considered to notably affect the scale of the effect which would remain influenced by tower cranes and taller building elements.

Construction activities at the western end of the scheme will have notable influence on views into the village from Howth Road and from the approach road to Howth Castle when travelling north. Given that this part of the site relates to the proposed western parkland, it is the most suitable location for a site compound and storage area and will allow work to be undertaken progressively through the site with minimal interim changes to the layout of the construction site. This is therefore an inevitable consequence of the measures taken to mitigate the influence of the Proposed Development on these views by the creation of the western parkland.

Construction effects from a landscape and visual perspective are not considered to differ in any meaningful way from those that have been found to be previously acceptable at the site. In addition, the site’s zoning objective demonstrates an acceptance in principle that construction activities will occur. From a landscape and visual perspective, FCC did not raise any concerns during the course of pre-application consultation on the construction stage, with a greater degree of focus placed on the permanent features of the development.

No specific construction phase mitigation measures are proposed.

10.7.2 OPERATIONAL PHASE

Embedded mitigation

With the objective to develop context sensitive mitigation measures that will avoid, reduce or remediate adverse landscape and visual impacts, it is recognised that the development layout, architectural character, external spaces and material treatments associated with the Proposed Development have been developed as part of an iterative approach to design and assessment.

Design development considered the impact of the evolving proposal on landscape character and on views experienced from the wider landscape, including those locations where there was a map map-based objective ‘to preserve views’.

This approach has drawn reference to baseline studies and various technical specialist inputs, such that the proposals are grounded in, and respect, the key characteristics of the receiving landscape and visual environment. These considerations have been developed iteratively throughout the design process and are therefore inherent within the Proposed Development being assessed.

The evolving proposals have been subject to consultation with FCC with issues of concern expressed during this consultation considered and incorporated as part of design development. These discussions included the reduction in the maximum proposed height, to that which was the preference of FCC.

The culmination of these discussions was a Pre-Application Consultation submission to The Board which they considered to constitute a reasonable basis for an application. The evolution of the Proposed Development is presented in more detail in Chapter 2 – Project Description and Description of Alternatives.

From a landscape and visual perspective, in addition to the commitment to establishing a high design and material quality and positive areas of open space, there are numerous design responses that have been employed to mitigate potential landscape and visual effects.

Height

The height of the proposed development has been considered carefully in line with extant permissions on the site with the maximum height of the built form being similar to those permitted under F11A/0028 and lower than those granted under F08A/1172. As part of the iterative design process, it was considered from close proximity locations along Howth Road and within the village as well as more distant locations.

During the pre-application consultations, the evolving scheme was presented. In reviewing the evolving proposals from the viewpoint locations FCC made it clear that their preference was for 7/8 storeys to be considered a maximum. In direct response to this, the height of the development was reduced, including the removal of an entire floor from the western block.

A measure that was taken early in the process to reduce the perceived height of the built form from close proximity locations on Howth Road, was the configuration of the Howth Road frontage to accommodate a ribbon of ‘town scale’ duplex units in order to break down the scale of the taller built elements and be of a height that is consistent with the village frontage and proportionate to the character of the approach road into the village.

In terms of the taller building elements, the height of the built form has considered the existing tree line that bounds Howth Road (as demonstrated by viewpoints 2, 3 6a and 6b). A height has been determined that marks what will be the new urban threshold of the town but is consistent with the scale of the immediate landscape context as defined by this contextual tree line that provides the reference scale.

Beyond a relatively short distance, the difference in height between that proposed and the extant permission on the site are negligible and difficult to discern in the context of wider panoramic views. In these more distant locations (as demonstrated by viewpoints 17-22), the influence of the Proposed Development on views reduces and other more dominant influences on views prevail.

Relationship with topography

Careful consideration has been given to the relationship between the built form and the topography of the wider peninsula. The distribution of height along the development from east to west has sought to reflect the rise and fall of the wider topography of Howth Head when viewed from locations in the wider landscape.

This was considered from all locations but is particularly relevant to views from the sea and Ireland's Eye (as represented viewpoints 20a/b) and from the north west (as represented by viewpoint 22). Although the built form is noticeable, the distribution of the development has sought to complement the distinctive wider landform of the peninsula.

As mentioned previously, the proposed development has been considered alongside the existing tree line that bounds Howth Road. From close proximity locations, this tree line defines the topography of these lower developed vegetated coastal areas (relative to the sharper undeveloped heathland character of the upland areas) and so the height of the built form, relative to this vegetation, is considered to relate with the prevailing topography.

Relationship to context

The stepped-terrace approach with a decrease in height towards Howth Road has sought to generate a strong physical relationship between the development and the prevailing sylvan character of Howth Road as well as enabling the development to relate closely with the scale and character of the village frontage.

In conjunction, the creation of a vegetated tree lined avenue character along Howth Road would enhance this sylvan character and channel the visual relationship from Howth Road to the lower activated building frontage, thereby reducing the prominence and visual impact of the taller building elements. This avenue would be consistent with the avenue character present along Harbour Road (in line with objective GI36 of the development plan).

Whilst the design of the external spaces around the built form primarily influence the immediate locality, it is recognised that the site holds a key gateway location at the entrance to the village and plays an important role in terms of generating a sense of arrival. Through the combination of building façade treatments, ground floor building uses, hard landscape treatments and planting, an increasingly civic character has been generated towards the village from west to east.

In addition, hard and soft landscape treatments have been employed to marshal a change in character between the sylvan character of Howth Road and the more exposed coastal context along the northern promenade (south to north).

Whilst it is not considered to be a specific mitigation response, an opportunity was identified to generate a new vista towards St. Mary's Church Spire from the Northern Promenade (in line with objective GI34 of the development plan). Appropriate consideration has been given to the layout of the development, so as to allow the appreciation of this view from the northern promenade.

Massing

The consideration given to the distribution of height in 'finger blocks' has been employed to reduce the perceived block massing of built form when viewed from the wider landscape as well as to maximise the amount of sunlight penetration to courtyards and the Northern Promenade.

This approach was considered with reference to the previously permitted scheme which had a much stronger horizontal massing. In many locations, but particularly pertinent to locations to the north and south (as represented by viewpoints 20a/b and viewpoint 17 respectively), this approach acts to reduce the perceived mass of the built form by increasing the degree of visual permeability through the built form.

The monolithic form presented at the fourth pre-application consultation meeting was amended following concerns about this architectural approach and the perceived mass of the built form as viewed from Howth Road. In addition to the reduction in height, the introduction of strong horizontal elements was employed to help break down its massing and articulate appropriate verticality in a way that complements the horizontal nature of the proposal.

Urban grain

As previously mentioned, the approach to the continuous ribbon of 'town scale' duplex units along Howth Road generates a strong and activated building frontage that presents itself as a village terrace. The scale and character of this frontage has been designed so as to be complementary in character with the village frontage along Harbour Road, providing a degree of physical and visual integration between the site and the village frontage where this is currently detached in nature. The layout of the development has been designed as a series of blocks with legible connectivity provided at various points between Howth Road and the northern promenade, therefore breaking down the physical grain of the developed site.

The relationship between the Proposed Development and the external spaces has been considered carefully in order that it would be easy to move through and understand. Detailed consideration of levels ensures that routes are available through the development, which are universally accessible.

Protected views

The wider peninsula contains many locations that have a map-based objective 'to preserve views', the objective of which is to protect views that contribute to the character of the landscape. In undertaking the LVIA, viewpoints were selected that represented views from a variety of locations and distances and from an early stage in the design process influenced the design of the scheme.

With distance, beyond the height of the proposed development and the distribution of this height, very little in the way of mitigation is possible to mitigate the effects of the proposed development. In this regard, the height of the built form was considered so as to be similar to that which was previously approved, and the finger block character allows a visual permeability between the taller building elements which reduces its perceived mass and visual impact, most notably from locations to the north and south. In terms of protected views, this is demonstrated by viewpoint 17.

Concerns were raised by FCC at the meeting held on 26/02/2019 in regard to the views to the north from the approach road to Howth Castle which has a map-based objective 'to preserve views'. The scheme presented incorporated an area of parkland at the western end of the scheme that allowed a visual relationship with the sea to be maintained along this route. However, the western part of the site was still considered to be of concern due to the size, scale and mass of the built form and its influence on views along this route.

As a result of this concern, the height of the built form was reduced and the entirety of the proposed built form was moved to the east in order that the incursion into this view by the western end of the development was consistent with (and marginally improved on) that which was previously considered appropriate.

Assessment viewpoints were identified at four points along this route (viewpoints 5a-d) to help demonstrate the changing influence of the proposed development. In addition, both winter and summer conditions were reviewed such that this change considered the effects of winter leaf loss appropriately.

In considering the extant permissions on the site, a key change was employed in terms of the vehicular points of entrance. The permitted scheme had a key vehicular access point at this western end of the development which would be visible in views to the north from this location. In order to moderate the visual impacts, the proposed entrances are located further to the east, minimising the extent to which vehicular activity influence the view to that which exists at present, with the exception of the required layby proposed.

In terms of the western parkland, detailed consideration was also given to the nature of the views towards the sea. The distribution of tree planting was considered so as to maintain a visual connectivity with the sea and to 'frame' this view at locations at the southern end of the route. In addition, the consideration given to landform elements has sought to partially screen play equipment and activity within the play areas so as to improve the integrity of the view to the sea with fewer distracting foreground elements.

Views from Howth Road on arrival and departure from the village

Views were considered from all locations in the wider study area and measures employed (in terms of the height and distribution of height) to moderate the landscape and visual impact of the Proposed Development. In recognition of the strategic importance the site has in terms of its location at the entrance to the village, the development was considered carefully in terms of its impact on the character of the Howth Road approach and on proximate views experienced from it.

As mentioned previously, the staging of the development frontage along Howth Road was a key mitigation response to reduce the influence and visual impact of the built form and to complement the built form present along the village frontage. The incorporation of ground floor entrances has sought to activate this frontage such that it presents itself positively on the approach to the village and increases the level of activity at ground level, a feature that will encourage the principle visual relationship to be with the streetscape.

The location of the development and the distribution of trees within the western parkland was considered in detail in order to maintain visual connectivity with Ireland's Eye from Howth Road near the junction of Howth Road and the access to Howth Castle and St. Mary's Church (as represented by viewpoint 2), a characteristic that was considered important to the approach to the village at this location.

Mitigation measures considered in relation to residual effects

A key element of the landscape proposals relates to the proposed planting within the external areas of the Proposed Development. Planting serves differing purposes around the site, and together with other aspects of the public realm seek to enhance the development and its external areas as would be expected of most development proposals. This proposed planting however would have limited influence on the effects on landscape and visual receptors in the wider landscape.

In considering specific mitigation measures, whilst tree planting along Howth Road and within the western part of the site would not screen the development fully (nor would any tree planting within the site), it is considered to be of particular importance in moderating the adversity of visual impacts on the approach into the village, generating a strong sense of approach at this primary gateway location and integrating the development with the sylvan character of Howth Road. As such, the only feature of the Proposed Development which (for the purposes of assessment) is considered to be mitigation, is the tree planting and earthworks along the western edge of the site and the tree avenue along Howth Road.

Landscape and Visual MM OP 1
Tree planting will be undertaken along Howth Road and within the western extent of the site in order to moderate the adversity of visual impacts on the approach into the village, generate a strong sense of approach at this primary gateway location and to integrate the development with the sylvan character of Howth Road.

10.7.3 MONITORING

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified professional and planting works undertaken during the planting season, on completion of civil engineering and building work.

All landscape works will be subject to an establishment phase where monitoring of the mitigation measures will form part of the ongoing landscape management. This will include the appropriate and timely replacement of planting failures. Prior to completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place.

10.8 RESIDUAL IMPACTS

The EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, Draft (2017) describe 'Residual Effects' as the degree of environmental change that will occur after the proposed mitigation measures have taken effect.

10.8.1 CONSTRUCTION PHASE

From a landscape and visual perspective, construction stage effects will be highly variable throughout the short term construction period and will result from the removal of existing built form, the presence of tower cranes (amongst other plant), increased activity at the site, construction site hoarding and infrastructure and the evolving built form.

It is not always possible, practical or appropriate to mitigate all effects during construction, an example being the presence of tower cranes for which there is little that can be done to mitigate their visual impact. These features and their resulting effects are an inevitable consequence of the development proposed, and as previously described no specific construction stage mitigation measures are proposed (that would result in the avoidance or reduction of the effects previously reported) above those that are proposed within the

Construction Management Plan and those that would be employed on any site as part of general site management.

Residual landscape effects

No significant residual landscape effects were identified.

The construction phase would involve the comprehensive removal of existing features on the site. This would be restricted to the land within the boundaries of the site and will influence only the character of the immediate site. None of the existing features on site are considered to be of any notable quality or amenity value.

Residual Moderate direct effects on LCA A would occur primarily as a result of removing existing built form and features on the site, and construction phase activities.

Residual Moderate indirect effects to LCAs B-E, J, K (albeit only a small part), L and R occur as a result of the indirect influence of the removal of built features on the site, crane activity and the emerging built form.

Residual indirect effects on other LCAs would be Slight or lower.

Effects are considered to be adverse during construction, albeit these would be short term and temporary during the construction phase and would include the removal of landscape detractors.

Residual visual effects

Residual significant effects were identified at 8 of the 30 viewpoint locations, namely viewpoints 1, 2, 5c, 5d, 6a, 6b, 7 and 8. These relate to proximate locations near to the site where the intensity of the activities and the scale of the construction plant would result in notable changes to existing views.

Residual Moderate effects were identified at 10 of the 30 viewpoint locations, namely viewpoints 3, 5a, 5b, 9, 12, 16b, 17, 18 and 20a/b. Again, these relate to views obtained from nearby locations along Howth Road and within the surrounding landscape where the influence of construction related activities on the site and the prominence of cranes would be most notable.

Residual Moderate-slight effects or less were identified at the remaining 12 viewpoint locations.

Effects are adverse but are short term and temporary and an inevitable consequence of any comparable development proposal at this proximity. Visual effects as a result of construction activities are considered to be adverse.

Residual cumulative landscape effects

Given the limited change to the baseline views brought about by the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), cumulative landscape effects are not considered to differ from the main assessment of effects.

Residual cumulative visual effects

Cumulative effects at viewpoint 19 would be Slight. Given the limited change to the baseline views brought about by the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), cumulative visual effects are not considered to differ from the main assessment of effects.

10.8.2 OPERATIONAL PHASE

In the same way as the construction stage, it is not always possible, practical or appropriate to mitigate all effects, in this case those effects that occur in the longer term as a result of the Proposed Development.

As previously described, the majority of measures incorporated to minimise landscape and visual concerns are inherent and embedded within the Proposed Development being assessed.

Judgements presented in the main body of the assessment consider effects with proposed planting in place at year 15 and are considered to be representative of the residual impacts.

Residual landscape effects

Residual Moderate positive effect on land use, urban grain and vegetation with effects on landform being slight and positive.

Residual Moderate positive direct effects on LCA A – Harbour owing to the replacement of derelict large scale, industrial buildings with high quality development and public realm that complements the character of the LCA and offers public accessibility and opportunities to obtain views of the sea.

Residual indirect effects on the landscape character of other surrounding landscape character areas identified would result primarily from the indirect visual influence of new built form. None of the residual indirect effects on landscape character were considered to be significant. Effects include:

- Moderate-Slight positive indirect effect on LCA L (Howth Castle);
- Slight positive indirect effect on LCA P (Ireland’s Eye) and R (Coastal Waters and sand flats);
- Slight indirect neutral effect on LCA H (Heath Land);
- Slight indirect negative effect on LCA J (Amenity Grassland); and
- Not Significant indirect neutral effect on LCA B (Residential Howth Village), K (residential Sutton), (Coastal Amenity), Q (Agriculture and natural scrub).

From other identified LCAs, the Proposed Development would not be visible, or would be to such a minimal extent, that it would not result in any discernible change to the prevailing landscape and visual characteristics that define character.

It is not considered that the judgements made for LCA A (in regard to the magnitude of change or the significance of the effects), would differ in the absence of the planting propose as mitigation. Likewise, it is not considered that the quality of the effects would become adverse by default. The Proposed Development would still create a strong and positive frontage to Howth Road with high quality materiality and planting.

In recognition that this vegetation is important to the quality of the effects, particularly in terms of the integration of the development with the character of Howth Road, whilst the residual effects of the proposed development are positive, the effects of the proposed development on landscape character without the vegetation in place would be neutral.

Residual visual effects

Residual Significant effects were identified at 3 of the 30 viewpoint locations. Visual effects on viewpoint 1 would be significant and for viewpoints 7 and 8 would be significant-moderate. These viewpoint locations are directly adjacent to the site and effects occur primarily due to the extent to which views would be influenced. At this proximity, the scale of the development will inherently represent a notable change to existing views and would affect a large proportion of the overall visual composition. When considered in the context of the existing visual composition, the high quality architectural and landscape treatments employed are considered to be positive in their effect.

Residual Moderate effects were identified at 9 of the 30 viewpoint locations, namely viewpoints 2, 5c, 5d, 6a, 6b, 2, 17, 20a and 20b. Effects were considered to be positive or neutral, with the exception of views from the northern façade of St. Mary's Church and from Muck Rock where effects were considered on balance to be negative.

Residual Moderate-slight effects or less were identified at 13 of the 30 viewpoint locations. Effects were considered to be positive or neutral, with the exception of views from the golf course where effects were considered negative. No effects, because of a lack of visibility were identified at the remaining 5 viewpoint locations.

The winter conditions presented in the photomontages demonstrate the influence of the tree planting in both winter and summer conditions. It is clear to see that none of the planting has sought to fully screen the development, rather it seeks to integrate the development more sensitively within its landscape setting and generate a strong sense of approach into the village. It is also straight forward to interpret from these winter photomontages, the influence the Proposed Development would have in the absence of the mitigation planting.

In the event that the proposed mitigation tree planting along Howth Road and within the western part of the site substantially fails, the perceived scale of the built form from these nearby locations would marginally increase and a greater overall proportion of the built form would be visible without the influence of vegetation. It would also result in the development presenting itself more abruptly and would reduce the sylvan character of the road.

It is not considered that the judgements made in relation to the assessed viewpoints would differ in the absence of this vegetation. Likewise, it is not considered that the quality of the effects would become adverse by default. The Proposed Development would still create a strong and positive frontage to Howth Road with high quality materiality and planting.

In recognition that this vegetation is important to the quality of the effects, whilst the residual effects of the proposed development are positive, the effects at these viewpoints without the vegetation in place would be neutral.

For the purposes of demonstrating the likelihood that the predicted positive residual effects (as reported) will occur, it is noted that existing tree planting along Howth Road has reached a reasonable degree of maturity despite being located immediately at the roadside, within assumed poor soil volumes, partially exposed root systems, and in many places along the pedestrian pavement overlaid by hard surfacing. Conversely, the proposed tree planting would be planted in much more favourable conditions, set back from the road within a 3m wide verge that contains high soil volumes to support future growth. Species have been selected that are tolerant of coastal and windy conditions and as such the trees are anticipated to grow successfully in their climatic context. It is therefore considered that there is a high degree of probability that tree planting along Howth Road will be successful in generating the positive effects reported.

Residual cumulative landscape *effects*

Given the limited change to the baseline views brought about by the permitted residential development at Balscadden Road & Former Baily Court Hotel (granted under ABP-301722-18), cumulative landscape effects are not considered to differ from the main assessment of effects.

Residual cumulative visual effects

Cumulative effects at viewpoint 19 would be Slight and neutral. Given the limited change to the baseline views brought about by the permitted residential development at Balscadden Road & Former Baily Court

Hotel (granted under ABP-301722-18), effects are not considered to differ from the main assessment of effects.

10.8.3 Urban Development and Building Heights Guidance

The NPF places greater emphasis on achieving a more compact urban form and delivering effective densities and greater consolidation of urban development. National Policy Objective 11 states that "*in meeting urban development requirements, there will be 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*".

Objective 13 adds "*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*".

Specific planning policy requirement (SPPR) 3 of the Urban Development and Building Heights Guidelines relates to the development management criteria presented. It states that where the application complies with these criteria and "*the assessment of the planning authority concurs, taking account of the wider strategic and national policy parameters set out in the NPF and these guidelines, then the planning authority may approve such development, even where specific objectives of the relevant development plan, local area plan or planning scheme may indicate otherwise*".

The Proposed Development has evolved in conjunction with the principles outlined in these criteria and from a townscape and visual perspective are considered to respond positively to these. The following provide a narrative of the residual effects of the Proposed Development against the development management criteria:

At the scale of the relevant city/town

Well served by public transport with high capacity

The site is well served by public transport infrastructure, lying in close proximity to the Howth Railway Station and being located directly adjacent to local bus stops. This accessibility to the public transport network is a key feature of the site.

Successfully integrate into/enhance the character and the public realm of the area, having regard to topography, cultural context, setting of key landmarks, protection of key views. Proposals should undertake a landscape and visual assessment by a qualified practitioner

The evolution of the Proposed Development has been undertaken as part of an iterative approach to design and assessment. The Proposed Development has been considered sensitively within its landscape and visual context and takes reference from the village whilst also establishing a new, high quality character to this suburban location. The design of the Proposed Development has been cognisant of the distinctive topography of the Howth Peninsula, of its relationship with surrounding built heritage and in terms of key views identified throughout the wider area.

This chapter of the EIAR presents an assessment of the landscape and visual effects of the Proposed Development and has been undertaken by Chartered Members of the Landscape Institute.

Make positive contribution to place-making, incorporate new streets and public spaces, sufficient variety in scale and form, and create visual interest in the streetscape

The disposition and character of built form across the site has been considered collaboratively so as to ensure that the development incorporates a series of high quality, attractive public spaces across the site that provide safe and accessible amenity for the existing local community and potential future residents and provide opportunities for active and passive recreation and social interaction.

Overarching strategic concepts for the site that have influenced the design of the external environment include the transition in character from east to west across the site (with the character becoming increasingly urban and civic towards the village), and the transition in character from south to north across the site (to sensitively marshal a change in character between the lush sylvan hillside and the open coastal environment).

The Proposed Development also incorporates a public walkway along the northern edge of the development (Northern Promenade), that will allow views towards Ireland's Eye over Claremont Beach where these weren't previously available. In addition, consideration has been given to creating a new view towards St. Mary's Church from this Northern Promenade, capitalising on the interest of this built heritage feature.

In terms of the western part of the Proposed Development and the Howth Road interface, the high quality nature of the architecture and planting, and the consideration given to activating the development frontages, will generate a strong gateway character and sense of place, commensurate with the importance of this key nodal point to the village.

At the scale of district/neighbourhood/street

Respond to their overall natural and built environment making a positive contribution to the streetscape

The Proposed Development has sought to improve the relationship between the site and its wider village setting through the generation of a strongly defined street frontage to Howth Road. This interface has incorporated ground floor entrances and a clearly defined staged frontage and tree avenue that seeks to complement the built frontage present along Harbour Road and moderate the visual impact of the taller parts of the development through the activation of the ground floor frontage.

The scale of the built form has considered the topography of the wider peninsula and has drawn reference to the tree line that bounds Howth Road. As mentioned previously, the external spaces have also been considered in terms of marshalling a change in character across the site and enhancing the sylvan character of Howth Road.

The proposed materiality and planting have drawn reference to existing hard landscape materials present in the wider village, and planting that references the site's sylvan and coastal characteristics. The commitment to high quality is commensurate with the site's gateway location and will make a positive contribution to the presentation of the village on the approach.

Not monolithic and avoids long, uninterrupted walls. The building fabric should be well considered

The architectural proposals have incorporated sensitive setbacks and subtle changes in materiality within the built fabric to generate variety and distinctiveness within the development elevations and to break down the volume and mass of the built form. The creation of 'finger blocks' has also been considered to allow sunlight penetration and break down the volume and mass of built form when viewed from locations to the north and south of the site.

Enhance the urban design context for public uses and key thoroughfares

A key element of the Proposed Development that has been incorporated, is the provision of public access around the site. The Proposed Development includes a walkway along the northern edge of the development (the Northern Promenade) that facilitates views to the sea that were not previously available. It also incorporates a 3m wide shared walkway along Howth Road, separated from it by a 3m tree lined verge) so as to afford a safer and more pleasant pedestrian experience.

Universal accessibility is provided between Howth Road and the Northern Promenade at the western end of the Proposed Development, at the Riparian Strip and at the Civic Plaza, each having a different character and facilitating different passive and active recreation opportunities.

All open spaces and pedestrian routes will be of high quality and will be afforded passive surveillance.

Improve legibility through the site or the wider urban area which the development is situated and integrates in a cohesive manner

The Proposed Development establishes a strong and positive building frontage that complements the existing village, physically and visually associates the village to the Howth Castle and St. Mary's Church and presents a strong and distinctive architectural character that will sensitively reference built form in the village whilst establishing a new character at this key gateway location.

At the scale of the site/building

The form, massing and height of the Proposed Development should maximise access to natural daylight, ventilation and minimise over-shadowing and loss of light

The approach to the layout of the development and height with slender finger block approach has been undertaken with the intent to maximise access to natural light and minimise overshadowing. Reference should be made to other technical studies included within the application.

Regard to Daylight/Sunlight assessment

Reference should be made to the Daylighting and Suncast shadow study included at Chapter 6 (Air Quality and Climate, including Microclimate) of the EIAR, which concludes that the design meets with the principles of the BRE guide - "Site Layout Planning for Daylight and Sunlight" and the latest guidelines for new apartments as issued by the Department of Housing. Good quality daylight would be available across a substantial portion of the development including the development's amenity areas. The proposed development will have little impact on the surrounding beaches or surrounding houses in terms of overshadowing and is unlikely to result in any undue adverse effects on daylight access within buildings in the wider surrounding area.

10.9 INTERACTIONS

In addition to the requirement to describe the likely significant effects of the Proposed Development, it is also a requirement to consider the interaction of these effects. The following are the interactions anticipated from the Proposed Development.

10.9.1 LANDSCAPE AND VISUAL IMPACT / POPULATION AND HUMAN HEALTH

Reference is made to Chapter 3 – Population and Human Health.

Existing residents, workers and visitors to Howth will interact with this landscape on the arrival and departure from the village such that they will be aware of a change at this site. Such a transformation, whilst notable, is a zoned objective for the site and development of a notable scale has been previously approved. The landscape and visual impact associated with human beings focuses on the visual effects of the Proposed Development to sensitive visual receptors in the landscape. The Proposed Development generates visual effects, and these are discussed within the main body of the assessment.

The design of the Proposed Development has considered in detail the opportunities to integrate the Proposed Development with the existing village, and in particular capitalising on opportunities to provide views of the sea, public amenity that was not previously available and opportunities for recreation and social interaction.

The development would represent a high-quality intervention in the landscape at the gateway to the village that would enhance the sense of approach and arrival into the village for locals and visitors alike.

10.9.2 LANDSCAPE AND VISUAL IMPACT / LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

Reference is made to Chapter 4 – Land, soils, Geology and Hydrogeology. Residual soils arising as a result of excavation at the development site that are identified as suitable for re-use, will be used in external landscape works as much as possible rather than transporting off-site. Interactions would not be significant.

10.9.3 LANDSCAPE AND VISUAL IMPACT / WATER

Reference is made to Chapter 5 – Water.

It is not considered that the landscape proposals would adversely influence the hydrology and hydrological characteristics. The Culverted Bloody Stream would be rediverted and for a short length within the Riparian

Strip opened to provide amenity to this area of public open space. Surface water runoff would be managed appropriately. Interactions would not be significant.

10.9.4 LANDSCAPE AND VISUAL IMPACT / AIR QUALITY AND CLIMATE, INCLUDING MICROCLIMATE

Reference is made to Chapter 6 – Air Quality and Climate, including Microclimate.

Mitigation measures are proposed that eliminate significant effects and the design of the scheme allows good levels of daylight and sunlight penetration with little or imperceptible impact on the surrounding beaches or surrounding houses in terms of overshadowing.

It is widely considered that tree planting has a positive influence on air quality and climate as a result of the removal of air pollutants and the reduction in urban air temperatures. In this regard, the proposed development includes a notable amount of new planting.

Interactions would not be significant

10.9.5 LANDSCAPE AND VISUAL IMPACT / BIODIVERSITY

Reference is made to Chapter 8 – Biodiversity.

The Proposed Development would result in the loss of all vegetation on the site. A significant proportion of this vegetation was found to be of poor quality because of health or defects or growing in constrained conditions such as to compromise their long-term viability. None of the vegetation on the site is considered to be of any particular individual merit or amenity value.

The Proposed Development seeks to provide a range of public and semi-public open spaces that will provide for a range of plant types and will encourage the development of local habitats for small fauna. The long-term effects of the Proposed Development will have a positive effect on the tree cover associated with the Proposed Development's open spaces and street trees and will provide a successional tree stock, important in terms of the character of the site, its relationship with the adjacent wooded context and the long term habitat value of the site.

Sensitive management control provisions during the operational phase will ensure that any management and maintenance activities associated with external areas will not enter the water channel within the Riparian Strip. Further consultation with the Ecological Consultant will take place at detailed design, implementation and monitoring stages to ensure adherence to best practice and sound ecological principles.

Interactions would not be significant.

10.9.6 LANDSCAPE AND VISUAL IMPACT / ARCHAEOLOGY, ARCHITECTURE AND CULTURAL HERITAGE

Reference is made to Chapter 9 – Archaeology, Architecture and Cultural Heritage.

Careful consideration has been given to minimising the visual impact of the Proposed Development with design responses that are cognisant of Protected Structures and Architectural Conservation Areas in the wider Howth area, for the purpose of protecting their setting and inherent character qualities. The Proposed

Development has considered the influence of extant permitted applications on the site in order that the development is consistent with building lines and general principles established.

In addition, opportunities to generate improved visual relationships with the nearby heritage features have been incorporated, such as the creation of a framed view towards St. Mary's Church from the Northern Promenade.

Interactions would not be significant.

10.9.7 LANDSCAPE AND VISUAL IMPACT / MATERIAL ASSETS

Reference is made to Chapter 11 – Material Assets.

The Proposed Development is urban in character and has been designed to integrate with the existing built form and landscape in this area. The proposed development would result in an increase in pedestrian and vehicle activity during both the construction and operation phases. In this regard, it is noted that these lands have been zoned for development under the Fingal Development Plan and the site is subject to extant development permissions.

Whilst pedestrian and vehicular activity have the potential to result in landscape and visual impacts, this is not considered to be significant in the context of the existing road use and in light of that anticipated by the redevelopment of the site.

Appropriate design responses have been and will be integrated so as to avoid conflict with existing and proposed services.

Interactions would not be significant.

10.10 DIFFICULTIES ENCOUNTERED IN COMPILING REQUIRED INFORMATION

There were generally no difficulties encountered in compiling any specified information. It is noted that the assessment of effects has been derived through the use of publicly available information only and limited by public accessibility.

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Chapter 11
Material Assets
Traffic, Waste, and Utilities

11.1 TRAFFIC AND TRANSPORT

11.1.1 INTRODUCTION

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This section of chapter 11 assesses the traffic and transport impacts of the proposed mixed use development at the Claremont Development, Howth Road, Howth, Co. Dublin (the **Proposed Development**) on the existing road network in the vicinity of the site, as well as identifying proposed mitigation measures to minimise any impacts.

11.1.2 METHODOLOGY

The assessment of the potential impact of the Proposed Development on the material assets in the area was carried out according to the methodology specified by the EPA and the specific criteria set out in the Guidelines on Information to be Contained in an Environmental Impact Assessment Report 2017 (Draft).

The traffic analysis undertaken on the basis of 1.4% annual growth in network traffic over the period 2019 to 2030 period, decreasing to 0.4% in the 2030 to 2039 period, consistent with the 'medium growth' assumption for the four planning authorities within the Dublin city area as detailed within the 2016 Transport Infrastructure Ireland document 'Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections', PE-PAG-02017 October 2016.

The following sources of information were used in the completion of this assessment:

- Smarter Travel A Sustainable Future (2009-2020).
- National Cycle Policy Framework (2009).
- Regional Planning Guidelines for the Greater Dublin Area.
- Fingal County Council Development Plan 2017-2023 for cycling and parking requirements
- Guidelines for Traffic Impact Assessments': The Institution of Highways and Transportation;
- Transport for Ireland – Irish Rail
- Census 2016 -www.cso.ie

The methodology included a number of key inter related stages;

- Background Review: This background review is broken down as follows:

  (i) *An examination of the local regulatory and development management documentation.*
  (ii) *An analysis of previous 'transport' related, strategic and site-specific studies of development and transport infrastructure proposals across the Howth area.*
  (iii) *A review of planning applications to establish the legal status of various third-party development schemes that were either considered within the strategic 'transport' studies or which have emerged and received full planning permission.*

- Traffic Counts: Classified junction automatic traffic counts were undertaken and analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed residential development.

- Trip Generation: A trip generation exercise has been carried out to establish the potential level of vehicle trips generated by the proposed residential development.

- Trip Distribution: Based upon both the existing and future (for the adopted assessment horizon years) network characteristics, a distribution exercise has been undertaken to assign site generated vehicle trips across the local road network using the following software:

    - TRL Oscady Junction 5 - Signalised Junction
    - PICADY Software - Standard Junction

- Consultation with local authority traffic engineer, Niall Thornton in November 2018, and May 2019 where the issues to be considered in this assessment were agreed as well as the scope of baseline surveys to be carried out were agreed.

- Assessment of Impacts.

In line with the EPA Draft Guidelines (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 11.1

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	

Table 11.1 - Definition of Quality of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts. See Table 11.2.

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

Table 11.2 - Definition of Significance of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See Table 11.3

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

Table 11.3 - Definition of Duration of Effects

11.1.3 DESCRIPTION OF DEVELOPMENT

11.1.3.1 Existing

The Proposed Development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

Figure 11.1 shows the Ariel view indicating the location of the Proposed Development.

Figure 11.1 - Site Location

11.1.2.2 Proposed

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

11.1.4 CHARACTERISTICS OF DEVELOPMENT

Table 11.4-Details the parking proposed for the Proposed Development.

Development type	Area / units	Car Parking Standards	Parking proposed
Apartments 1-bed	222 No.	0.7 per unit	156
Studio	4 No.	0.7 per unit	3
Apartments 2-bed	276 No.	0.7 per unit	193
Apartments 3-bed	10 No.	0.7 per unit	7
TOTAL Residential	512 No.		359
Car Club			5
Retail / Commercial	2637 m^2	1 per 40m2	75
Total Spaces			439
		Bike parking standards	Parking proposed
Apartments	4No. Studio 222 No. 1 bed 276 No. 2 bed 10 No. 3 bed Visitor	1.0 per unit (4) 2.0 per unit (444) 2.0 per unit (552) 3.0 per unit (30) 0.5 per unit (256)	1286
Retail / Commercial/Creche	2637 m^2	1 per 54m2	49
Total Spaces			1335

Table 11.4 - Proposed Parking at Proposed Development

The development will have 2 No. access points onto Howth Road, Figure 11.2. Based on the split of the carparking spaces 70% of generated traffic will access via the east entrance.

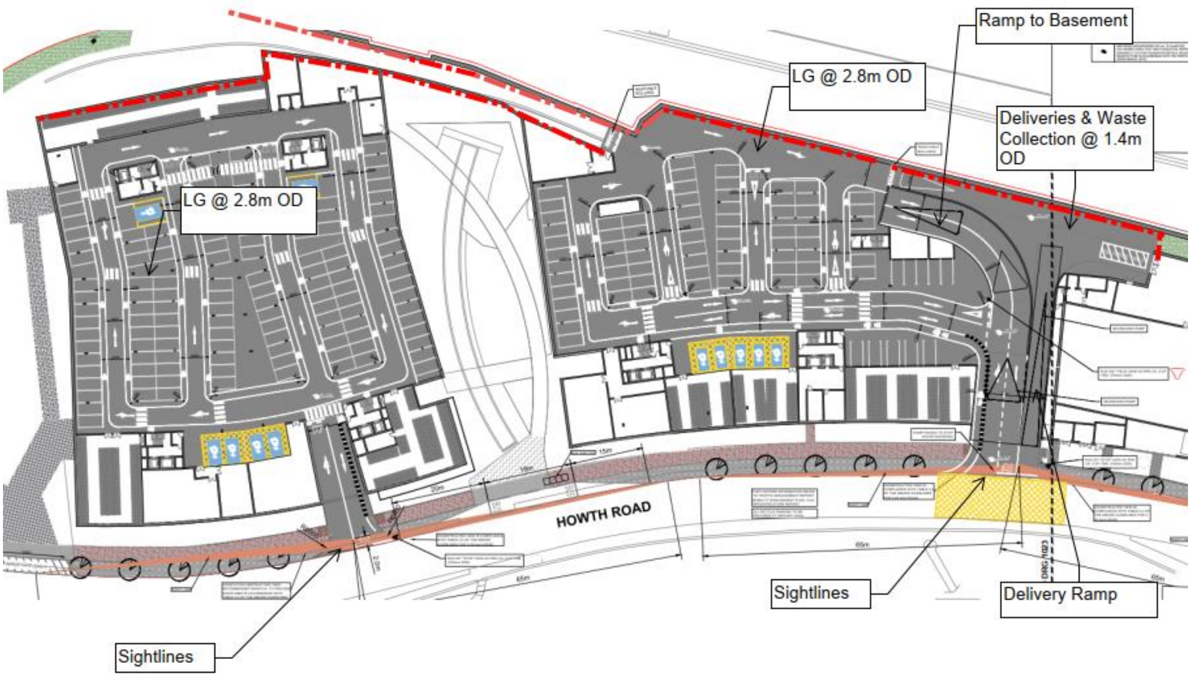

Figure 11.2 - Proposed Development – Ground Level

Sightlines for the development will be 65 metre from a 2 metre set-back within a 60 km/h speed zone.

Figure 11.3 - Proposed Development - Podium Level

A public walkway/cycleway to the north of the site shall be provided at podium level, Figure 11.3. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. Bicycle parking is to be provided in both ground floor car parks.

11.1.5 BASELINE ENVIRONMENT

11.1.5.1 Road Network

Traffic surveys were carried on Tuesday 15th January 2019 over a 12-hour period between 0700 and 1900 in order to ascertain the peak hour flows for all traffic movements at 6 No. critical junctions close to the Proposed Development:

- Sutton Cross Signalised junction
- Greenfield Road / Church Road priority junction
- Church Road / Howth Road priority junction
- Offington Park / Howth Road priority junction
- Claremont Road / Howth Road priority junction
- Harbour Road / Church Street priority junction

Figure 11.4 - Traffic Survey Locations

Based on the results of both the surveys and assumptions regarding when peak flows from the generated traffic will occur, the morning peak hour has been taken as 0800 to 0900, with the evening peak taken to occur between 1700 and 1800.

The survey data is detailed for the morning and evening peak hours in Figure 11.5 and Figure 11.6 respectively:

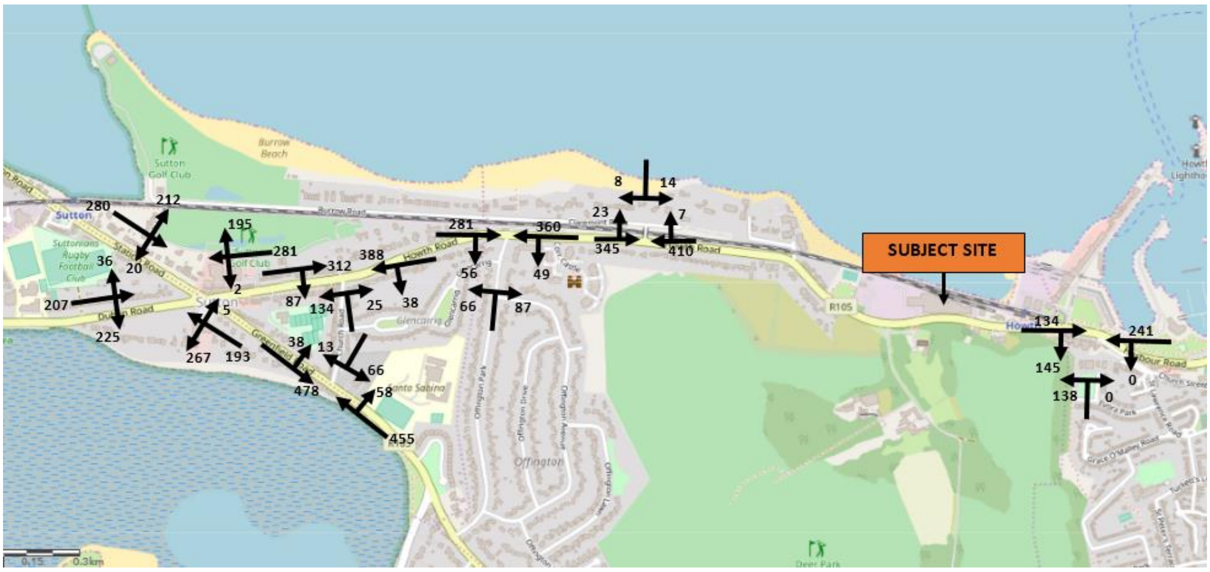

Figure 11.5 - Existing morning peak hour flows on local road network

Figure 11.6 - Existing evening peak hour flows on local road network

In the case of Claremont Road / Howth Road, the minor road flows are low (approximately one vehicle exiting onto major road every three minutes). Thus, no detailed analysis is necessary at this location.

In the case of the Greenfield Road / Church Road junction it is shown later in this report that the existing flows are effected by less than 5% by the Proposed Development, which is below the indicative threshold for a traffic assessment at a congested junction (National Roads Authority Transport Assessment Guidelines, 2014).

The existing Sutton cross junction is at capacity and is dealt with separately below. The existing capacity on the remaining 3 junctions is tabulated in Table 11.5.

	MAXIMUM RATIO OF FLOW TO CAPACITY (RFC) (Existing)	
	AM PEAK	PM PEAK
Offington Park / Howth Road	0.53	0.17
Church Road / Howth Road	0.44	0.11
Harbour Road / Church Street	0.34	0.39

Table 11.5 - Maximum ratios of flow to capacity at Offington Park, Church Road and Church Street junctions for morning and evening peak hours (existing)

The above results confirm that no congestion occurs at the above at these three junctions.

Regarding the Sutton cross junction, an Analysis for every 15 minutes of the existing AM and PM peak hour flows has been carried out and the result is tabulated below:

Table 11.6 and Table 11.7 detail the flows, capacities, RFC's and queue lengths for the existing morning and evening peaks at Sutton cross:

	EXISTING AM PEAK FLOWS			
0800-0815	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.03	6.89	0.73	13
Howth Road (East) R	1.70	2.62	0.65	6
Greenfield Road (South) L+S+R	6.87	9.38	0.73	13
Dublin Road (East) L+S	3.53	9.45	0.37	8
Dublin Road (East) R	2.47	3.75	0.66	8
Station Road (North) L	1.70	13.66	0.12	3
Station Road (North) S+R	5.17	10.25	0.51	10
0815-0830	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.85	6.75	0.87	17
Howth Road (East) R	2.22	2.62	0.85	9
Greenfield Road (South) L+S+R	8.27	8.65	0.96	21
Dublin Road (East) L+S	5.47	9.35	0.59	12
Dublin Road (East) R	4.20	3.75	1.12	20
Station Road (North) L	2.13	13.66	0.16	3
Station Road (North) S+R	6.87	9.58	0.72	13
0830-0845	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.50	6.80	0.96	21
Howth Road (East) R	2.83	2.62	1.08	14
Greenfield Road (South) L+S+R	8.13	8.18	1.00	24
Dublin Road (East) L+S	5.83	9.51	0.61	13
Dublin Road (East) R	3.24	3.75	0.86	15
Station Road (North) L	3.52	13.66	0.26	5
Station Road (North) S+R	7.62	9.63	0.79	15
0845-0900	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.65	7.07	0.80	16
Howth Road (East) R	2.35	2.62	0.90	14
Greenfield Road (South) L+S+R	7.93	9.61	0.83	17
Dublin Road (East) L+S	4.72	9.52	0.49	10
Dublin Road (East) R	2.02	3.75	0.54	6
Station Road (North) L	2.31	13.66	0.17	4
Station Road (North) S+R	5.15	9.47	0.54	10

Table 11.6 - Existing capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the morning peak hour at Sutton Cross

	EXISTING PM PEAK FLOWS			
1700-1715	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.01	10.16	0.49	10
Howth Road (East) R	1.66	2.46	0.67	5
Greenfield Road (South) L+S+R	6.47	6.47	1.00	20
Dublin Road (East) L+S	5.61	13.10	0.43	10
Dublin Road (East) R	3.39	3.20	1.06	15
Station Road (North) L	1.96	10.61	0.19	4
Station Road (North) S+R	4.04	7.35	0.55	9
1715-1730	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	4.54	10.38	0.44	9
Howth Road (East) R	1.93	2.46	0.79	7
Greenfield Road (South) L+S+R	4.73	6.98	0.68	11
Dublin Road (East) L+S	5.63	13.13	0.43	10
Dublin Road (East) R	2.17	3.20	0.68	8
Station Road (North) L	1.96	10.61	0.19	4
Station Road (North) S+R	3.04	7.60	0.40	7
1730-1745	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.02	10.52	0.67	15
Howth Road (East) R	2.78	2.46	1.13	15
Greenfield Road (South) L+S+R	4.07	6.84	0.59	9
Dublin Road (East) L+S	6.40	13.01	0.49	11
Dublin Road (East) R	2.53	3.20	0.79	9
Station Road (North) L	2.24	10.61	0.21	4
Station Road (North) S+R	4.29	7.67	0.56	9
1745-1800	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	4.58	10.24	0.45	9
Howth Road (East) R	1.29	2.46	0.53	6
Greenfield Road (South) L+S+R	5.67	6.11	0.93	16
Dublin Road (East) L+S	6.44	13.45	0.48	11
Dublin Road (East) R	3.29	3.20	1.03	15
Station Road (North) L	2.93	10.61	0.28	5
Station Road (North) S+R	4.67	7.86	0.59	10

Table 11.7 - Existing capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the evening peak hour

One can see that the junction is at present heavily loaded, with between 15 and 20 vehicles queuing on major approaches during both peak hours. The maximum ration of flow to capacity is estimated at 112% in the morning peak and 113% in the evening peak.

Queuing and delays are thus significant during both peak hours. To verify the modelling date a comparison between actual queue lengths and modelled queue lengths is presented below:

	MORNING PEAK	
0800-0900	**Max. queue modelled** (average veh)	**Max. queue observed** (average veh)
Howth Road (East) L+S	17	14
Greenfield Road (South) L+S+R	18	23
Dublin Road (East) L+S	13	14
Station Road (North) S+R	12	18
	EVENING PEAK	
1700-1800	**Max. queue modelled** (average veh)	**Max. queue observed** (average veh)
Howth Road (East) L+S	11	12
Greenfield Road (South) L+S+R	14	19
Dublin Road (East) L+S	12	10
Station Road (North) S+R	10	11

Table 11.8 - Comparison of modelled and observed queues at Sutton Cross

The data within Table 11.8 above demonstrates that the modelling process is accurate, with significant convergence between the modelled and observed queuing at the major approaches at the signalised junction.

11.1.5.2 Pedestrians

The Proposed Development is within 100 metres of the Howth DART Station and within 700 metres of the centre of Howth Village, with excellent pedestrian links in place in all cases.

The pedestrian links to all transport, retail and employment centres in the vicinity of the Proposed Development are of high standard see Figure 11.7.

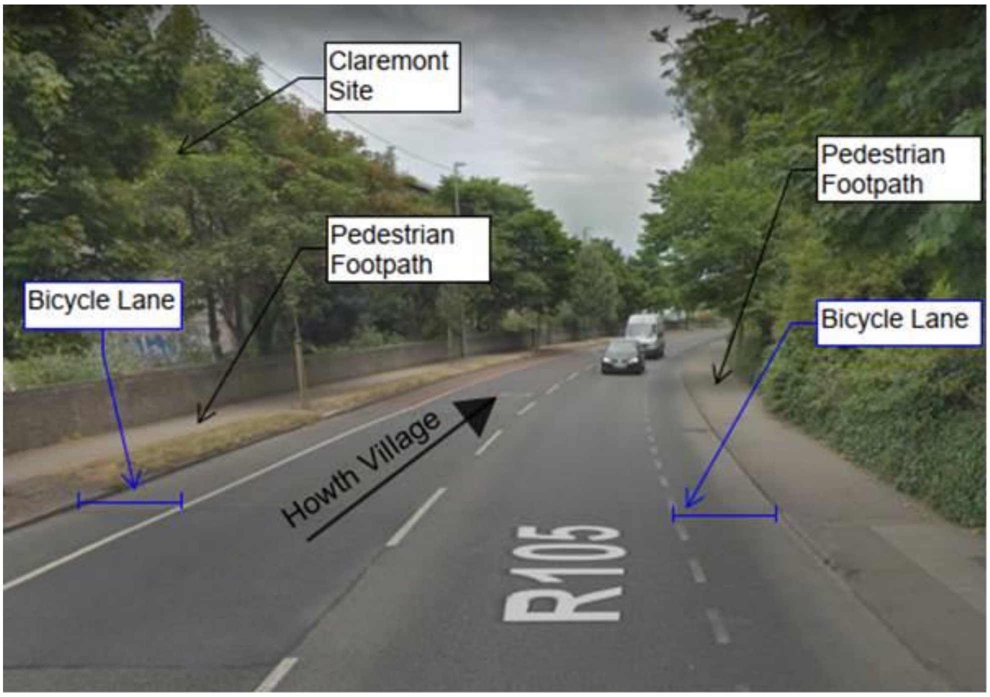

Figure 11.7 - Existing Cyclist/Pedestrian Facilities on Howth Road

Figure 11.8 - The map below shows the pedestrian links to the Dart station and the promenade walk on the sea side, access from Howth village.

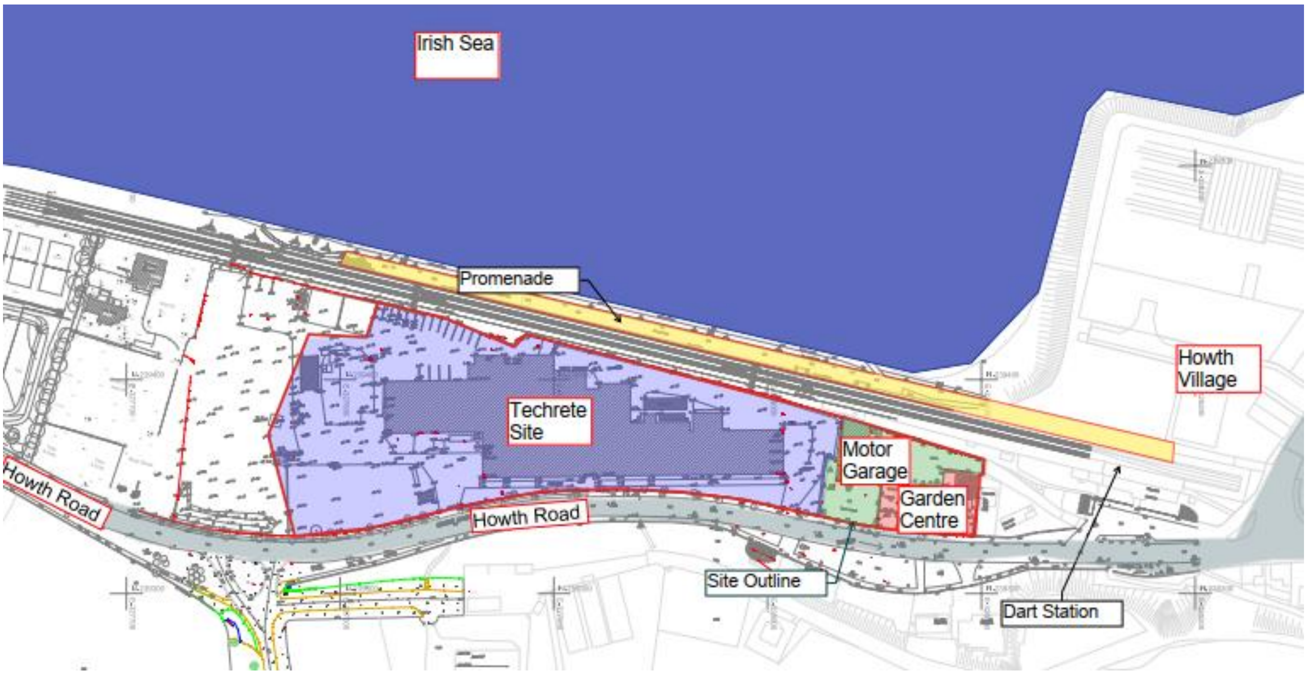

Figure 11.8 - Pedestrian links

11.1.5.3 Cyclists

The "Greater Dublin Area Cycle Network Plan" has produced an overall plan for providing safe cycle routes both within the city and in the suburbs. Dublin City Council has an overall target of increasing journeys by cyclists in the city by 25% by the year 2020. Permeability and direct safe routes are therefore critical in achieving this goal.

Figure 11.9 contains the map of existing cycle facilities for the area close to the Proposed Development, as detailed within the Greater Dublin Area Cycle Plan.

Figure 11.9 - Existing cycle facilities close to the Claremont site (GDA cycle plan)

It can be seen that, at present, the major cycle lane is along the bus corridor on the Howth Road, linking the site to Sutton Cross and onwards towards the city centre.

11.1.5.4 Public Transport

<u>Existing Bus Services</u>

The Dublin Bus services in the area provide direct linkage to the city, the Route 31/a along Howth Road towards the city centre, and the 31b Route along Carrickbrack Road towards the city centre.

The frequency of each route during the morning peak is detailed within Table 11.9.

Route	Origin	Destination	Frequency (08:00-09:00)
Route 31/a	Howth Road / Carrickbrack Road	Talbot Street	2 per hour
Route 31b	Carrickbrack Road	Talbot Street	1 per hour

Table 11.9 - Dublin Bus Route Frequencies

Figure 11.10 details the existing bus routes serving the Proposed Development, emphasising the proximity of the routes 31 and 31a to the Proposed Development.

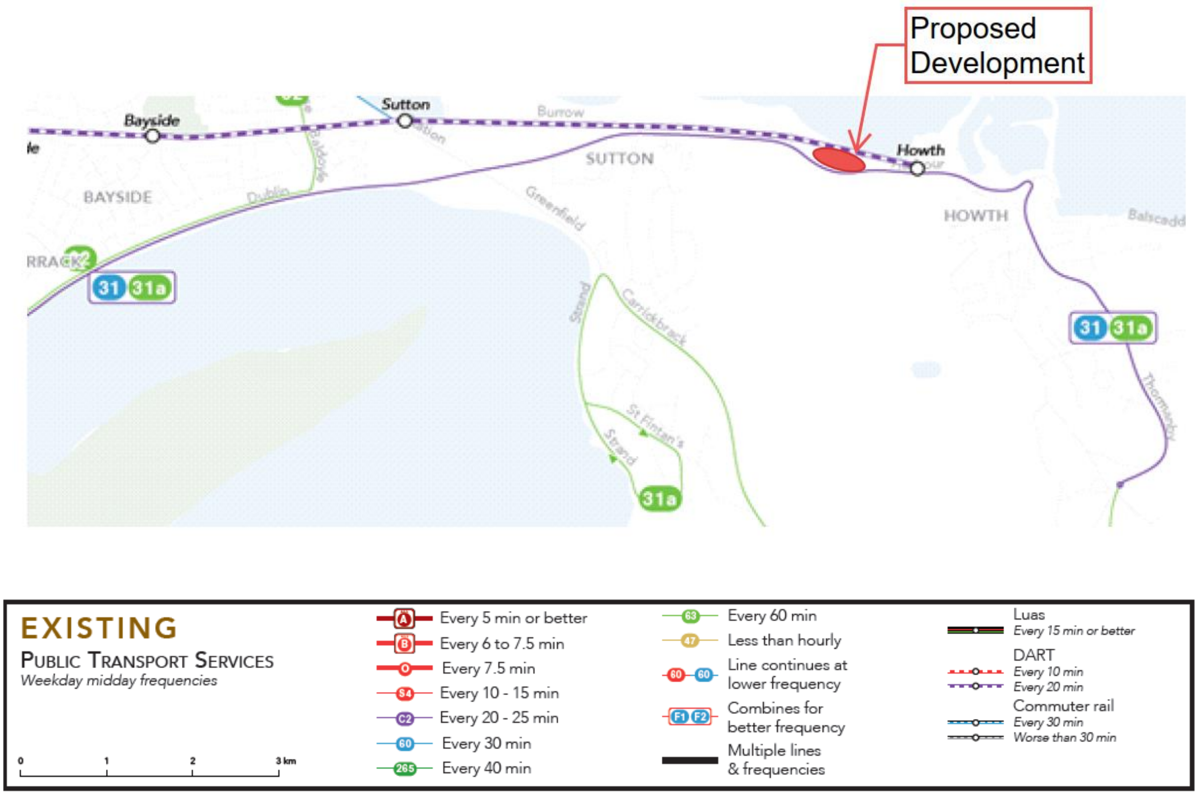

Figure 11.10 - Existing bus services (31 31a) close to Proposed Development

<u>Existing DART Service</u>

The DART extends along the coastline of the South Dublin area, extending from the centre of town to Ballsbridge, Sandymount, Merrion, Booterstown, Blackrock, Monkstown, Dun Laoghaire, Dalkey, Ballybrack, Shankhill, Bray and Greystones, and along the coastline of the north Dublin area extending from the town centre to Clontarf, Sutton, Howth and Malahide.
The Howth DART Station is within 100 metres (1 minutes' walk) of the Proposed Development. From the centre of the site this would equate to 10- 15minute walk.

The DART operates a service to the city centre every 12 to 15 minutes during the morning and evening peak time.

Figure 11.11 contains diagrammatic representations of the DART system serving the site and its connectivity to the regional / national rail network.

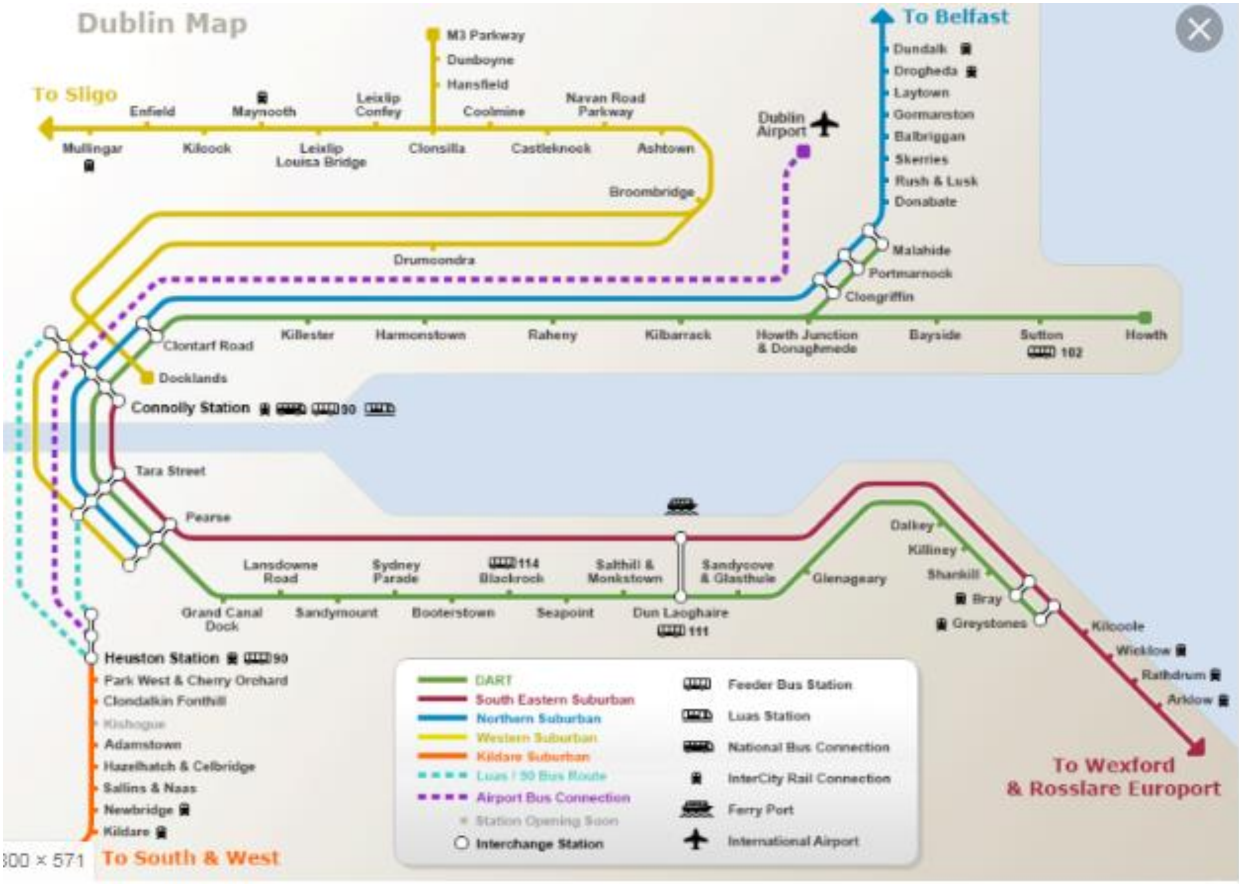

Figure 11.11 - Diagrammatic representation of DART line and its connectivity to regional / national rail network

11.1.6 IMPACT OF PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

11.1.6.1 Road Network

<u>Direct/Indirect Impact</u>

The total construction period is estimated at 40 months, this is to be broken down as follows;

- Demolition - 2 months
- Excavation - 8 months
- Construction - 30 months

This is an indicative figure and subject to planning and compliance approvals.

The following estimates for weekday traffic have been made with respect to a proposed construction programme and activities on site:

- No of private vehicles per day from staff and site visitors – 35

- No. of light good vehicles per day from subcontract staff - 25
- No. of heavy goods vehicles per day during excavation process - 80
- No heavy goods vehicles per day outside of the excavation periods – 20

The above results in an estimate of 160 vehicles accessing the site daily during the excavation phase and will reduce to 80 vehicles outside of the excavation period.

Over a 10-hour working day, this equates to 1 vehicle entering and leaving the site on average every 3.75 minutes during excavation and 7.5 minutes entering and leaving the site all times outside the excavation period.

The 80 number of excavation vehicles is based on a predicted maximum 10 vehicles per hour based on a realistic availability and assignment of resources. This equates to an average of 1 No. HGV vehicle movement every 6 minutes during excavation.

Traffic surveys carried out as part of the traffic Impact Assessment for this project defined the peak traffic hours as 08:00 - 09:00 and 17:00 – 18:00. However, the surveys indicated that the morning peak was more extreme, with flows approximately 13% greater than the evening peak.

Construction operation time is predicted to be between 8:00 and 18:00. Given that the site workforce will be arriving at site before 8AM and leaving after 6PM, the traffic movements generated by the site workers will take place outside the peak times for network flows. Site workers will also be encouraged to use public transport.

HGV's will enter site via the two existing entrances. These entrances were previously used by the Techrete factory for HGV goods and are suitable for the construction phase. The majority of vehicles leaving this site would have been going to Sutton Cross and right turns has not been raised as an issue.

During the construction phase, HGV's entering the site will be guided by signs to a waiting area before being directed to their location and on departure enter a cleaning area prior to leaving site. Figure 11.2. Difficulties entering Howth road, particularly turning right towards Sutton Cross, is not seen as an issue, however a banksman will be assigned to both gates to ensure vehicles can safely enter Howth Road.

As agreed with Fingal County Council all HGV's during the construction phase will travel to and from Sutton Cross using Howth road, Route 1, as shown in Figure 11.13. This route was chosen as it is the shortest and minimises the effect the development has during the construction phase on Howth Village.

Therefore, the impact of the development during the construction phase will have a slight impact on the road network with short term temporary slight effects.

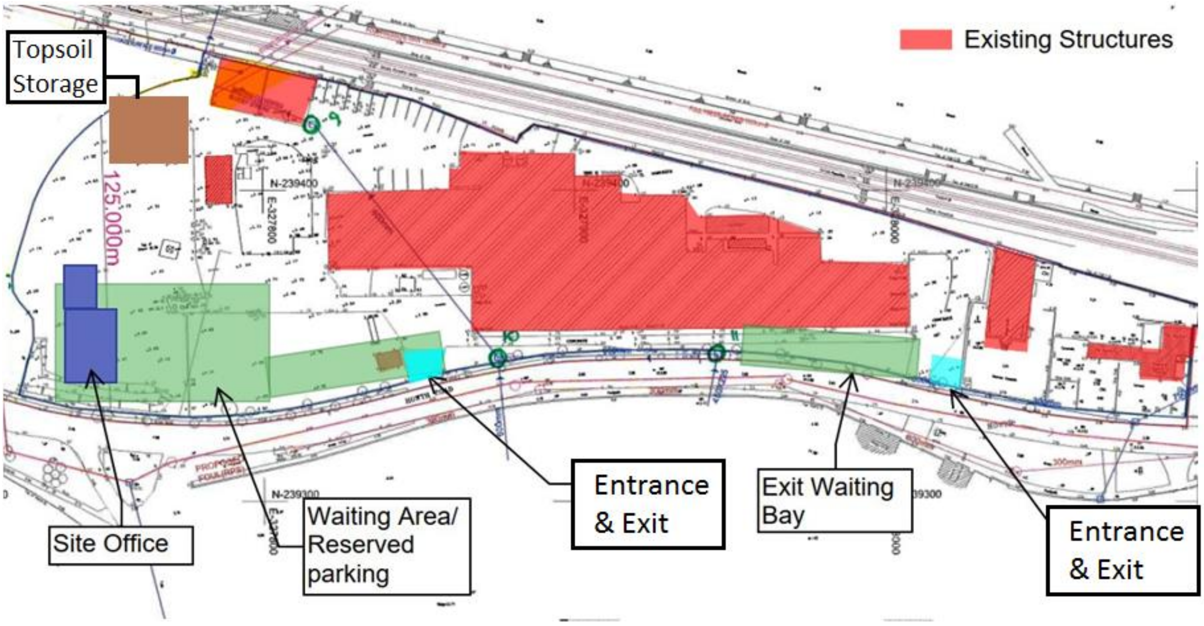

Figure 11.12 - Site Layout

During the excavation phase (highest volume of HGV's) this will equate to 16 additional vehicles during the rush hour period. This is a 0.03% increase on the current traffic at Sutton Cross and therefore the additional vehicles are likely to have an imperceptible impact of neutral and temporary effect on the current traffic situation at this junction. All other junctions assessed are less than 5% impacted and perform well within capacity, therefore, the impact will be an imperceptible impact of neutral and temporary effect during the construction phase.

<u>Cumulative - Construction Impact of adjacent Balscadden Development</u>

The Balscadden development located in Howth village, see Figure 11.13 is another development currently in the planning process by the same promoter. The development comprises of 163 residential units.

Figure 11.13 - Separate construction traffic routes for proposed Balscadden and Claremont developments

It is important in relation to this proposed development that they the most appropriate construction routes be identified in order to bring materials to and from the site in the most efficient and environmentally sensitive manner in order to minimise potential conflict. There are two possible constructions routes into Howth as shown in Figure 11.13.

The Proposed Development plans to use Route 1 to limit the potential impacts on Howth Village This will be the haul route for excavated materials from the site and has been agreed with Fingal County Council. Upon reaching Sutton Cross, traffic will take the most direct route to the nearest major roads infrastructure, i.e. the M50/M1.

The Balscadden Construction Management Plan confirms that all traffic from the Baldcadden development will use the Carrickbrack road and will not influence traffic movements on the Howth Road (Route 2). Therefore, the impact of using route 1 to service the excavation phase during the construction phase as a haul road will have a slight impact with a short-term temporary effect.

11.1.6.2 Pedestrian

The site is currently permeable to pedestrians. Appropriate hoarding will be erected around the site perimeter in order to protect the works and members of the public. The boundary to the site will be maintained and site security will be provided throughout the contract period. Pedestrian access will be strictly controlled via manned turnstile system, via Howth Road.

Appropriate segregation will be employed on site to separate pedestrians from heavy equipment. Fenced off pedestrian walkways will be provided close to the site offices. There is to be limited parking on site for staff members. Staff will be encouraged to use public transport or cycle.

The existing footpath will be maintained during the works except for periods where service connections and new drain lines to be constructed along existing footpath lines, for limited periods within the overall construction programme (2 months). Pedestrians at such times will be provided with either an alternative pedestrian lane on the development side subject to local authority approval or temporary pedestrian activated signalised crossings to divert pedestrians to the footpath on the other side of the road. Therefore, the potential impact of the proposed development on the pedestrian routes will be slight with short term temporary neutral effect.

For further information regarding drainage works and utility installation refer to

- Chapter 11.3 – Material Assets Utility and
- Chapter 5 – Water.

11.1.6.3 Cycling

Direct/Indirect Impact

The use of cycle lanes will not significantly be impacted during the construction phase other than the increase traffic usage from vehicles entering and exiting the site.

In relation to drainage upgrades and utility connections which will be carried out over a limited period as set out above the cycle lanes will be suspended for these periods. The cyclists will be diverted similar to normal road services installation works with the approval of the Fingal County Council road department.

The impact in relation to cyclist *is not significant, of negative and temporary effect.*

Cumulative Impact

The Balscadden haulage route, route 2, has no designated cycle lanes. With the haulage vehicles coming from the Balscadden development cyclists may opt to use Howth Road instead. However, in reality the number of cyclist using route 2 would be minimal as it is a steep climb (117m) out of Howth village and considerably longer than the Howth road route to Sutton Cross, estimated 11 minutes virus 30 minutes.

Therefore, the majority of cyclists are using Howth road, the impact of the additional cyclists as a result of the Balscadden development will be not significant and will have no negative temporary effect on the cycling network.

11.1.6.4 Public Transport

Direct/Indirect Impact

Pedestrians can cycle or walk to the construction site or alternatively can avail of the following public transport:

Dublin Bus

Route	**Origin**	**Destination**	**Frequency**
Route 31/a	Howth Road / Carrickbrack Road	Talbot Street	2 per hour
Route 31b	Carrickbrack Road	Talbot Street	1 per hour

DART

Howth DART Station is within 100 metres (1 minutes' walk) of the Proposed Development and operates a service to the city centre every 12 to 15 minutes during the morning and evening peak time.

There will be an increase of public transport usage during the construction phase. The proximity and frequency of the DART and Dublin Bus services to the site means that this will be the primary method of reaching the site used by site staff. The site staff will be commuting to the site from outside the Howth area and in the evening commuting from the site. These trip journeys are the opposite of the public transport usage at these times and thus there will be imperceptible impact neutral short-term effect.

Cumulative Impact

The site staff coming to the Balscadden and Claremont sites will be going against peak hour flows. Therefore, the potential impact will be imperceptible with neutral short-term effect.

11.1.7 Impact of Proposed Development – Operational Phase

11.1.7.1 Road Network

The traffic impact of the Proposed Development is derived by assessing the trips generated by both the proposal (direct impacts) and planned adjacent development on Balscadden Road, east of the Proposed Development (cumulative impacts), taking the existing, day of opening and design year flows on the network, gauging the extent to which the superimposed flows from the proposed and adjacent developments will affect the efficiency of future network flows.

Direct/Indirect Impact

The analysis of traffic growth volumes on the traffic network plus traffic generated by proposed and adjacent development constitutes a robust assessment of the likely direct impacts of the Proposed Development.

The impact of the Proposed Development on the following 6 No. junctions is assessed.

- Sutton Cross Signalised junction
- Greenfield Road / Church Road priority junction
- Church Road / Howth Road priority junction
- Offington Park / Howth Road priority junction
- Claremont Road / Howth Road priority junction
- Harbour Road / Church Street priority junction

Flows Generated By Proposed Development

The planned quantum of the development is as follows:

- 512 No. apartments
- 1,705 m2 GFA Anchor Unit
- 603 m2 GFA Retail
- 563 m2 GFA café / crèche / restaurant

The majority of café/crèche and other retail is assumed to be mostly internal use or used by locals and would result in very little vehicular traffic. Based on the location of the site and current congestion issues at Sutton Cross, these vehicles will be passing traffic and already on the network. Therefore, no additional vehicles will be added.

TRICS typically gives the following weekday morning and evening peak trip rates for apartments using Irish sites only where parking provision is not greater than 1.2 spaces per dwelling unit:

		Weekday AM		Weekday PM	
		IN	OUT	IN	OUT
Apartments	Trips/Unit	0.042	0.16	0.15	0.08

Table 11.10 - Peak hour trip rates for apartments within development site

The above TRICS trip rates give rise to the following weekday morning and evening peak trip rates for apartments:

		Weekday AM		Weekday PM	
	Units (No.)	IN	OUT	IN	OUT
Apartments	512	22	82	77	41

Table 11.11 - Peak hour flows generated by proposed apartments within development site

Trips generated by the commercial / mixed use component of the Proposed Development:

TRICS typically gives the following weekday morning and evening peak trip rates for major retail component of the development:

		Weekday AM		Weekday PM	
		IN	OUT	IN	OUT
Retail space	Trips/100m^2 GFA	3.3	2.9	4.1	4.6

Table 11.12 - Typical peak hour trip rates for pharmacy component within development site

The above TRICS trip rates give rise to the following weekday morning and evening peak trip rates for the major retail component:

		Weekday AM		Weekday PM	
	GFA m^2	IN	OUT	IN	OUT
Retail space	2466	87	77	108	121

Table 11.13 - Peak hour flows generated by major retail component within development site

It would be reasonable to assume that a significant proportion of these volumes are multi-purpose trips that involve use of the retail facilities by the inhabitants of the residential units. Also, a significant proportion of trips generated will be pass-by / diverted trips which are already on the network and are thus not deemed new trips. Therefore, it would be reasonable to assume that 50% of the values within Table 11.13 are new trips.

The following are the combined flows generated by the residential and major retail components within the Proposed Development for the morning and evening peak:

	Weekday AM		Weekday PM	
	IN	OUT	IN	OUT
Apartments	22	82	77	41
Retail	44	39	54	61
Total generated flows	66	121	131	102

Table 11.14 - Total flows generated by the Proposed Development

Thus, the proposal will result in a 2-way flow of 187 vehicles per hour in the morning peak, increasing to 233 vehicles per hour in the evening peak (3.1 vehicles entering or exiting every minute during the morning peak, rising to 3.9 vehicles entering or exiting per minute during the evening peak).

<u>Distribution of Flows Generated by Proposed Development</u>

The incident flows along the R105 / Howth Road are relatively well balanced during both the morning and evening peaks.
For the morning peak, in the interests of robustness for exiting traffic (peak direction of flow) a 2:1 ratio is assumed in favour of traffic exiting towards Sutton Cross. Of the one-third exiting towards Howth Village, 50% of trips are assumed to terminate in the local area, with the remaining 50% accessing Sutton Cross via Greenfield Road.

For traffic entering the development (non-peak direction of flow), 50% is assumed to enter from the Howth Village direction with 50% from Sutton Cross via Howth Road.

At Sutton Cross, for exiting traffic (peak direction of flow) from Howth Road / Greenfield Road, 60% is assumed to exit to the Dublin Road, with 40% exiting to Station Road, while for traffic entering (non-peak direction of flow) from Sutton Cross, 50% will enter form Dublin Road and 50% from Station Road. 50% of this entering traffic will exit onto Howth Road, with 50% exiting onto Greenfield Road.

Figure 11.14 details the assumed distributions for the AM peak hour generated flows.

In the evening peak, for exiting traffic (non-peak direction of flow), a 50:50 split will be assumed between traffic exiting towards Sutton Cross and Howth Village. Of the 50% exiting towards Howth Village, again 50% of trips are assumed to terminate in the local area, with the remaining 50% accessing Sutton Cross via Greenfield Road.

For traffic entering the development (peak direction of flow), one-third are assumed to enter from the Howth Village direction, with two-thirds from Sutton Cross via Howth Road.

At Sutton Cross, for exiting traffic (non-peak direction of flow) from Howth Road / Greenfield Road, 60% is assumed to exit to the Dublin Road, with 40% exiting to Station Road, while for traffic entering (peak direction of flow) from Sutton Cross, 60% will enter form Dublin Road and 40% from Station Road. 60% of this entering traffic will exit onto Howth Road, with 40% exiting onto Greenfield Road.

Figure 11.14 and Figure 11.15 details the assumed distributions for the AM and PM peak hour generated flows.

Figure 11.14 - Distribution of morning peak hour flows generated by Proposed Development

Figure 11.15 - Distribution of evening peak hour flows generated by Proposed Development

<u>Assumptions Regarding Traffic Growth Within Local Road Network</u>

The 2014 Traffic and Transport Assessment Guidelines published by the NRA requires that the relevant junctions be analysed for the existing situation, the year of opening (2024) with the proposed and adjacent developments in place, the design year 1 (year of opening plus 5) with the proposed and adjacent developments in place, and the design year 2 (year of opening plus 15) with the proposed and adjacent developments in place. In order to bring focus to the analysis, design year 1 has been omitted from those junctions fully analysed.

An annual growth rate of 1.4% has been assumed for the period 2019 to 2030, decreasing to 0.5% for 2031 to 2039, based on the medium growth estimate for Fingal County Council published by TII in 2017 (PE-PAG-02017).

The 2024 Do-Nothing ('without development') scenario is derived by factoring the survey results in Diagrams 1 and 2 up by 4.2% ($(1.014)^3 - 1 = 0.042$). The 2024 Do-Something ('with development') scenario is derived by adding the development flows detailed within Diagrams 7 and 8 to these factored network flows.

The 2039 Do-Nothing ('without development') scenario is derived by factoring the survey results in Diagrams 1 and 2 up by 20.7% ($((1.014)^{11} – 1))((1.005)^7 – 1) = 0.207$). The 2039 Do-Something ('with development') scenario is derived by adding the development flows detailed within Diagrams 7 and 8 to these factored network flows.

The 2039 analysis constitutes a significantly conservative analysis for current transport policy, in the Greater Dublin Area. The use of the private car for the trip to work is being actively discouraged and use of public transport and soft modes actively encouraged, it is highly unlikely that an increase in traffic volumes of 21% from now until 2039 will take place.

The comparison of 2015 and 2019 flows at Sutton Cross detailed within Table 11.15 would reinforce this assertion (The 2015 surveys were commissioned for a previous planning application on the Techrete site).

In reality, it could reasonably be assumed going forward that traffic volume increases during the morning and evening peaks will be marginal over the coming years.

		2015		2019			
		8 to 9	5 to 6	8 to 9	5 to 6		
		AM	PM	AM	PM	AM +/-	PM +/-
Sutton Crossroads	site 1	1933	2004	1949	1694	**0.8**	**-15.5**
Greenfield Road / Church Road	site 2	1092	778	1107	814	**1.4**	**4.6**
Church Road / Howth Road	site 3	921	1203	983	824	**6.7**	**-31.5**
Offington Park / Howth Road	site 4	890	1152	898	797	**0.9**	**-30.8**
Claremont Road / Howth Road	site 5	823	1112	798	756	**-3.0**	**-32.0**
Harbour Road / Church Street	site 6	717	932	658	712	**-8.2**	**-23.6**

Table 11.15 - Comparison of 2015 and 2019 surveys at 6 No. critical junctions

Traffic Flows Generated By Adjacent Planned Development At Balscadden

Trips Generated by Adjacent Planned Development

As detailed within the submitted TTA for the Balscadden Development, the Proposed Development is predicted to generate 41 No. outbound trips and 7 No. inbound trips during the morning peak hour between 0800 and 0900, with 27 No. inbound trips and 9 No. outbound trips generated during the evening peak between 1700 and 1800.

Distribution of Trips Generated By Adjacent Planned Development

The assumed distribution of trips generated by the adjacent planned development are detailed for the morning and evening peak hours in Figure 11.16 and Figure 11.17 respectively:

Figure 11.16 - Distribution of morning peak hour flows generated by adjacent planned development

Figure 11.17 - Distribution of evening peak hour flows generated by adjacent planned development

The following 4 No. priority junctions - Development Entrance, Offington Park, Church Road and Church Street - experience a very limited traffic impact as a result of the Proposed Development. They are analysed for the day of opening with and without development, with results summarised in Table 11.16.

<u>Traffic Impacts on Offington Park, Church Road, Church Street and Development Entrance junctions resulting from total development flows</u>

Table 11.16 summarises the day of opening maximum ratios of flow to capacity at the junctions with the total development flows assumed to be in place:

	MAXIMUM RATIO OF FLOW TO CAPACITY (RFC)	
	AM PEAK	PM PEAK
Offington Park / Howth Road	0.62	0.21
Church Road / Howth Road	0.51	0.13
Harbour Road / Church Street	0.39	0.45
Development Entrance (Howth Road)	0.22	0.19

Table 11.16 - Maximum ratios of flow to capacity at Offington Park, Church Road, Church Street and Development Entrance junctions for morning and evening peak hours (2024)

The above results confirm that no congestion at the above 4 No. junctions will result with total development flows incident on them. Therefore, the potential impact of the development on the 4 junctions listed above is not significant with neutral long term effects.

Traffic Impacts on Sutton Cross resulting from total development flows

This is the critical junction, with all traffic leaving Howth peninsula funnelling through Sutton Cross. Therefore, a full analysis of the junction, both on its projected day of opening in 2024 and within its design year, 15 years thereafter, is undertaken in full compliance with the requirements of Transport Infrastructure Ireland's Traffic and Transport Assessment Guidelines.

Table 11.17 and Table 11.18 analyses the junction for the morning and evening peaks respectively on the assumed day of opening of the proposal in 2024 with total development flows incident included (incident development flows based on the distribution assumptions detailed above).

	2024 AM PEAK FLOWS (WITH DEV)			
0800-0815	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.49	6.94	0.94	20
Howth Road (East) R	2.24	2.62	0.86	9
Greenfield Road (South) L+S+R	7.53	9.32	0.81	15
Dublin Road (East) L+S	4.09	9.48	0.43	9
Dublin Road (East) R	2.58	3.75	0.69	8
Station Road (North) L	1.96	13.66	0.14	3
Station Road (North) S+R	5.64	9.96	0.57	11

0815-0830	Flow (veh/min)	Cap. (veh/m3.08 in)	RFC (-)	Max. queue (vehicles)
Howth Road (East) L+S	7.28	6.83	1.07	30
Howth Road (East) R	2.78	2.62	1.06	14
Greenfield Road (South) L+S+R	9.00	8.56	1.05	28
Dublin Road (East) L+S	6.18	9.38	0.66	14
Dublin Road (East) R	4.36	3.75	1.16	22
Station Road (North) L	2.42	13.66	0.18	4
Station Road (North) S+R	7.44	9.21	0.90	15
0830-0845	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.95	6.88	1.16	46
Howth Road (East) R	3.45	2.62	1.32	26
Greenfield Road (South) L+S+R	8.80	8.10	1.09	38
Dublin Road (East) L+S	6.48	9.53	0.68	14
Dublin Road (East) R	3.38	3.75	0.90	18
Station Road (North) L	3.87	13.66	0.28	6
Station Road (North) S+R	8.20	9.32	0.88	18
0845-0900	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.08	7.11	0.99	47
Howth Road (East) R	2.92	2.62	1.11	31
Greenfield Road (South) L+S+R	8.67	9.55	0.91	31
Dublin Road (East) L+S	5.34	9.55	0.56	12
Dublin Road (East) R	2.12	3.75	0.57	8
Station Road (North) L	2.63	13.66	0.19	4
Station Road (North) S+R	5.64	9.19	0.61	11

Table 11.17 - Day of opening (2024) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the morning peak hour (total development flows in place)

Table 11.19 and Table 11.20 analyses the junction for the morning and evening peaks respectively within the assumed design year in 2039, 15 years after the assumed day of opening, with total development flows incident included (incident development flows based on the distribution assumptions detailed above).

	2024 PM PEAK FLOWS (WITH DEV)			
1700-1715	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.89	10.22	0.58	12
Howth Road (East) R	1.97	2.46	0.80	7
Greenfield Road (South) L+S+R	7.27	6.40	1.16	31
Dublin Road (East) L+S	7.05	13.20	0.53	12
Dublin Road (East) R	3.75	3.20	1.17	19
Station Road (North) L	2.56	10.61	0.24	5
Station Road (North) S+R	4.64	7.14	0.65	10
1715-1730	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.42	10.42	0.52	11
Howth Road (East) R	2.25	2.46	0.89	9
Greenfield Road (South) L+S+R	5.40	6.82	0.79	16
Dublin Road (East) L+S	7.07	13.25	0.53	12
Dublin Road (East) R	2.46	3.20	0.77	11
Station Road (North) L	2.59	10.61	0.24	5
Station Road (North) S+R	3.55	7.47	0.48	8
1730-1745	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.98	10.54	0.76	17
Howth Road (East) R	3.15	2.46	1.28	21
Greenfield Road (South) L+S+R	4.73	6.67	0.71	11
Dublin Road (East) L+S	7.89	13.13	0.60	13
Dublin Road (East) R	2.85	3.20	0.89	11
Station Road (North) L	2.86	10.61	0.27	5
Station Road (North) S+R	4.81	7.53	0.64	11
1745-1800	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.48	10.29	0.53	11
Howth Road (East) R	1.58	2.46	0.65	9
Greenfield Road (South) L+S+R	6.40	5.90	1.08	18
Dublin Road (East) L+S	7.92	13.50	0.59	6
Dublin Road (East) R	3.61	3.20	1.13	15
Station Road (North) L	3.61	10.61	0.34	3
Station Road (North) S+R	5.25	7.869	0.68	6

Table 11.18 - Day of opening (2024) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the evening peak hour (total development flows in place)

One can see that the junction is at or over capacity on a number of its approaches. Assuming network flow increases of 4.2 % between 2019 and 2024, plus development flows of 179 No. vehicles during the morning peak and 227 No. vehicles during the evening peak, maximum queuing will increase by 30 No. vehicles during the morning peak relative to the ‘without development’ scenario on the busiest approach (Howth Road), and an increase of 8 No. vehicles during the evening peak relative to the ‘without development’ scenario at Greenfield Road. Therefore, the potential impact will be moderate with a negative and long term effect on the Sutton Cross junction in 2024.

	2039 AM PEAK FLOWS (WITH DEV)			
0800-0815	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.30	6.94	1.05	27
Howth Road (East) R	2.50	2.62	0.96	11
Greenfield Road (South) L+S+R	8.67	9.06	0.96	21
Dublin Road (East) L+S	4.68	9.48	0.49	10
Dublin Road (East) R	2.99	3.75	0.80	10
Station Road (North) L	2.25	13.66	0.17	4
Station Road (North) S+R	6.48	9.55	0.68	12
0815-0830	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	8.26	6.82	1.21	49
Howth Road (East) R	3.14	2.62	1.20	20
Greenfield Road (South) L+S+R	10.33	8.10	1.28	54
Dublin Road (East) L+S	7.04	9.35	0.75	16
Dublin Road (East) R	5.02	3.75	1.34	32
Station Road (North) L	2.78	13.66	0.20	4
Station Road (North) S+R	8.55	8.65	0.99	23
0830-0845	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	9.02	6.87	1.31	81
Howth Road (East) R	3.91	2.62	1.49	39
Greenfield Road (South) L+S+R	10.13	7.57	1.34	91
Dublin Road (East) L+S	7.47	9.52	0.78	17
Dublin Road (East) R	3.93	3.75	1.05	35
Station Road (North) L	4.43	13.66	0.33	6
Station Road (North) S+R	9.43	8.75	1.08	35
0845-0900	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	8.02	7.11	1.13	96
Howth Road (East) R	3.31	2.62	1.26	49
Greenfield Road (South) L+S+R	9.93	9.38	1.06	103
Dublin Road (East) L+S	6.14	9.55	0.64	13
Dublin Road (East) R	2.46	3.75	0.66	17
Station Road (North) L	3.00	13.66	0.22	4
Station Road (North) S+R	6.46	8.68	0.74	15

Table 11.19 - Design Year (2039) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the morning peak hour (total development flows in place)

	2039 PM PEAK FLOWS (WITH DEV)			
1700-1715	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.75	10.21	0.66	14
Howth Road (East) R	2.25	2.46	0.91	9
Greenfield Road (South) L+S+R	8.33	5.97	1.39	49
Dublin Road (East) L+S	7.96	13.20	0.60	13
Dublin Road (East) R	4.30	3.20	1.34	26
Station Road (North) L	2.88	10.61	0.27	5
Station Road (North) S+R	5.26	6.81	0.77	12
1715-1730	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.11	10.41	0.59	12
Howth Road (East) R	2.55	2.46	1.04	13
Greenfield Road (South) L+S+R	6.20	6.67	0.93	45
Dublin Road (East) L+S	7.97	13.24	0.60	13
Dublin Road (East) R	2.83	3.20	0.88	22
Station Road (North) L	2.90	10.61	0.27	5
Station Road (North) S+R	4.04	7.21	0.56	9
1730-1745	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	9.13	10.54	0.87	20
Howth Road (East) R	3.60	2.46	1.47	30
Greenfield Road (South) L+S+R	5.40	6.49	0.83	30
Dublin Road (East) L+S	8.94	13.11	0.68	15
Dublin Road (East) R	3.26	3.20	1.01	24
Station Road (North) L	3.23	10.61	0.30	6
Station Road (North) S+R	5.51	7.32	0.75	12
1745-1800	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.21	10.28	0.60	13
Howth Road (East) R	1.79	2.46	0.73	21
Greenfield Road (South) L+S+R	7.33	5.57	1.31	54
Dublin Road (East) L+S	8.97	13.49	0.66	15
Dublin Road (East) R	4.17	3.20	1.30	38
Station Road (North) L	4.07	10.61	0.38	7
Station Road (North) S+R	6.00	7.49	0.80	14

Table 11.20 - Design Year (2039) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the evening peak hour (total development flows in place)

Assuming network flow increases of 21 % over the 2019 to 2039 period plus 2-way development flows of approximately 3 vehicles per minute, maximum queuing has grown significantly over existing levels, and further above the 2039 'without development' scenario. Therefore, the potential impact will have a significant impact with a negative and long term effect on the Sutton Cross junction in 2039.

The above analysis in Table 11.20 is very much a 'worst case' scenario, as an increase of 21% in network flows over the next 19 years is highly unlikely given the aim of existing transport policies within the Greater Dublin area to minimise use of the private car for the journey to work. It should also be stated that the trip distribution assumptions are very robust, with the assumption that 75% of all development flows would be incident on Sutton Cross during both peaks. In reality, vehicle trips with local destinations during the morning peak and with local origins during the evening peak may form a significantly greater cohort than assumed within this analysis. Therefore, in reality the likelihood is that the potential impact in 2039 will be more moderate than significant.

Cumulative Impacts

In order to demonstrate, in overall terms, the level of traffic impact generated by the proposed development and the Balscadden development, flows on the local road network, Table 11.21 details the increase in traffic at the 6 No. existing critical junctions plus the Proposed Development entrance:

		EXISTING TRAFFIC		GENERATED TRAFFIC		PERCENTAGE INCREASE	
		AM	PM	AM	PM	AM	PM
Sutton Crossroads	site 1	1949	1694	187	224	9.6	13.2
Greenfield Road / Church Road	site 2	1107	814	42	78	3.8	9.5
Church Road / Howth Road	site 3	983	824	145	164	14.8	19.9
Offington Park / Howth Road	site 4	898	797	145	164	16.2	20.6
Claremont Road / Howth Road	site 5	798	756	145	164	18.2	21.7
Harbour Road / Church Street	site 6	658	712	104	119	15.8	16.7
Development Entrance (Howth Road)	Proposed Development	658	700	218	256	33.1	36.5

Table 11.21 - Impact of generated flows on critical junctions

Thus, increases are below 5% on Greenfield Road / Howth Road, which is below the indicative threshold for a traffic impact assessment at a congested junction (National Roads Authority Transport Assessment Guidelines, 2014). No analysis of cumulative impacts from the proposal is thus required for this location. Therefore, the potential cumulative impact on the road network for the combined developments is moderate in the medium term and significant in the long term with regards to Sutton Cross Junction. All other junction are operating well within capacity and the potential impacts are slight, in short, medium and long term

11.1.7.2 Pedestrian

Direct/Indirect

To the west of the proposed development site are a series of dwellings on the opposite side of Howth road and on the development side over a dozen dwellings and a block of apartments, Howth Lodges, followed by the DART line towards Sutton Cross. Further west there is a number of housing estates, where their nearest station would be Sutton Cross DART station.

For pedestrian using the Howth road footpath on the site side of the road, the first crossing point is provided outside the Howth DART Station. This road is very busy and it would be reasonable to assume that most pedestrians using the footpath do not cross until they reached Howth DART station.

Based on the information taken from the Transport for Ireland, 52% of commute use public transport, 5.7% cycle and 11.2% walk. For the purpose of this analysis worse case scenario it is assumed that the people using the public transport and walking are all either walking towards public transport (i.e. Howth DART Station) or Howth Village, this equates to 63.2% of the population using the footpath outside the proposed site. Based on the Permeability Best Practice Guide B published by the Transport for Ireland (TFI), the pedestrian route directness (PRD), needs to be under 10 minutes or 700m to be a desirable walking route. Howth Lodge apartments and 5 of the dwellings are over 1000m from the DART line, therefore it would be fair to assume that half of these would opt to drive or cycle, reducing the pedestrian number to 31.6%.

Table 11.22 below calculates the current number of pedestrians using the public footpath directly outside the development as 116 people, based on 2.7 persons per dwelling unit. Taken from the 2016 census 50% of the population works, this reduces the number of commuters during peak hour to 58 people. This equates to a total movement in and out of Howth village per day of 116 movement. Using the same peak times as traffic,08:00 - 09:00 and 17:00 and 18:00, this equates to currently one person per minute using the footpath during peak hours.

Property	No of Units	Total People	Percentage of Pedestrian %	No of People walking to Howth Village
Howth Lodge apartments over 700m	102	276	31.6	44
Dwelling Houses over 700m	5	38	31.6	6
Dwelling Houses under 700m distance	9	24.3	63.2	8
Total Number of People using footpath				**58**

Table 11.22 – Current Pedestrian Permeability during peak hour

The proposed development is within the 700m zone and therefore it is assumed that 63.2% will be using the public footpath. As shown in Table 11.23 this increase the pedestrian usage to 495 people. Therefore, during peak times this will equate to 9 people per minute using the footpath. The proposed footpath is in accordance with DEMURs requirements and is enough for this volume of foot traffic.

It should be noted that work place environments are becoming more flexible allowing people to work from home or flexi time, therefore stating that all these people would be going to work between 8:00 and 9:00 and returning home between 17:00 and 18:00 is worst case scenario and would not be the actual case.

Therefore, the potential impact of the proposed development will be significant on the public footpaths with neutral long-term effects.

Property	No of Units	Total People	Percentage of Pedestrian %	No of People walking to Howth Village
Howth Lodge apartments over 700m	102	276	31.6	44
Dwelling Houses over 700m	5	38	31.6	6
Dwelling Houses under 700m distance	9	24.3	63.2	8
Proposed development under 700m	512	1383	63.2	437
Total Number of People using footpath				**495**

Table 11.23 - Proposed Pedestrian Permeability Activity

<u>Cumulative</u>

Pedestrians associated with Balscadden will not impact the pedestrian facilities west of Howth DART Station. Therefore, no cumulative effects in respect of the proposed development.

11.1.7.3 Cyclists

<u>Direct/Indirect</u>

Table 11.29 details the network improvements proposed within the Greater Dublin Area cycle plan.

Figure 11.18 - Proposed cycle facilities close to the Proposed Development (GDA cycle plan)

A secondary cycle route is planned along Howth Road. Carrickbrack Road, which will connect the Proposed Development to all parts of Howth, southwards towards the city centre and north-westwards towards Portmarnock, Malahide and Swords.

In addition, the proposed East Coast Greenway will run on the northern edge of the site, connecting Howth to the greenway network in the Greater Dublin area.

Figure 11.18 contains a drawing of the Dublin Greenway network map, indicating the extent of the east Coast Greenway.

Figure 11.19 - Dublin Greenway Map, including route of East Coast Greenway

The current population of Howth Peninsula based on the census of 2016 is 8,294 people, based on census on average 50% work. Of those, based on the information taken from the Transport for Ireland website, 52% of people use public transport, 5.7% cycle and 11.2% walk. It is estimated that the development will be completed in 2024.

An assessment has been carried out to determine the implication of the proposed development on the proposed network. The number of people in the development is based on the 2.7 person per unit, which equates to 1,383 people. Therefore the commuting population from the development is 692 people.

Table 11.24 - Shows the current number of people cycling to work and anticipated increase in bicycles on network due to the development.

Public Transport	Existing	Network Increase
Existing	236	
Proposed Development	40	
Total	276	17%

Table 11.24 – Existing and Proposed Cycling Network

Current peak commute hours are between 08:00 to 09:00 and 17:00 to 18:00. There is a 17% increase on the cycling network. The potential impact on the cycling network will be a long term neutral effect of moderate significance.

Cumulative

The cumulative effect is to assess the cycle network for the proposed development with the Balscadden development. The Balscadden development plans to have 164 units, which equates to 443 people and of this

222 commuting for work. Table 11.25 shows that number of cyclists will be increased by 23% on the existing network. Therefore, the potential impact of the combined developments will be a long term neutral effect of moderate significance.

Public Transport	Existing	Network Increase
Existing	236	
Proposed Development	40	
Balscadden	13	
Total	289	23%

Table 11.25 - Combined Cycle Network

It should be noted this is a worse-case scenario, this assumes that all cyclist leave for work between 8:00 and 09:00 and return home at 17:00 and 18:00. In realistic terms with modern flexible working hours and working from home options, these figures should be spread over 2 hours in morning and evening, therefore reducing the number cyclists one cyclist per minute. Thereby, the likely potential impact of the combined developments will be long term neutral effect of slight significance.

11.1.7.4 Public Transport

Direct/Indirect

The major public transport facility available to residents and visitors at the Proposed Development is the DART, which extends along the coastline of the South Dublin area, linking the centre of Dublin city to Ballsbridge, Sandymount , Merrion, Booterstown, Blackrock, Monkstown, Dun Laoghaire, Dalkey, Ballybrack, Shankhill, Bray and Greystones, and along the coastline of the north Dublin area extending from the town centre to Clontarf, Sutton, Howth and Malahide. The Howth DART Station is within 100 metres (1 minutes' walk) of the Proposed Development (15 minutes walk from the centre of the site) to the station and operates a service to the city centre every 12 to 15 minutes during the morning peak time.

In the future, the Bus Connects project put forward by the national Transport Agency proposes the N6 orbital route across the north side of Howth, opening up a new service to DCU while maintaining a good connection to the rail or the D spine for travel to the city centre.

On the southern and western sides of Howth, where demand is relatively low, local routes 290 and 291 will operate an hourly service, providing direct service to Sutton and Clongriffin DART Stations, thus providing enhanced connectivity to the local train system.

These proposed improvements are detailed within Figure 11.20

Figure 11.20 - Future bus routes envisaged in Bus Connects Report (NTA,

The expansion programme will create a full metropolitan area DART network for Dublin, with all of the lines linked and connected. This will transform the rail system in the Greater Dublin Area, delivering new DART services between the City Centre and Drogheda, Maynooth - M3 Parkway and Hazelhatch - Celbridge. Figure 11.20 details the DART expansion programme planned 2018 to 2027,

Customer capacity and train service frequency on these lines will be significantly increased as a result of the programme.

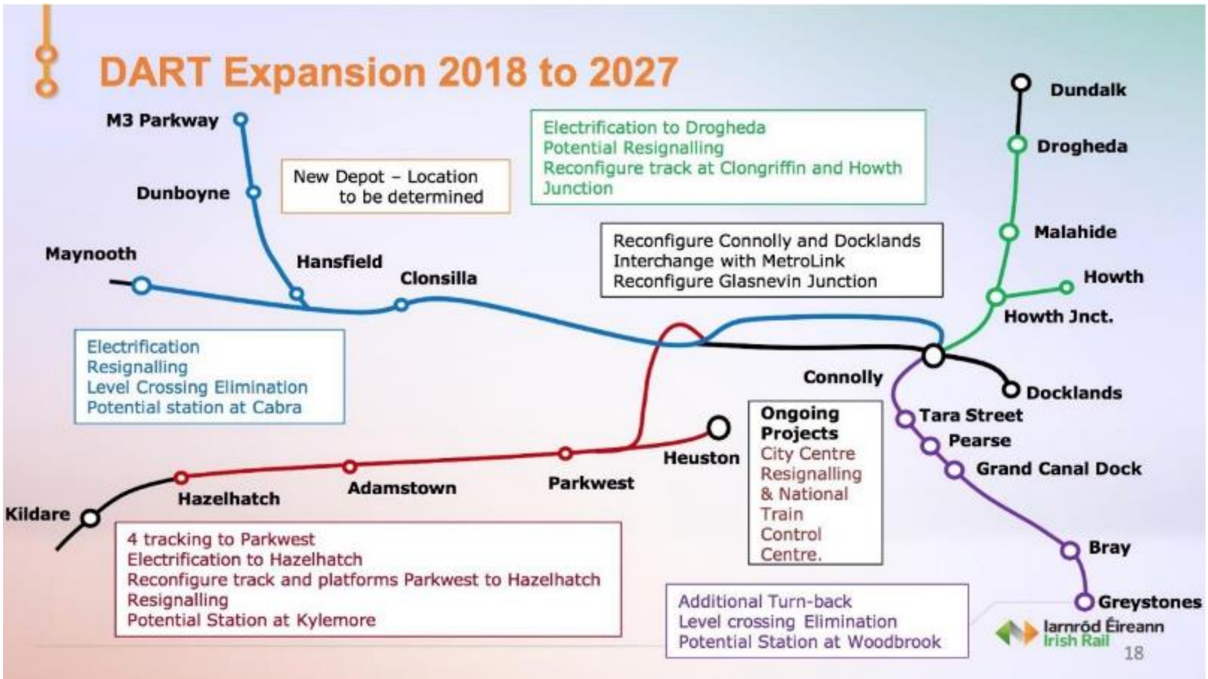

Figure 11.21 - DART expansion programme

The current population of Howth Peninsula based on the census of 2016 is 8,294 people. Based on the information taken from the Transport for Ireland, 52% of people use public transport, 5.7% cycle and 11.2% walk. It is estimated that the development will be completed in 2024. Table 11.26 taken from the Iarnrod Eireann website show that the Dart line (Northern Line) will be near completion by 2024 and therefore appropriate to assess the development against the proposed scheme.

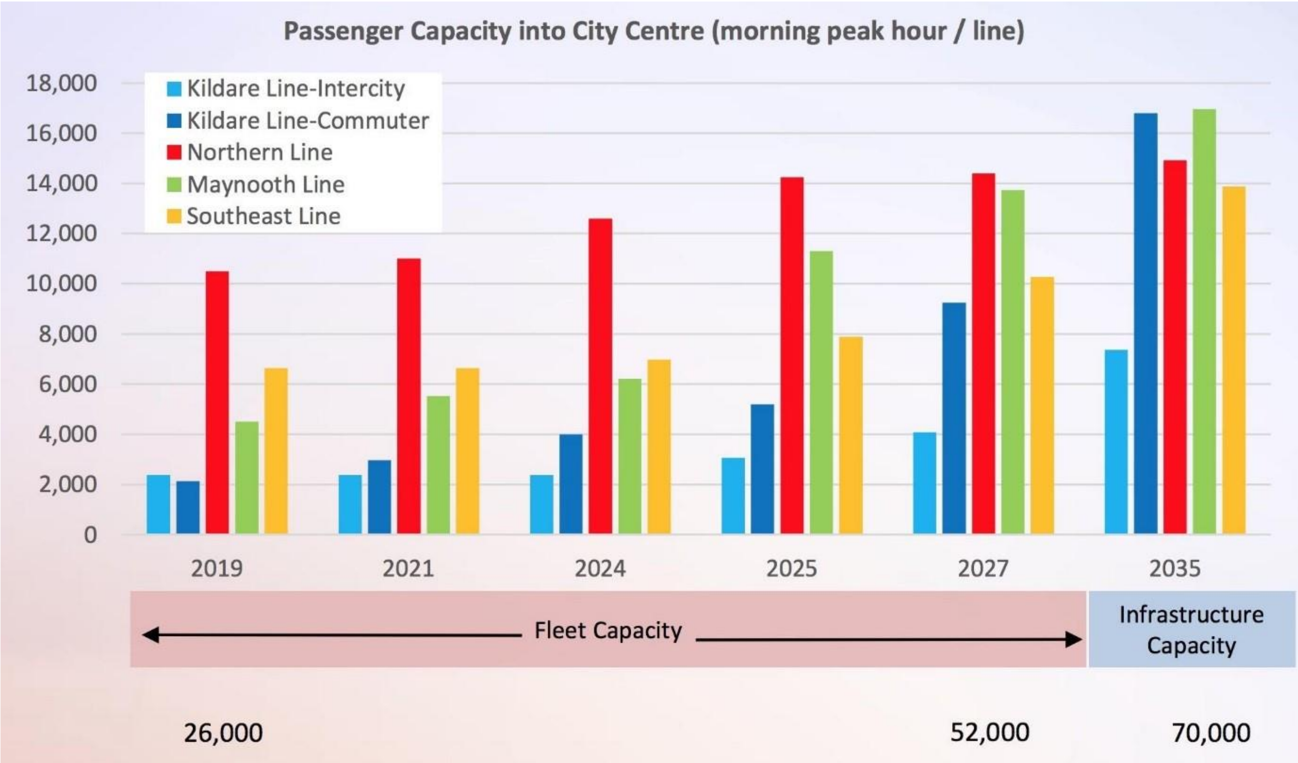

Table 11.26 – Improve Network Capacities

In relation to the 14,000 capacity shown in Table 11.26 above the capacity from Howth will be in the order of 3,600 people.

An assessment has been carried out to determine the implication of the proposed development on the proposed network. The number of people in the development is based on the 2.7 person per unit, which equates to 1,383 people, of which 692 people will commuting.

Table 11.27 - illustrates the network utilisation increase for when the development is in operation. It can be seen that the proposed development will have a 16% increase in the network demand.

Public Transport	Demand 2024 excluding Development	Development	Total	Network Increase
DART	1,940	324	2,264	16%
Bus	216	36	252	16%
Total	2,156	360	2,875	16%

Table 11.27 – Public Transport with and without development

Current peak commute hours are between 08:00 to 09:00 and 17:00 to 18:00. This equates to an additional 54 people per train and 12 people per bus from the development. However, this is a worse-case scenario and assumes that everybody in the developments are commuting at a set time. In realistic terms with modern flexible working hours and working from home options, these figures should be spread over 2 hours in morning and evening, therefore reducing the number for the development to, 27 people per train and 6 people per bus. The likely potential impact on the train and bus service will be moderate with negative long term effects.

Cumulative

A cumulative effect is to assess the Balscadden development combined with the proposed development. The population data referred to above and taking account of the additional 163 units which equates to 443 people in that development, Table 11.28 can be generated.

Table 11.28– Shows that the combined development will result in an increase in network demand of 22%.

Public Transport	Demand 2024 excluding Development	Development	Balscadden	Total	Network Increase
DART	1,940	324	104	2,368	22%
Bus	216	36	12	264	22%
Total	2,156	360	116	2,632	22%

Table 11.28 - Public Transport with Balscadden and Proposed Development in operation

As discussed, previously current peak commute hours are between 08:00 to 09:00 and 17:00 to 18:00. This equates to an additional 72 people per train and 16 per bus during peak hour from the two developments. However, this is a worst-case scenario, if we allow to be spread over 2 hours in the morning and evening this will reduce to 36 people per train and 8 people per bus. The potential impact on the train service and bus service will be moderate with negative long term effects.

11.1.8 'DO NOTHING' IMPACT

The same format will be utilised as in section 11.1.7.1, with the 3 No. non-critical junctions assessed in summary together (no development entrance junction in 'do-nothing' scenario), and the 'without development' assessment of Sutton Cross analysed in more detail.

Traffic Impacts on Offington Park, Church Road And Church Street Junctions (2024 'Do-Nothing' Scenario)

Table 11.29 summarises the 2024 maximum ratios of flow to capacity at the junctions for the 'do-nothing' scenario:

	MAXIMUM RATIO OF FLOW TO CAPACITY (RFC)	
	AM PEAK	PM PEAK
Offington Park / Howth Road	0.58	0.20
Church Road / Howth Road	0.47	0.12
Harbour Road / Church Street	0.40	0.45

Table 11.29 - Maximum ratios of flow to capacity at Offington Park, Church Road and Church Street junctions for morning and evening peak hours (2024, 'do-nothing' scenario)

The above results confirm that no congestion at the above 4 No. junctions will result with total development flows incident on them. The results are virtually indistinguishable from the 2024 results with total development flows in place. Therefore the potential impact for the do nothing situation is imperceptible and will have neutral long term effects.

Traffic Impacts on Sutton Cross Arising From Network Increases Only (2024 And 2039 Without Any Proposed Development In Place)

Table 11.30 and Table 11.31 analyses the junction for the morning and evening peaks respectively on the assumed day of opening of the proposal in 2024 with no development flows incident on it and network flow increases of 4.1% assumed in the 2019 to 2024 period.

Table 11.32 and Table 11.33 analyses the junction for the morning and evening peaks respectively within the assumed design year in 2039 with no development flows incident on it and network flow increases of 21% assumed in the 2019 to 2039 period.

	2024 AM PEAK FLOWS (WITHOUT DEV)			
0800-0815	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.29	6.89	0.77	14
Howth Road (East) R	1.78	2.62	0.68	6
Greenfield Road (South) L+S+R	7.13	9.32	0.77	14
Dublin Road (East) L+S	3.64	9.45	0.38	8
Dublin Road (East) R	2.56	3.75	0.68	8
Station Road (North) L	1.75	13.66	0.13	3
Station Road (North) S+R	5.38	10.17	0.53	10
0815-0830	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.08	6.78	0.90	18
Howth Road (East) R	2.32	2.62	0.89	9
Greenfield Road (South) L+S+R	8.60	8.54	1.00	24
Dublin Road (East) L+S	5.71	9.35	0.61	13
Dublin Road (East) R	4.36	3.75	1.16	22
Station Road (North) L	2.23	13.66	0.16	4
Station Road (North) S+R	7.17	9.42	0.76	14
0830-0845	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.77	6.83	0.99	24
Howth Road (East) R	2.97	2.62	1.13	17
Greenfield Road (South) L+S+R	8.47	8.04	1.05	32
Dublin Road (East) L+S	6.05	9.51	0.64	13
Dublin Road (East) R	3.35	3.75	0.89	18
Station Road (North) L	3.67	13.66	0.27	6
Station Road (North) S+R	7.93	9.48	0.84	17
0845-0900	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.89	7.07	0.83	17
Howth Road (East) R	2.44	2.62	0.93	16
Greenfield Road (South) L+S+R	8.27	9.57	0.86	21
Dublin Road (East) L+S	4.92	9.53	0.52	11
Dublin Road (East) R	2.08	3.75	0.56	8
Station Road (North) L	2.43	13.66	0.18	4
Station Road (North) S+R	5.37	9.34	0.58	10

Table 11.30 - Day of opening (2024) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the morning peak hour (development not in place)

	2024 PM PEAK FLOWS (WITHOUT DEV)			
1700-1715	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.22	10.17	0.51	11
Howth Road (East) R	1.71	2.46	0.70	6
Greenfield Road (South) L+S+R	6.73	6.40	1.05	23
Dublin Road (East) L+S	5.85	13.11	0.45	10
Dublin Road (East) R	3.55	3.20	1.11	17
Station Road (North) L	2.04	10.61	0.19	4
Station Road (North) S+R	4.23	7.27	0.58	9
1715-1730	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	4.72	10.38	0.46	10
Howth Road (East) R	2.01	2.46	0.82	7
Greenfield Road (South) L+S+R	4.93	6.95	0.71	13
Dublin Road (East) L+S	5.88	13.13	0.45	10
Dublin Road (East) R	2.26	3.20	0.71	9
Station Road (North) L	2.06	10.61	0.19	4
Station Road (North) S+R	3.14	7.54	0.42	7
1730-1745	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.31	10.52	0.70	15
Howth Road (East) R	2.89	2.46	1.17	17
Greenfield Road (South) L+S+R	4.27	6.80	0.63	19
Dublin Road (East) L+S	6.68	13.01	0.51	11
Dublin Road (East) R	2.65	3.20	0.83	9
Station Road (North) L	2.33	10.61	0.22	4
Station Road (North) S+R	4.47	7.61	0.59	10
1745-1800	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	4.80	10.24	0.47	10
Howth Road (East) R	1.34	2.46	0.54	6
Greenfield Road (South) L+S+R	5.93	6.03	0.98	19
Dublin Road (East) L+S	6.71	13.45	0.50	11
Dublin Road (East) R	3.42	3.20	1.07	16
Station Road (North) L	3.06	10.61	0.29	6
Station Road (North) S+R	4.87	7.81	0.62	11

Table 11.31 - Day of opening (2024) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the evening peak hour (development not in place)

Assuming network flow increases of 4.2 % from now until the projected day of opening of the Proposed Development in 2024, maximum queuing will increase by 30 No. vehicles during the morning peak relative to the existing situation on the busiest approach (Greenfield Road), and an increase of 3 No. vehicles during the evening peak relative to the existing situation at the same location.

Thus, assuming no development flows, it is predicted that this junction will be over capacity on a number of its approaches by 2024 assuming network flows increase by 4.1% between 2019 and 2024. Therefore the potential impact for the do nothing situation is slight and will have negative long term effects.

	2039 AM PEAK FLOWS (WITHOUT DEV)			
0800-0815	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.08	6.89	0.88	18
Howth Road (East) R	2.06	2.62	0.78	8
Greenfield Road (South) L+S+R	8.27	9.06	0.91	19
Dublin Road (East) L+S	4.24	9.45	0.45	9
Dublin Road (East) R	2.96	3.75	0.79	10
Station Road (North) L	2.05	13.66	0.15	3
Station Road (North) S+R	6.22	9.75	0.64	12
0815-0830	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.06	6.78	1.04	27
Howth Road (East) R	2.68	2.62	1.02	13
Greenfield Road (South) L+S+R	10.00	8.07	1.23	48
Dublin Road (East) L+S	6.57	9.35	0.70	15
Dublin Road (East) R	5.03	3.75	1.34	32
Station Road (North) L	2.58	13.66	0.19	4
Station Road (North) S+R	8.29	8.82	0.94	20
0830-0845	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	7.84	6.83	1.15	43
Howth Road (East) R	3.43	2.62	1.30	25
Greenfield Road (South) L+S+R	9.80	7.51	1.30	81
Dublin Road (East) L+S	7.03	9.51	0.74	16
Dublin Road (East) R	3.91	3.75	1.04	34
Station Road (North) L	4.22	13.66	0.31	6
Station Road (North) S+R	9.19	8.91	1.03	28
0845-0900	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.83	7.07	0.96	42
Howth Road (East) R	2.83	2.62	1.08	28
Greenfield Road (South) L+S+R	9.60	9.38	1.02	88
Dublin Road (East) L+S	5.71	9.53	0.60	12
Dublin Road (East) R	2.42	3.75	0.65	16
Station Road (North) L	2.80	13.66	0.21	4
Station Road (North) S+R	6.20	8.80	0.70	13

Table 11.32 - Design Year (2039) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the evening peak hour (development not in place)

	2039 PM PEAK FLOWS (WITHOUT DEV)			
1700-1715	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	6.06	10.17	0.59	13
Howth Road (East) R	2.00	2.46	0.82	7
Greenfield Road (South) L+S+R	7.80	6.12	1.27	39
Dublin Road (East) L+S	6.78	13.11	0.52	11
Dublin Road (East) R	4.09	3.20	1.28	23
Station Road (North) L	2.38	10.61	0.22	4
Station Road (North) S+R	4.89	6.91	0.71	11
1715-1730	**Flow** (veh/min)	**Cap.** (veh/m3.08 in)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.43	10.38	0.52	11
Howth Road (East) R	2.30	2.46	0.94	10
Greenfield Road (South) L+S+R	5.67	6.81	0.83	26
Dublin Road (East) L+S	6.78	13.13	0.52	12
Dublin Road (East) R	2.62	3.20	0.82	16
Station Road (North) L	2.36	10.61	0.22	4
Station Road (North) S+R	3.64	7.30	0.50	8
1730-1745	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	8.45	10.52	0.80	19
Howth Road (East) R	3.35	2.46	1.36	24
Greenfield Road (South) L+S+R	4.93	6.62	0.75	13
Dublin Road (East) L+S	7.74	13.01	0.60	13
Dublin Road (East) R	3.06	3.20	0.96	16
Station Road (North) L	2.70	10.61	0.26	5
Station Road (North) S+R	5.16	7.41	0.70	11
1745-1800	**Flow** (veh/min)	**Cap.** (veh/min)	**RFC** (-)	**Max. queue** (vehicles)
Howth Road (East) L+S	5.52	10.24	0.54	11
Howth Road (East) R	1.55	2.46	0.63	12
Greenfield Road (South) L+S+R	6.87	5.68	1.20	32
Dublin Road (East) L+S	7.76	13.45	0.58	13
Dublin Road (East) R	3.97	3.20	1.24	28
Station Road (North) L	3.54	10.61	0.33	6
Station Road (North) S+R	5.66	7.60	0.74	13

Table 11.33 - Design Year (2039) capacities, ratios of flow to capacity and queue lengths for each 15-minute interval during the evening peak hour (development not in place)

Assuming network flow increases of 21 % from now until the design year for the Proposed Development in 2039 (day-of-opening plus 15), maximum queuing is significant, even without all proposed / planned development in place.

It should again be stated, however, that an increase of 21% in network flows over the 2019 to 2039 period is highly unlikely given the aim of existing transport policies within the Greater Dublin area to minimise use of the private car for the journey to work.

There is no planned upgrades to the cycle and footpath network, therefore if there is to be no development then the potential impact will be imperceptible with neutral long term effects.

In regard to public transport the planned improvements for the upgrades to the DART service and the new bus orbit route will still happen. Therefore, the potential impact if there was no development is positive with increased carriage capacity and a positive long-term effect.

11.1.9 MITIGATION MEASURES

This section details the measures which will mitigate the traffic impacts detailed within this section of the EIAR.

In this regard we will detail mitigation measures which will offset any traffic impacts predicted for both the construction and operational phases of the Proposed Development.

Mitigation measures describe any corrective measures that are either practicable or reasonable, having regard to the potential impacts discussed above.

11.1.9.1 Construction Phase

The following measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the road network.

Road Network Construction Stage Measures to be implemented:

To ensure the road network will have a slight impact with short term temporary slight effects, the following migration will be incorporated.

- To reduce the potential impact with morning traffic particularly between the hours of 8am and 9am, no HGV's will be allowed to leave site during this period. However, vehicles coming to site will be against morning traffic and will therefore have minimal impact on the local road network. These vehicles will be able to enter site and wait in the waiting area, if necessary, be loaded and ready to leave site after 9am.
- Works in Howth road will be carried out in a strip process, limiting the extent of works at any given time and given the existing width of the road across the site frontage two way traffic will be managed at all time.
- Informing workers and expected visitors regarding access arrangements and parking provision to ensure an appropriate mode of travel is chosen; By enforcing this the potential impacts of road delays will be slight and have short term neutral effect.
- Clear and appropriate signage within the site to advise of permitted routes, speed limits, safety requirements.
- Any recommendations with regard to construction traffic management made by the Local authority will be adhered to.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- Provision of sufficient on-site parking and compounding to ensure no overflow of construction generated traffic onto the local network.
- A dedicated 'construction site' access / egress system will be implemented during the construction phases.
- Site offices and compound will be located within the site boundary. The site will accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas. This will prevent visitors or employees parking on the surrounding streets.
- A series of 'way-finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Truck wheel washes will be installed at construction entrances necessary to ensure Howth Road is kept clean.

Pedestrian Construction Stage Measures to be implemented:

To ensure the potential impact of the proposed development on the pedestrian routes will be slight with short term temporary neutral effect the following mitigation measures have been incorporated.

- Promote usage of public transport by site staff by clearly displaying local bus, DART and rail services with a map and timetable indicating routes and travel times.
- Works carried out in Howth Road, pedestrians will be directed via a temporary footpath, which will be clearly marked out and separated from the vehicle users. This will only be for short periods when drainage and utility connections works are being carried out in Howth Road.
- Only Safe-Pass accredited personnel will be permitted on site and daily in-out attendance records will be maintained.
- Hoarding to be set up around the perimeter to prevent pedestrian access.
- Signage to be implemented to clearly indicate navigation routes around the site.
- Provide bike parking locations on site to promote the usage of cycling by site staff.

11.1.9.2 Operational Phase

The following mitigation measures are proposed for the operational phase of the Proposed Development with reference to the road network:

Road Network Operational Stage Measures to be implemented:

The proposed development will have a moderate impact with a negative and long term effect on the Sutton Cross junction, the following mitigation measures have been incorporated into the design limit the effect.

The above traffic assessment details that Sutton Cross is at present a busy and congested junction during the morning and evening peak hours of travel, and will continue to experience increased congestion going into the future if the required conservative growth estimates are applied to existing surveyed network flow, with estimated total generated traffic from both proposed and planned adjacent development not adding significantly to existing and future predicted congestion levels at Sutton Cross – the critical junction within this comprehensive traffic analysis.

Given that the critical junction under analysis is congested, it is appropriate that there is a comprehensive set of mitigation measures envisaged to minimise car usage by residents and visitors to the Proposed Development. The measured are detailed as follows:

- Available Car club spaces on site
- Limited on-site car parking spaces

Availability of car club spaces
5 No. car club spaces are provided at the Proposed Development. Private cars will be used for the journey to and from work during the morning and evening peaks. However, in many cases, residents require access to a parking space in order to have a car available to make non-work related trips for shopping and leisure purposes. Such trips can be very infrequent, therefore, the provision of dedicated car parking spaces for such usage constitutes an inefficient use of such resources.

Therefore, an alternative approach is proposed in order to cater for the non-trip-to-work-related car demand of residents at the Proposed Development. It is proposed to provide 5 No. car club vehicle spaces, available exclusively for residents.

Car clubs typically operate with residents signing up to the service being able to reserve the use of the vehicle at certain times / days, paying a rental fee to do so, but saving the user the necessity of owning either a car or a parking space at the development.

GoCar, a car club provider in Ireland, reports that car club vehicle usage is predominantly for private rather than business purposes, with just less than 60% using the service to replace a private car. The average car is rented out for 1 hour per day. Shopping and leisure related trips were listed as top uses for GoCar.

The provision of 5 No. car club spaces will result in a number of benefits for residents at the Proposed Development:

- Elimination of the necessity to own a car (and the associated expense) where use of it will be relatively infrequent
- Access to car transport for those using a car infrequently

The provision of car club spaces is also consistent with section 4.23 of the 2018 Design Standards for New Apartments which states that 'for all types of location, where it is sought to eliminate or reduce car parking provision, … 'provision is to be made for alternative mobility solutions including facilities for car sharing club vehicles.'

Limiting on-site car parking spaces
It is proposed within this development to provide car parking space for 70% of the 512 no. apartment units proposed.

The trip generation estimates for this project outlined within this report are conservative and robust as they are based on sites with greater car parking provision than proposed for the Proposed Development. It is highly likely, therefore, that the actual traffic impact of the proposal will be less than predicted, as the limited car parking provision will require residents to actively seek out alternative modes of travel particularly for their journey to work / college within the morning and evening peak.

Table 11.34 details existing modal splits for the Electoral Districts within the Howth area close to the Proposed Development:

Mode	CAR DRIVER (%)	BUS (%)	DART/TRAIN (%)	CYCLING (%)	WALKING (%)
Howth	54	4	20	2	5
Sutton	47	4	29	5	3
Baldoyle	48	5	26	4	4
Average	49	4	25	4	4

Table 11.34 - Modal splits for electoral districts in vicinity of Proposed Development

The above table demonstrates that, for existing residents close to the Proposed Development, 49%, less than half commute by private car as detailed within the 2016 Census, with 25% commuting by bus or train and 8% cycling or walking.

It is expected that residents at the Proposed Development would undertake a similar pattern of mode usage, thus resulting in reduced traffic impact on the local road network relative to that envisaged within the conservatively-framed traffic assessment.

11.1.10 RESIDUAL IMPACTS

11.1.10.1 Road Network

Provided that the proposed mitigation measures are implemented, the impact of the Proposed Development during the construction stage will be an imperceptible impact of neutral and temporary effect during the construction phase.

There is an increase of road usage by private vehicles in the operational phase, however given the reduce carparking provisions set out in this development, the consequent model shift will result in the mitigation effect traffic flow on the network set out in section 11.1.9. The potential impact of the proposed development with out such model shift will have significant impact with a negative and long term effect on the Sutton Cross junction in 2039. An increase in use of public transport will result in a moderate impact with negative and long term effects on Sutton Cross Junction.

11.1.10.2 Pedestrians/Cyclists

Provided that the proposed mitigation measures are implemented, the impact of the Proposed Development during the construction stage will be of a temporary nature and imperceptible. There will be an increase in pedestrians in the surrounding area in the operational stage, however these pedestrians will predominantly use the proposed green routes. This will have a marginally effect on the pedestrian walkways and cycle networks. Therefore, the impacts of the development will be neutral imperceptible and long term.

11.1.10.3 Public Transport

Provided that the proposed mitigation measures are implemented, the impact of the Proposed Development during the construction stage will be of a temporary nature and imperceptible. There will be an increase in public transport usage by site staff, but these will be in the opposite direction to commuting traffic. There will be an increase in public transport usage by residents from the proposed development in operation. Without mitigation, the effect is moderate with a negative long-term effect. The effect of the model shift set out above as a result of reduced carparking facilities, will increase public transport usage. Given the increased capacity of the DART proposed, that will be in place when the proposed development is operational, the public transport system will have capacity to accommodate this model shift and the long-term impact will be moderate with negative.

11.1.11 INTERACTIONS

11.1.11.1 Construction Phase

The traffic impacts, which are be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified in section 11.1.9. Increased traffic flows during construction, notwithstanding the mitigation measures outlined, have short term temporary impacts in respect of air, noise, biodiversity and human health.

11.1.11.2 Operational Phase

The Proposed Development includes the delivery of a range of new transport infrastructure which caters for all modes of travel. Pedestrians and cyclists will benefit from this new range of transport infrastructure as these will develop connections with existing urban areas which will enhance the attractiveness, safety and convenience of active modes of travel for journeys both (i) to/from the Proposed Development and (ii) existing urban areas who will be able to benefit from the new shorter routes through the Site. The increase in traffic flows are considered to have a moderate, negative, long term impact on Sutton Cross.

Increased traffic flows resulting from the Proposed Development, notwithstanding the mitigation measures outlined, do have an impact in respect of air, noise, biodiversity and human health and these impacts are discussed within the appropriate chapters of this EIAR.

11.1.12 Difficulties Encountered in Compiling Required Information

None.

11.1.13 References:

- National Roads Authority, Traffic and Transport Assessment Guidelines (2014)
- Transport Infrastructure Ireland, Traffic Appraisal Guidelines (PE-PAG-02017). (2017)
- Fingal County Development Plan (2017 - 2023)
- National Transport Authority, Dublin Area Bus Network Redesign Public Consultation Report, June 2018
- National Transport Authority, Greater Dublin Area Cycle Network Plan, December 2013
- Dublin Bus Website; www.dublinbus.ie
- Irish Rail Website; www.irishrail.ie
- Guidelines on the Information to be contained in Environmental Impact Assessment Report (Draft Aug 2017) – www.epa.ie
- Central Statistics Office – www.cso.ie
- TRL Oscady Junction 5 & PICADY Software

11.2 WASTE

Author: Gillian Free, LL.M., BSc., MCIWM

11.2.1 INTRODUCTION

11.2.1.1 QUALITY ASSURANCE AND COMPETENCE

This section of Chapter 11 Material Assets describes the potential impact of the Proposed Development in the context of waste. It describes the baseline environment for the Proposed Development and presents the likely significant impacts associated with 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 impacts are also described.

A site-specific Construction Management Plan (CMP) and Construction Demolition Waste Management Plan (CDWMP) accompanying this planning application have been prepared by Barrett Mahony Consulting Engineers(BMCE), October 2019 (hereinafter referred to as the CMP) to deal with waste generation during the Construction and Demolition Phases of the project. The CMP was prepared in accordance with the 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

An Operational Waste Management Plan (hereinafter referred to as the OWMP) and Construction Environmental Management Plan (hereinafter referred to as the CEMP) have also been prepared by Enviroguide Consulting, October 2019 for the Proposed Development and accompany this planning application. These documents will ensure that the management of wastes arising at the development is sustainable and is carried out in accordance with legislative requirements and best practice standards.

This section has been authored by Gillian Free of Enviroguide Consulting. Gillian holds a Master of Laws (LL.M) in Environmental and Natural Resources Law, a Bachelor of Science Degree in Environmental Management, a Diploma in Environmental and Planning Law, a Diploma in Environmental Resources Management and is a Chartered Waste Manager (Chartered Member of the Chartered Institution of Wastes Management). Gillian has fifteen years' experience working in the field of environmental and waste management and specialises in the areas of waste legislation, minimisation, reduction, management and the Circular Economy.

11.2.1.2 DESCRIPTION OF DEVELOPMENT

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents’ amenities to include a gym, residents’ lounge, residents’ support office, and 2 no. residents’ multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents’ lounge, residents’ multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

During the Construction Phase the main site activities will include site clearance, demolition of existing buildings, basement excavation, building construction, road works, and landscaping. This Phase has the greatest potential for waste impacts on its surrounding environment; however, this Phase will be of short- term impact. As set out in the CMP, the entire construction Phase , including demolition and excavation, will take place in Phases, over approximately 40 months. Demolition is expected to take approximately one month. Groundworks will take approximately 6 months. Waste will be generated throughout each stage and as the work is Phased, will not be generated all at once.

The Operational Phase will involve waste generation typical of residential and retail and non-retail uses and will be a long-term impact.

Both Phases are discussed in the following sections.

11.2.1.3 CHARACTERISTICS OF PROPOSED DEVELOPMENT

11.2.1.3.1 Demolition and Construction Phase

11.2.1.3.1.1 Construction and Demolition Waste

The Proposed Development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement . As identified in the CMP, waste will be generated from the demolition activities. The Techrete factory structure is a combination of masonry and concrete walls with a galvanised roof which contains asbestos. Internally it is expected there will be steel elements left over from when it was in operation. The motor garage is a steel portal frame with a galvanised roof, a walk around the internal building was not possible however it would be logical to assume that the external walls are masonry, with lightweight stud partitions inside. The retail unit is a typical masonry construction with a flat roof.

According to the CMP for the Proposed Development , the combined development is 90% hardstanding, with a significant amount of concrete slab. The slab will be broken out using a rock breakers and materials either sent off site or used for the piling matt depending on the quality and quantity.

During the Demolition and Construction Phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated.

Demolition wastes will typically include:

- concrete
- steel cladding
- steel beams
- gypsum
- metals
- plastic
- wood
- glass a
- waste electronic and electrical equipment (WEEE)
- asbestos containing materials
- underground storage tanks
- concrete storage bays
- existing pipe network

services

During demolition, it is estimated by BMCE that approximately 100 tonnes of material will arise from the soft strip, this would allow for any partitions, insulation and other soft materials. Much of the masonry/concrete material, depending on the quality, would be used for the pilling mat and in turn would be removed from site during the excavation Phase . Table 11.2.1 sets out the volumes of waste which will arise during the demolition Phase :

Table 11.2.1 Estimated waste arisings during demolition (source: Barret Mahony Consulting Engineers CDWMP)

Demolition Waste	
	Weight
	tonne
Concrete/Masonry	16263
Steel	377
Cladding/Roof Finishes	126
Soft Finishes	100
Total Waste	16866

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction Phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

All demolition wastes will be segregated and stored in designated waste storage areas on site for recycling, recovery or disposal in accordance with the CMP and the CDWMP.

11.2.1.3.1.2 Asbestos

Asbestos Containing Materials (ACM's) are present in the existing buildings and in various areas identified on the site which will be removed from site by an appropriately qualified and permitted contractor prior to further demolition and construction. An asbestos survey has been carried out to identify and characterise ACM's. The findings of this survey are recorded in the document Asbestos Demolition Survey Report for Former Techcrete Site Howth Road Howth Co. Dublin completed by OHSS Safety Consultants in October 2019 (OHSS October 2019a) which accompanies this planning application. This report provides detail on the type and location of ACMs and includes recommendations in relation to the safe removal of ACMs which will be included in the mitigation measures for Asbestos waste in this chapter. ACMs will be removed from site in strict accordance with this plan and with the Safety Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 and the CDWMP for the development.

The asbestos removal contractor/Demolition contractor is required under the Safety Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 to develop a plan of work prior o commencing demolition activities. This plan of work (POW) will specify how the ACM's will be removed, transported and disposed of. The POW will also have detailed of quantities and receipts for the quantities of ACMs taken off site including List of Waste Coding (17-06-05 or 17-06-01). The plan of work must be submitted to the Health and Safety Authority (HSA) 14 days in advance of the works commencing and as part of the notification of the project. Both the HSA and Local Authority inspectors or waste enforcement officers have powers to inspect the POW and the site under the asbestos regulations.

The POW will be based on the HSA guidelines for removal of asbestos containing materials. A a competent independent analyst will be employed on the project to oversee the asbestos removal works and to undertake air monitoring and clearance testing as required by the regulations. All of these reports can be made available to the regulatory bodies.

11.2.1.3.1.3 Soil and Stone

Excavations will be required to facilitate construction of *inter alia* the basements, carpark and riparian strip. The project engineers, BCME, have estimated that the total volume of material to be excavated will be c. 70,551m3. There are limited opportunities for reuse onsite, an estimated 7000 m3 will be reused, and therefore much of the excavation material will require removal offsite for reuse elsewhere subject to testing for suitability and market requirements, recovery or disposal, as appropriate.

A waste classification assessment was undertaken by Golder Associates Ireland and is referred to in Golder Associates Ireland Limited, October 2019. *Materials Management & Remedial Strategy Plan Claremont Development Site, Howth* accompanying this planning application, to assess the general nature of the in situ materials in the context of the waste characterisation for off-site disposal in compliance with waste management legislation. The majority of soils are classified as inert and non-hazardous with a small number of hazardous waste hotspots including material contaminated with asbestos, polycyclic aromatic hydrocarbons, petroleum hydrocarbons and heavy metals primarily restricted to made ground deposits.

As identified in Chapter 4 of this EIAR Land, Soils, Geology and Hydrogeology, contaminated soil located at the site will be removed as part of the excavations for the basements and other subsurface structures. This contaminated material will be removed from site as waste during the Construction Phase of the development.

The Proposed Development will therefore result in inert, non-hazardous and hazardous soil and stone waste arising throughout the Construction Phase .

There are three subcategories of soil materials that require management and/or offset removal during the groundworks Construction Phase of the project. These categories are as follows:

• Insitu soils for assessment and verification of reuse/disposal;

• Pile Arisings;

• Hazardous/Contaminated Soils.(estimated in Golder 2019 MMRP to be approximately 2,600 M^3).

The insitu material at the site requires excavation during the construction of the basement to formation levels and consists of materials to be further assessed and verified to identify the appropriate destination for its disposal/recovery; we have assessed the worst case impacts of these materials.

The breakdown of volumes for each subcategory are presented in Table 11.2.2 below.

A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos report was produced by OHSS Safety Consultants in October 2019 (OHSS October 2019b). This report details the recommendations for the safe mechanical handling of asbestos contaminated soil and will accompany this planning application. The recommendations from this report will be included as mitigation measures in this chapter of the EIAR.

Table 11.2.2 Volumes of Excavated Material Proposed (based on volumes provided by BMCE, Engineers for the Proposed Development)

Cut Balance	Area (m^2)	Volume (m^3)
Earth		
Block A (2.5m strip)	6,308	15,770
Basement (0-4.0m)	9,933	39,732
Block B (road strip 2.0m)	690	1,380
Riparian Strip		
Max Depth – 2m	1,632	3,264
Pile Arising		
West Block 970 No.600 dia x 12m (plus 25%)		3,940
East Block 450dia secant wall x 4m		1,015
Total Earth		65,101
Landscaping, 1.75m above	4,000	-7,000
Cut/Fill Balance		**58,101**
Rock		
Basement (circa 1.2m)	9,933	11,920
East Block Pile Arising – 2m		510
Total Rock		12,450
Total Approx. quantity of excavated material		70,551

In order to establish the appropriate reuse, recovery and/or disposal route for the material to be removed off-site, it will first be classified.

Waste material will initially be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous.

Environmental soil analysis will be carried out prior to construction on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability.

Surplus soil/stones may be suitable for acceptance at either inert or non-hazardous soil recovery facilities/landfills in Ireland or, in the event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities.

It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the quantities of construction waste categorized as non-hazardous and hazardous that will be generated from the construction of the Proposed Development as the exact quantities may be subject to some degree of change and variation during the construction process. Therefore, we have assessed the worst-case impacts of these materials. However, the materials arising will be managed in accordance with best practice and the measures set out in the CDWMP and the CMP.

A waste compound will be in place during the Construction Phase for the storage of receptacles for holding segregated materials to be recycled or recovered awaiting transfer off site by a permitted waste collector. The waste compound will have clear signage and will be regularly inspected by the Construction Waste Manager.

11.2.1.3.2 Operational Phase

The Proposed Development use will change the existing use from a disused former industrial site to residential, retail and non-retail commercial uses which will increase demand for waste services in the area.

The OWMP prepared for the Proposed Development which accompanies this planning application will ensure that the development contributes to the targets outlined in the Eastern Midlands Region Waste Management Plan 2015 – 2021.

11.2.1.3.3 Residential Waste Arising

The projected waste types arising from the residential element of the Proposed Development during the Operational Phase are detailed in Table 11.2.3.

Table 11.2.3 Anticipated Waste Arising Residential.

Waste Description	List of Waste Code
Mixed Municipal Waste	20 03 01
Mixed Dry Recyclables	20 03 01
Biodegradable Kitchen Waste	20 01 08
Glass	20 01 02
Bulky wastes	20 03 07
Waste electrical and electronic equipment*	20 01 35* 21 01 36
Batteries and accumulators*	20 01 33* 20 01 34
Textiles	20 01 11
Fluorescent tubes and other mercury containing waste*	20 01 21
Pesticides	20 01 19*
Edible oil and fat Oil and fat other than those mentioned in 20 01 25*	20 01 25 20 01 26*
Paint, inks, adhesives and resins containing hazardous substances* Paint, inks, adhesives and resins other than those mentioned in 20 01 27	20 01 27* 20 01 28
Detergents containing hazardous substances* Detergents other than those mentioned in 20 01 29	20 01 29* 20 01 30
Cytotoxic and cytostatic medicines* Medicines other than those mentioned in 20 01 31	20 01 31* 20 01 32
Plastic	20 01 39
Metals	20 01 40
Paper and Cardboard	20 01 01

According to the OWMP, at maximum capacity it is expected that the Proposed Development will accommodate 1,075 residents. According to the 2016 statistics on household waste, published by the Environmental Protection Agency, each person produces 580kg of municipal waste per year. At maximum capacity, the 512 no. residential units are expected to accommodate 1,075 (actual numbers may vary), the expected average waste produced per year would be 623,500kg.

Based on the bin ratios detailed in section 4.2.1 of the OWMP, it is anticipated that approximately 30% of the overall waste collected will be municipal solid waste. The remaining 70% (approximate) of waste collected will be recyclable waste streams which will include dry mixed recyclables (packaging, papers, cardboards, plastics, aluminium, metals and tin), and food waste.

All of the municipal solid waste (MSW) collected will be transported for further recovery. No MSW will be transported directly to landfill. All MSW will be consigned to a recovery facility where it will undergo mechanical waste recovery, or it will be consigned to a licenced facility for energy recovery. According to the OWMP, a total number of 75 no. 1100L bins will be required per week to cater for the waste arisings across the proposed residential blocks. In total, 8 No. bin compound areas are proposed on the basement and lower ground floor levels. Table 11.2.4 details the location and size of the bin compounds designed for the development.

Table 11.2.4 Location and Size of Bin Compounds

Level of Proposed Development	Block	Area m^2
B01 – BASEMENT	Block C	60.5 m^2
B01 – BASEMENT	Block C	49.4 m^2
B01 – BASEMENT	Block C	32.8 m^2
B01 – BASEMENT	Block D	35.0 m^2
00 - LOWER GROUND FLOOR	Block A Main	127.6 m^2
00 - LOWER GROUND FLOOR	Block B	46.3 m^2
00 - LOWER GROUND FLOOR	Block B	20.7 m^2
00 - LOWER GROUND FLOOR	Block B Main	142.1 m^2
Total Waste Compound Areas		**514.3 m^2**

Sufficient capacity is provided for the storage of the required number of bins to service the residential units as well as commercial units. The requirements are calculated in the OWMP based on a weekly collection of waste. This allows for increased frequency of collections to bi-weekly as additional capacity which should not be required under normal circumstances.

11.2.1.3.3.1 Commercial Waste Arising

The tenants of the proposed commercial units have not yet been finalised.

The predicted waste types that will be generated at the proposed development include the following:

i. Mixed Municipal Waste (MSW) / General Waste;
ii. Dry Mixed Recyclables (DMR) - includes cardboard, plastic packaging, aluminium cans, tins, paper and Tetra Pak cartons; and
iii. Organic (food) waste.

In addition to the typical waste materials that will be generated on a daily basis, there will be some additional waste types generated in small quantities that will need to be managed separately. The predicted waste types that will be generated at the proposed development include the following:

- Glass, waste oil, hygiene waste may be generated on a routine basis depending on the commercial activity. These waste streams will be collected by dedicated and authorised commercial waste contractors. Dedicated waste receptacles will be provided to the commercial units by the waste contractor.
- Bulky wastes, textiles and C&D waste are only expected to be generated if refurbishment works are being completed at a commercial unit. In this instance the contractor appointed for completing the refurbishment works will be responsible for hiring a skip or suitable waste receptacle for the temporary storage and authorised collection and transportation of these waste streams.
- Waste Electrical and Electronic Equipment (WEEE), batteries and light bulbs or fluorescent tubes may be generated when these items become end of life. It is anticipated that each of these waste streams will be classed as Business to Consumer (B2C) equipment under the European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014) and will be collected, free of charge by the WEEE Compliance Scheme. In the unlikely event that these waste streams are classified as Business to Business (B2B) waste, the commercial unit will be responsible for financing the collection of these by an authorised waste contractor.

It shall be a condition of contract with the appointed management company to ensure that all commercial tenants will be provided with an information pack from the waste collection provider. This information pack will detail the waste streams that can and cannot be placed in the bins provided in the waste compound so that waste segregation is actively encouraged.

The ratio of the waste volumes may vary depending on the business type. The waste storage area will not be visible to the public and it will conform to the requirements of *BS 5906: 2005 – Waste Management in Buildings – Code of Practice.* This Code of Practice states that "*in order to calculate the storage, containment and equipment requirements for effective waste management, the following should be considered:*

- *need for a temporary designated collection point;*
- *volume and composition of waste;*
- *frequency of collection;*
- *degree of waste segregation required;*
- *degree of container separation required;*
- *type of on-site treatment proposed".*

The number of waste receptacles required for the storage of commercial waste will depend on the types and quantities of the waste to be handled and the frequency of collection. Detailed knowledge of the anticipated nature and scale of the activities associated with each commercial unit is required in order to determine the volume and ratio of waste streams to be generated. In general, the principles that apply to the selection of systems for residential buildings apply to those for non-residential buildings, but the greater quantities of waste may require more frequent waste collection (e.g. bi-weekly).

The commercial components of this proposed development consist of the following:

- Anchor unit (1,864 sq. m).
- Retail unit (603 sq. m),
- Restaurant (243 sq. m),
- Café (86 sq. m).
- Crèche (236 sq. m)
- Gym (337 sq. m)

A Waste Generation Calculation has been developed by Enviroguide Consulting Ltd. in the OWMP to estimate the volume of commercial waste to be generated for each commercial unit. This calculation takes into account the business type, floor area, sales area, EPA statistics on commercial waste, bye-laws and Regional and European recycling targets. The BS5906:2005 Code of Practice has also been taken into account. The actual volume may vary once each tenant has been finalised. The Tenants' environmental practices, purchasing policies and waste management practices and policies may cause variance to these figures. The floor area of the proposed waste storage areas provides ample space for the storage of the commercial waste arisings at the Proposed Development.

11.2.1.3.3.2 Segregation of Waste Material

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site in accordance with the Fingal Development Plan 2017 – 2023 (Objective DMS146). At a minimum, wastes shall be segregated into Mixed Dry Recyclables, Organic waste and Mixed Municipal Waste and presented for collection.

11.2.1.3.3.3 Waste Storage Areas

The OWMP sets out the required facilities for the storage and collection of the waste arisings during the Operational Phase of the Proposed Development and has determined that the design provides ample provision for waste storage, access and egress.

As outlined in the OWMP, the bin compounds will have the following provisions as minimum:

i. **Access:** The bin compounds will be accessible for the mobility impaired.
ii. **Lighting:** Bin compounds will have adequate lighting. Energy saving lighting controlled by motion sensors is proposed. This is to ensure that waste will not be tipped in dimly lit areas and that the areas do not pose a safety risk.
iii. **Spillage & drainage:** A non-slip surface will be provided to prevent slips or falls, and the compounds will have adequate drainage which will be directed to foul sewer.
iv. **Security:** The bin compounds will have restricted access and will be accessible by tenants and residents only. Security measures will be in place and CCTV will be provided in the bin compounds. This is to prevent unauthorised access to the bins by the general public.
v. **Ventilation:** A natural vent will be provided. All vents will be ducted to an external opening so that the bin storage areas will not cause an odour nuisance, taking into account the avoidance of nuisance for habitable rooms nearby.
vi. **Signage:** Pictorial signage will be provided to show residents and tenants what wastes can and cannot be placed in each bin. All signage will be provided by the management company appointed. This will be a requirement in their agreement to ensure this is included in any agreement with a waste contractor or provided by them directly.
vii. **Environmental nuisance:** The compounds will be in enclosed areas to avoid environmental nuisances such as litter. Regular waste collections will be required from the waste collection providers to prevent any other environmental nuisances such as odour or vermin. The management company appointed will be required to ensure there is adequate vermin control in place.
viii. **Vehicular Access:** Both compounds have ample space provided for waste collection vehicles to access the development and to collect the bins. Vehicular access for waste collection is included in the traffic management plan for the development.

11.2.1.3.3.4 Management of Wastes Moving Offsite

All waste leaving site will be recycled or recovered, except for those waste streams where appropriate recycling/recovery facilities are currently not available in which case they will be directed to an energy recovery facility such as the incinerator in Poolbeg.

11.2.1.3.3.5 Hazardous Waste

Hazardous waste may be generated from WEEE, batteries, fluorescent tubes, and cleaning products. Any waste classed as hazardous will be stored in designated area(s) and will be removed off site by suitably authorised waste contractor(s).

11.2.1.3.3.6 Description of other Relevant Developments

A Strategic Housing Development has been permitted at a site at Balscadden in Howth, planning reference ABP- 301722-18. This development consists of 163 no. residential units including 1, 2, and 3 bedroom apartments and duplex units. 757m^2 of commercial space, including two no. retail units and café, is also included. The development provides for 120 no. car parking spaces located at street level and basement level. Other developments in the area include:

F18A/0267

Granted Permission on 06/11/2018

Development Description:

Planning permission is being sought by the Department of Agriculture, Food and Marine for construction of 2 no. ground level industrial buildings (5 no. units each) consisted of a total of ten industrial units. The maximum height of buildings at ridge level is 6.25m. The use of the building will consist of light industrial activities such as repair and maintenance of maritime and fishing equipment and ancillary storage.

F17A/0553

Granted Permission on 05/12/2017

Development Description:

Permission sought by Oceanpath Ltd for development at existing food processing facility at sites 37-03 and 37-05, Claremont Industrial Estate, West Pier, Howth, County Dublin. The Proposed Development will consist of the scheme previously approved under F17A/0313 with the following alterations:

Reduction in size of the proposed extension by 133 square metres so that it will consist of: The construction of 1,258 square metre (approximately) two storey extension (8,135 metres high approximately) to west side of existing 1,130 square metre (approximately) two storey building (8,135 metres high approximately). The main use of the existing building is for the processing of food (primarily fish) and it storage and distribution. The main uses of the proposed extension will be for the processing of food (primarily fish) and its storage and distribution but will also include an 11 metre (approximately) factory retail outlet primarily for the sale to the public of seafood products produced on site.

The omission of the proposed construction of 3.8 square metre (approximately) single storey (3.505metre high approximately) compactor enclosure to northwest corner of site.

The relocation of the existing fence on the west side of site 37-05 to be against the legal site boundary.

Associated works.

F18A/0074

Granted Permission in 13/08/2018.

Development Description:

Permission granted to the Minister for Agriculture, Food & Marine for the provision of 130m long quay wall; associated deck area, road access, hard standing; localised dredging to facilitate works, dredging to -4m Chart Datum along the front of new quay wall to provide berthing depth and land reclamation of approximate 0.30 Ha on the east side of middle pier.

11.2.2 METHODOLOGY

11.2.2.1 REGULATIONS AND GUIDANCE

The methodology adopted for the assessment takes cognisance of the relevant legislation and guidelines in particular the following:

- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment including amendment directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014.;
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, August 2017).;
- Draft Advice Notes for preparing Environmental Impact Statements (EPA, September 2015).;
- Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002).;
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003).;
- The management of Waste from National Road Construction Projects. (TII, December 2017).;
- EPA National Waste (Database) Reports 2017 and 2018;
- The Fingal Development Plan (FCDP) 2017-2022;
- Environmental Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended;
- Waste Management Act 1996 (No. 10 of 1996), as amended.
- Litter Pollution Act 1997, as amended.
- Eastern-Midlands Waste Region Waste Management Plan, 2015-2021, Eastern-Midlands Region, 2015.
- The Fingal County Council Storage, Presentation and Collection of Household Waste Bye-Laws 2006.
- Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste).
- European Communities (Waste Directive) Regulations 2011, S.I. No. 126/2011.
- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended.
- Waste Management (Facility Permit and Registration) Regulations 2007, as amended
- Waste Management: Changing Our Ways, The Department of the Environment and Local Government, 1998.
- Preventing and Recycling Waste: Delivering Change, The Department of the Environment and Local Government, 2002.
- Taking Stock & Moving Forward, The Department of the Environment and Local Government, 2004.
- National Strategy on Biodegradable Waste Management, Department Environment, Heritage and Local Government, 2006.
- A Resource Opportunity – Waste Management Policy in Ireland, Department of the Environment, Community and Local Government, 2012.
- Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous, Environment Protection Agency, 2015.

- Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, Department of Housing, Planning and Local Government, March 2018.
- Waste Management in Buildings – Code of Practice, British Standard, BS 5906:2005, 2005.
- Mobile Waste and Recycling Containers Part 1: Containers with 2 wheels with a capacity up to 400 l for comb lifting devices — Dimensions and design, British Standard, BS EN 840-1:2012, 2012.
- Mobile waste containers. Containers with four wheels with a capacity from 750 l to 1700 l with flat lid(s), for wide trunnion or BG-and/or wide comb lifting devices. Dimensions and design, British Standard, BS EN 840-4:1997, 1997.
- Municipal Waste Statistics for Ireland, EPA Waste Data Release, 31 October 2018

11.2.2.2 PHASED APPROACH

A Phased approach was adopted for this EIAR in accordance with EPA guidelines as set out above and is described in the following sections.

Element 1: Initial Assessment and Impact Determination stage was carried in October, 2019 out to establish the project location, type and scale of the development, the baseline conditions, the type of waste likely to arise from the existing environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and impact determination. Liaison with the design team was integral to determining the overall potential impacts associated with the Proposed Development .

Element 2: The Direct and Indirect Studies stage was carried out in October which involved a detailed assessment and impact determination. The scope of work included: a desk-based review of site investigation and environmental assessment reports, planning permissions in the surrounding area and review of waste management infrastructure.

The reports and documents reviewed and evaluated for Element 1 and Element 2 of this assessment included the following:

- Barrett Mahony Consulting Engineers Civil and Structural, July 2019. Civil Infrastructure Report;
- Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth (Golder, 2019c) – note this report incorporates previous site investigation report by IGSL;
- Henry J Lyons, October 2019. Claremont Project. Block B – Basement Plan. Drawing No. CLR-HJL-02-B01-DR-A-1008;
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Construction Management Plan for the Proposed Development
- Enviroguide Consulting, October 2019, Construction Environmental Management Plan for the Proposed Development
- Enviroguide Consulting, October 2019, Operational Phase Waste Management Plan (OWMP) for the Proposed Development ;
- OHSS Safety Consultants in October 2019 Asbestos Demolition Survey Report for Former Techcrete Site Howth Road Howth Co. Dublin (OHSS October 2019a)
- by OHSS Safety Consultants in October 2019 A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos (OHSS October 2019b).

Element 3: Mitigation Measures, Residual Impacts and Final Impact Assessment were based on the outcome of the information gathered in Element 1 and Element 2 of the assessment. This element of the assessment took place on 18th October 2019. Mitigation measures to address the impacts that were identified in Element 1 and 2 of the assessment were considered in relation to the operational and

Construction Phase of the development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this chapter is described in Table 11.2.5 below:

Table 11.2.5 Terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect'.

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
Significance of Effects on the Receiving Environment	**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.
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

Element 4: Completion of the Waste Section of the EIA was completed in this EIAR chapter and includes all the associated figures and documents.

11.2.2.3 RELEVANT CONSULTATIONS

The following relevant bodies and groups have been consulted regarding the Proposed Development :

- Fingal County Council;

11.2.3 BASELINE CONDITIONS FOR THE RECEIVING ENVIRONMENT

11.2.3.1 SITE LOCATION AND ADJOINING LAND USE

The Proposed Development is located at the western side of Howth, Co. Dublin, approximately 400m west of Howth Harbour. The site is bordered to the south by Howth Road (R105) serving the Howth Peninsula and to the north by the DART railway line. Claremont Strand is located on the northern side of the railway line. A Fingal County Council (FCC) water pumping station and associated lands lie to the west of the site and there are residential and commercial properties adjoining the eastern site boundary. The site is located approximately one mile from Howth town centre. A site location plan depicting the current layout of the site prior to development and in the context of the surrounding environment is presented in Figure 1.

Figure 11.2.1Site Location

11.2.3.2 CURRENT AND HISTORIC LAND USE

The Site is presently disused and therefore there are no waste arisings or collections from the Site. The existing land is deemed to be contaminated in part and the buildings on Site contain both hazardous and non-hazardous materials.

The site is zoned as 'Objective TC – Town and District Centre'. The objective of this zoning is to 'Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities'. It is noted that residential development is permitted in principle under this zoning objective.

The site is approximately 2.68 hectares (Ha) in size. Howth Road (R105) provides direct access to the site.

The brownfield site consists of three formerly separate properties. The former Techcrete factory (historically operated by Parsons) area makes up the largest portion of the site occupying the central and western portion of the site (approximately 2.672Ha). The Techrete site was historically operated as a sheet metal engineering works by Parsons prior to the property being taken over by Techrete who manufactured concrete pre-cast products at the site until 2008. The buildings to the west continued to be used as an engineering works during this time. This area of the site comprises redundant offices, manufacturing and storage facilities located within two-to-three storey industrial sheds with corrugated steel roof, steel framework and masonry walls. The remaining area of the site was formerly used for storage of manufacturing equipment/material and storage of finished products e.g. concrete panels.

The property to the east of the Techrete factory is occupied by the former Beshoff Motors and historically operated by Teeling Motors garage site. The Beshoff Motors site was in use as a car dealership until 2018 and is no longer in operation. This area is occupied by a former steel frame show room, separate garage and car park.

A former garden centre and dog grooming facility lie east of the Beshoff motors area. This area is occupied by a vacant single storey masonry building with a corrugated roof and concrete yard. Anecdotal evidence identified that the site of the former garden was previously occupied by a service station and mechanics garage with underground storage tanks.

The undeveloped lands to the west of the site, are understood to have historically been used by the local authority and that screenings from the wastewater screening plant to the west of the site were placed on these lands.

Decommissioning of the on-site building infrastructure across the site had not been undertaken at the time of writing this report. The existing site infrastructure occupies a large portion of the central and eastern portions of the site, while the remaining lands are comprised of hard cover of bitumen or concrete in the lands surrounding the existing infrastructure, and with vegetation cover in the western portion of the site.

The lands adjoining the west of the site are owned by FCC.

11.2.3.3 WASTE MANAGEMENT, FACILITIES AND SERVICES

The receiving environment for waste in the FCC 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 and sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;

- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The EMRWMP sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of “70% preparing for reuse, recycling and other recovery of construction and demolition waste” (excluding natural soils and stones and hazardous wastes) to be achieved by 2020 in line with Waste Framework Directive targets and timelines.

The National Waste Statistics update published by the EPA in December 2017 identified that Ireland’s progress against this C&D waste target was at 68% and progress against ‘Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)’ was at 45%.

The latest update published by the EPA in 2018 shows that Ireland is on track in terms of progress towards meeting EU Targets as follows:

Preparing for reuse, recycling and other material recovery (including beneficial backfilling operations using waste as a substitute) of 70% by weight of C&D non-hazardous waste (excluding natural soils & stone) is at 71% (for reference year 2016).

Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (calculation method 1) is at 50% (for reference year 2017).

The Fingal Development Plan 2017 – 2023 sets policies and objectives for the FCC area which as follows:

- Objective DMS145 Promote increased recycling of waste in accordance with the Eastern Midlands Region Waste Management Plan 2015-2021 (or any subsequent plan).
- Objective DMS146 Ensure all new large-scale residential and mixed-use developments include appropriate facilities for source segregation and collection of waste.
- Objective DMS147 Ensure all new developments include well designed facilities to accommodate the three bin collection system
- Objective DMS148 Ensure all new developments make provision for bring bank facilities where appropriate.

11.2.3.4 WASTE INFRASTRUCTURE

FCC does not operate any municipal waste landfill in the area. There are three (3no.) municipal solid waste landfills currently in operation in Leinster and all are operated by the private sector. There are two (2no.) existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin. The Poolbeg facility is licenced to accept 600,000 tonnes of waste per annum.

There are numerous waste management facilities serving the Greater Dublin area which are capable of accepting the waste arisings from the Construction and Operational Phases of the Proposed Development .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. There are numerous authorised bring banks and recycling centres serving the local area which are summarised in Table 11.2.6 below.

Table 11.2.6. Bring Banks and Recycling Centres Serving the Area of the Proposed Development

Waste Facility Location	Materials Accepted	Distance from Proposed Development
Marina Car Park, Howth, Bring Bank	Beverage Cans	0.3km
Sutton Lawn Tennis Club, Bring Bank	Beverage Cans, Glass Bottles and Jars	2.3km
Supervalu Car Park, Sutton, Bring Bank	Beverage Cans, Food Cans, Glass Bottles and Jars	2.5km
Summit Inn, Howth Bring Bank	Beverage Cans	2.9km
St Fintan's Cemetery, Sutton, Bring Bank	Beverage Cans, Glass Bottles and Jars	3.1km
The Reservoir Public Car Park, Howth Bring Bank	Clothes and Textiles, Glass Bottles and Jars	3.1km
Golf Links Road Car Park, Portmarknock, Bring Bank	Glass Bottles and Jars	7.3km
Mulch, Coolock	Branches, Christmas Trees, Grass, Green Waste, Hedge cuttings, Hedges, Leaves, Plants, Prunings, Trees	11.3km
Collins Avenue, Dublin 9 Recycling Centre	Batteries, Beverage Cans, Beverage Cartons, Books, Car Batteries, Cardboard, Cards, Clothes and Textiles, Fluorescent Tubes, Food Cans, Glass Bottles and Jars, Grass, Green Waste, Hedge cuttings, Leaves, Magazines, Newspapers, Paper, Plants, Plastic Bottles, Plastic Film, Plastics other, Waste Oil	13.1km
Shamrock Terrace, Dublin 1 Recycling Centre	Batteries, Beverage Cans, Beverage Cartons, Books, Car Batteries, Cardboard, Cards, Clothes and Textiles, Electrical Waste, Fluorescent Tubes, Food Cans, Glass Bottles and Jars, Grass, Green Waste, Hedge cuttings, Leaves, Magazines, Metal, Mobile phone, Newspapers, Paints, Paper, Plants, Plastic Bottles, Plastic Film, Plastics other, Prunings, Used Gas Cylinders, Waste Oil, Wood	13.4km
Estuary Recycling Centre, Swords Recycling Centre	Batteries, Beverage Cans, Beverage Cartons, Books, Branches, Car Batteries, Cardboard, Clothes and Textiles, Electrical Waste, Fluorescent Tubes, Food Cans, Glass Bottles and Jars, Grass, Green Waste, Hedge cuttings, Hedges, Leaves, Magazines, Metal, Mobile phone, Newspapers, Paints, Paper, Plants, Plastic Bottles, Plastic Film, Plastics other, Print Cartridges, Prunings, Used Gas Cylinders, Waste Oil, Wood	15.5km

Ringsend Recycling Centre, Ringsend, Dublin 4 **Recycling Centre**	Batteries, Beverage Cans, Beverage Cartons, Books, Car Batteries, Cardboard, Cards, Christmas Trees, Clothes and Textiles, Electrical Waste, Fluorescent Tubes, Food Cans, Glass Bottles and Jars, Grass, Green Waste, Hedge cutting, Leaves, Magazines, Metal, Newspapers, Paints, Paper, Plants, Plastic Bottles, Plastic Film, Plastics other, Used Gas Cylinders, Waste Oil, Wood	15.4km

Waste from the Construction and Demolition Phase (excluding excavated soil and stone material and asbestos containing material) can be brought to a number of licenced facilities in the region. Table 11.2.7 includes an example of some of the facilities licenced to accept construction and demolition waste and sets out the licenced capacity of each.

Table 11.2.7 Licenced Facilities Authorised to Accept Construction and Demolition Wastes in the Dublin Region

Licence Reg ister No.	Name	Location	Capacity Per Annum Tonnes
P1014-01	Padraig Thornton Waste Disposal Limited	Stephenstown Business Park, Balbriggan, Dublin.	50000 (22,800 C & D)
W0039-02	Starrus Eco Holdings Limited	Ballymount Cross, Tallaght, Dublin 24, Dublin.	150,000
W0044-02	Padraig Thornton Waste Disposal Limited	Killeen Road, Ballyfermot, Dublin 10, Dublin.	300,000
W0183-01	Starrus Eco Holdings Limited	Millennium Business Park, Grange, Ballycoolin, Dublin 11, Dublin.	270,000
W0188-01	Starrus Eco Holdings Limited	14B Phase 3, Road 3A, Greenogue Industrial Estate, Rathcoole, Dublin.	95,000
W0205-01	Greyhound Recycling and Recovery	Crag Avenue, Clondalkin Industrial Estate, Clondalkin, Dublin 22, Dublin.	250,000
W0227-01	Lawlor Brothers (Waste Disposal) Limited, trading as Access Skip Hire	Unit 28, John F Kennedy Road, JFK Industrial Estate, Naas Road, Dublin 12, Dublin.	95,000
W0261-02	Starrus Eco Holdings Limited	Cappagh Road, Finglas, Dublin 11, Dublin.	250,000

The facility types which can accept excavated soil material from the Construction Phase of the Proposed Development are detailed in Table 11.2.8.

Table 11.2.8. Facilities Licenced to Receive Various Classifications of Excavated Material

Waste Category	Classification Criteria	Outlets
Unlined Recovery Sites	Uncontaminated soil and stone free from anthropogenic contamination (e.g. physical contaminants brick, concrete etc <2%. Free from PAHs,	Soil Recovery Facilities, Waste Facility Permitted Sites, COR Sites or potential by-product if not a waste

	Hydrocarbons etc). To be defined in the EPA Soil Trigger Level/Article 27 Guidance. Individual licenced sites can agree specific limits with the EPA (ref EPA Update Note, Feb 2019).	
Landfills		
Inert Landfills	Reported concentrations within inert waste limits, which are set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results also found to be non-hazardous using the HWOL application*.	IMS Hollywood, Co. Dublin (EPA Licence W0129-02) Kyletalesha, Co. Laois (EPA Licence W0026-03) Walshestown Restoration, Co. Kildare (EPA Licence W0254-01)
Inert Landfills increased limits	Reported concentrations greater than Category B criteria but less than IMS Hollywood Landfill acceptance criteria, as set out in their Waste Licence W0129-02. Results also found to be non-hazardous using the HWOL application*.	IMS Hollywood, Co. Dublin (EPA Licence W0129-02)
Non-hazardous (lined) landfills	Reported concentrations greater than Category B1 criteria but within non-haz landfill waste acceptance limits set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results also found to be non-hazardous using the HWOL application*.	Ballynagran, Co. Wicklow (EPA Licence W165-02) Drehid, Co. Kildare (EPA Licence W0201-01) East Galway, Co. Galway (EPA Licence W0178-02) Knockharley, Co. Meath (EPA Licence W0146-02) Corranure, Co. Cavan (EPA Licence W0077-04) Authorised Export under Waste Management (Shipments of Waste) Regulations, S.I. 419 of 2007 (TFS). It is noted that Noah in Norway accepts this material from Ireland at similar rates to facilities within Ireland.
Hazardous Material		
Hazardous Treatment	Results found to be hazardous using HWOL application*.	Enva Portlaoise (EPA Licence W0184-02), Rilta Greenogue (EPA Licence W0192-03),

		Authorised Export under Waste Management (Shipments of Waste) Regulations, S.I. 419 of 2007
Notes:		
* Hazwaste Online Application developed by One Touch Data Limited based on Regulation (EC) No. 1272/2008: the classification, labelling and packaging of substances and mixtures (CLP) and the latest UK Environment Agency guidance, WM3.		
While material may be classified based on the EU Council Decision 2003/33/EC or the HWOL application, waste acceptance criteria may vary at each waste facility and should be confirmed in advance.		

Based on a review of EPA licences for the facilities in Table 11.2.7, there is sufficient capacity to accept the material to be excavated from the Proposed Development . The majority of excavated material is expected to be classified as non-hazardous or inert and is expected to meet the waste acceptance criteria limits for acceptance into IMS in Hollywood, Co. Dublin which has an annual intake allowance of 500,000 tonnes per annum.

Soils which are classified as hazardous, which is expected to be approximately 2,600m^3 (approximately 4000 tonnes) can be dispatched to Enva's, Greenogue or Portlaoise facilities for authorised shipment for disposal abroad which have a combined annual licenced volume of 100,000 tonnes per annum.

Non-hazardous soil and stone which cannot be accepted at an unlined landfill, can be dispatched to one of the lined landfill facilities in the country subject to acceptance agreements or can be shipped directly via Dublin Port by an authorised waste contractor, under TFS Regulations to Noah in Norway which has capacity to accept up to 500,000 tonnes per annum via an authorised broker.

The following waste facilities are licensed by the EPA to accept asbestos waste:

Veolia Environmental Services Technical Solutions Limited, Corrin, Fermoy, Co. Cork. Waste Licence Register Number: W0050-2 and Rilta Environmental Limited, Block 402, Grant's Drive, Greenogue Business Park, Rathcoole, Co. Dublin. Waste Licence Register Number: W0192-03,

11.2.3.5 WASTE COLLECTION SERVICES

A database of waste collection permits issued for the region is available from the National Waste Collection Permit Office (NWCPO) website. There are numerous waste collectors with waste collection permits to collect the various waste streams which will be generated by the Proposed Development.

11.2.4 IMPACT OF PROPOSED DEVELOPMENT - CONSTRUCTION PHASE

The procedure for determination of potential impacts on the receiving environment is to identify potential receptors within the site boundary and surrounding environment and use the information gathered during the desk study to assess the degree to which these receptors will be impacted upon. Impacts and their effects are described in terms of quality, significance, duration and type. The proposed use will change the existing use from disused industrial to residential, retail and non-retail commercial uses.

The Proposed Development will therefore result in various classifications of waste arising throughout the construction and operational Phase s.

The impacts and mitigation measures for the Construction and Demolition and Operational phases are summarised in the Table of Impacts in Appendix 1 of this chapter.

11.2.4.1 DIRECT

11.2.4.1.1 Uncontrolled release of waste to the receiving environment

During the Construction Phase of the Proposed Development, waste from demolition of existing buildings and from excavations will arise. This will result in hazardous and non-hazardous waste arisings. If not managed properly, the waste could give rise to contamination of land, water or air due to uncontrolled release to the receiving environment.

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and in the surrounding area. The impact of litter issues is the attraction of vermin within the development and the surrounding areas.

This impact is significant with short-term, negative effect.

11.2.4.1.2 Excess Quantities of Waste Arising

Construction activities will generate quantities of waste if materials are oversupplied, if incorrect materials are delivered, or if materials are cut to size on-site. General housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste

Where possible, waste will be segregated into recyclable and recoverable materials. The majority of demolition and construction materials are either recyclable or recoverable.

This impact is slight, with short term negative effect.

11.2.4.1.3 Consignment of waste to treatment facilities

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution.

Removal of waste by an unauthorised waste collector and the deposit of waste at an unauthorised facility could result in an impact that is moderate to significant with short to long term negative effects depending on the receiving environment at the destination facility.

This impact is therefore considered significant with long term negative effect.

11.2.4.1.4 Classification of excavated soil and stone

There is a quantity of made ground and sub soil which will need to be excavated to facilitate the Proposed Development. It is unlikely that much of this material will be suitable for reuse onsite. Surplus excavated material will need to be removed off-site.

If the correct classification and segregation of the excavated material is not carried out to ensure that any potentially contaminated materials are identified and handled in a way that this could impact negatively on workers as well as on water and soil environments, both on and off- site.

This impact is significant with long term negative effect.

11.2.4.1.5 Management of contaminated soils

The accidental release of contaminated soil material due to improper storage or an accident during loading over open ground could result in these materials contaminating the soil and underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. The potential impact could be moderate to significant, with short to long-term negative effects on the receiving geological and hydrological environment depending on the nature of the incident.

11.2.4.1.6 Removal of asbestos containing materials and contaminated soil

The removal of asbestos containing materials from the site, if not carried out in accordance with recommendations contained within the OHSS Safety Consultants October, 2019 Asbestos Demolition Survey Report for Former Techcrete Site Howth Road Howth Co. Dublin and the OHSS Safety Consultants October, 2019 A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos could lead to negative impacts on human health and the environment. The improper storage and removal of soil containing asbestos could lead to release of asbestos into the air via dust particles.

The accidental release of contaminated soil material due to improper storage or an accident during loading over open ground could result in these materials contaminating the soil and underlying groundwater and potentially the receiving water of the Baldoyle Bay SAC. The potential impact could be moderate to significant, with short-term negative effects on the receiving geological and hydrological environment depending on the nature of the incident

This impact is significant with short term negative effect.

11.2.4.1.7 Movement of HGVs onto and off site

The movement of waste off site will result in the addition of Heavy Goods Vehicle (HGV) movements. This impact is not significant, with short term negative effect.

Unmitigated, the likely impact of construction waste generated from the Proposed Development is significant, with short to long-term negative effects.

11.2.4.2 INDIRECT

The movement of waste off site will result in the addition of Heavy Goods Vehicle (HGV) movements. This indirect impact has been assessed in Chapter 11 (Material Assets Part 1, Traffic) of this EIAR.

11.2.4.3 SECONDARY

There are no secondary impacts from waste during the Construction Phase of the Proposed Development, all facilities to which waste will be taken will be appropriately licenced or permitted to accept that waste type and therefore have been assessed through the consent process.

11.2.4.4 CUMULATIVE

The Proposed Development s in close proximity to the proposed developments which are detailed in section 11.1.1.1.2.7 of this chapter Description of Other Relevant Developments, if under construction concurrently, may result in additional pressure on waste facilities in the area to accept construction waste. It is considered that there is adequate waste management facility capacity as described in section 8.3 Baseline Environment section of this chapter and therefore the likely impact is not significant, with short term negative effect.

11.2.5 IMPACT OF PROPOSED DEVELOPMENT – OPERATIONAL PHASE

The impacts and mitigation measures for the Operational Phase are summarised in Appendix 2 to this chapter.

11.2.5.1 DIRECT

11.2.5.1.1 Demand for waste services in the area as a result of increased residents, retail and non-retail uses.

During the Operational Phase of the Proposed Development the main impact is the increased demand for waste services in the area as a result of increased residents, retail and non-retail uses.

This impact is significant with long term negative effect.

11.2.5.1.2 Lack of proper segregation and recycling

Lack of proper segregation and recycling by residents/tenants would lead to lack of compliance with the Regional Waste Management Plan.

This impact is not significant with long term negative effect.

11.2.5.1.3 Runoff from bin stores

Runoff from bin stores could contaminate surface water and cause odour and vermin nuisance.

This impact is not significant with short term negative effect.

11.2.5.1.4 Bins not collected on time (Inclement weather or industrial strike action could lead to waste not being collected on time)

Bins not collected on time and allowed to overflow attracting vermin and creating odour.

This impact is not significant with short term negative effect.

11.2.5.1.5 Improper collection, transport or disposal of waste

Improper collection, transport or disposal of waste could lead to the improper management of waste at end destinations.

This impact is significant with short term negative effect.

11.2.5.1.6 Poorly designed bin storage areas

- Unsecured bin storage areas could lead to unauthorised use of these facilities, vandalism or fly tipping
- Inadequate capacity provided in bin stores could lead to bins overflowing and attracting vermin
- Poorly designed bin storage areas could lead to poor usage, poor segregation and recycling rates and safety issues
- Inclement weather or industrial strike action could lead to waste not being collected on time thereby requiring adequate capacity

This impact is not significant with short term negative effect.

The overall impact associated with the Operational Phase of the development is not significant, with long term, negative effects.

11.2.5.2 INDIRECT

An indirect impact of waste arising at the Proposed Development during the Operational Phase is the movement of HGVs associated with the collection of waste and their impact on traffic and emissions. This has been assessed in Chapter 11 (Material Assets Part 1, Traffic) of this EIAR.

11.2.5.3 SECONDARY

There are no secondary impacts associated with the operation Phase of the Proposed Development .

11.2.5.4 CUMULATIVE

The cumulative impact of the Proposed Development with other developments in the area which are detailed in section 11.1.1.2.7 Description of Other Relevant Developments of this chapter is considered to be imperceptible with long term neutral effects due to the capacity of waste collection companies as well as waste management facilities in the region which have been designed with forward planning and expansion in mind to cater for a growing population in the Eastern Midlands Region. Existing waste collections currently take place in the local area and the Proposed Development will likely be added to an existing collection route.

11.2.6 ‘DO NOTHING’ IMPACT

In the ‘Do Nothing’ scenario the potential impact on the receiving environment if the Proposed Development did not proceed is considered.

It is considered that there would be no change or resulting impact on the receiving environment as there would be no waste generated from the site and there would be no impact or change to the receiving environment.

11.2.7 MITIGATION MEASURES

11.2.7.1 CONSTRUCTION PHASE

The following mitigation measures are included:

11.2.7.1.1 Uncontrolled release of waste to the receiving environment

All waste materials will be dealt with in accordance with regional and national legislation namely the Waste Management act, 1996, as amended and all subordinate regulations.

A Construction Waste Manager will be dedicated to ensuring the mitigation measures are implemented.

In the event of an environmental pollution incident, the local authority will be notified immediately.

Waste will be stored and managed in line with the CEMP and CMP pending collection by a permitted waste contractor

Dedicated areas for waste skips and bins will be identified across the site. These areas will be easily accessible to waste collection vehicles.

A stockpile compound will be designated at the site and in line with the CMP and CEMP for the Proposed Development .

All construction wastes will be stored in a secure segregated area in suitable containers which identify the waste material to be deposited in order to encourage good segregation, recycling and recovery.

Waste materials will be stored remote from any sensitive receptors such as water courses, drains and preferably on impermeable hardstand or in sealed containers.

Wastes identified for re-use will be stored separately to avoid the risk of mixing with wastes destined for off-site recovery.

While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows:

- A suitable temporary storage area shall be identified and designated;
- All stockpiles shall be assigned a stockpile number;
- Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on site drawings;
- Non-hazardous and hazardous soil (if required to be stockpiled) shall be stockpiled only on hard-standing or high grade polythene sheeting to prevent cross-contamination of the soil below;
- Soil stockpiles shall be sealed to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust;

When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to disposal.

An excavation/stockpile register shall be maintained on site showing at least the following information:

- Stockpile number;
- Origin (i.e. location and depth of excavation);
- Approximate volume of stockpile;
- Date of creation;
- Description and Classification of material;
- Date sampled;
- Date removed from site;
- Disposal/recovery destination; and
- Photograph;

Stockpile management will be carried out in accordance with the CEMP and the mitigation measures therein for dust management.

Waste storage and movement will be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable); and

Waste will be stored on site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Prevent hazards to site workers and the general public during Construction Phase (largely noise, vibration and dust).

Wastes arising will be taken to suitably registered/ permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate.

There are numerous licensed waste facilities in the Eastern Midlands Waste Region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the Proposed Development would be in line with daily activities at these facilities.

The inspection and monitoring stage of the construction activities increase the effectiveness of environmental mitigation, as this addresses any environmental problems that may be occurring and assists in intervention and response at an early stage. Daily inspection of the waste compound and stockpile areas and is to be undertaken throughout the construction Phase . This will be carried out by the appointed Construction Waste Manager.

11.2.7.1.2 Excess Quantities of Waste Arising

The management of waste will be in accordance with the Eastern–Midlands Regional Waste Management Plan 2015-2021 and the National Hazardous Waste Management Plan 2014-2020 and will be in compliance with the Waste Management Act 1996, as amended and all associated regulations.

The contractor will establish recovery/reuse/recycling targets for the site, and these will be reviewed in relation to waste arisings and removal records to encourage continuous improvement of recycling rates.

The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste segregation will be implemented to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery.

11.2.7.1.3 Consignment of waste to treatment facilities

The transport and consignment of waste will be in compliance with the Waste Management Act 1996, as amended and all associated regulations.

Wastes arising will be taken to suitably registered, permitted or licenced waste management facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate.

Waste will be transported from site by holders of Waste Collection Permits issued by the National Waste Collection Permit Office which authorise the collector to collect waste in the area and to transport the specific waste type to the destination facility.

A register of waste collection contractor waste collection permits will be maintained on site.

Waste will be consigned to facilities which are authorised to accept the waste type and which hold the appropriate waste management facility permit or EPA licence.

Waste records will be maintained and a register of all waste consignments from site will be recorded at the site in line with the requirements set out in the CMP and CEMP. Waste records will include documentation from the destination facility for each load of waste received.

Waste audits will be carried out at regular intervals to monitor waste management practices, record keeping, traceability of all waste arising and removed from site and evidence of acceptance at the end destination.

The removal of all waste from site shall be supervised at all times.

Waste shall only be consigned from the site to destinations which are licenced by the EPA, hold a waste management facility permit or certificate of registration issued by the relevant local authority and for which planning permission is in place thus confirming that the waste destination has been fully assessed through the regulatory consent process in relation to potential impacts on the environment.

Detailed waste records for each consignment of waste shall be maintained in accordance with the CEMP for the Proposed Development . Records must include confirmation of receipt of waste materials at the destination facility.

11.2.7.1.4 Classification of excavated soil and stone

Waste soil and stone excavated at the site will be classified as set out in the Material Management Plan Remedial Strategy and the CEMP, in accordance with Environmental Protection Agency Guidance, and will be consigned to facilities which are licenced to accept that classification. Waste soil and stone arising may be classified in the List of Waste[1] as either 17 05 03* (Soil and stone containing

[1] Environmental Protection Agency, Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous, Valid from 1st June 2015

hazardous substances) which is hazardous or 17 05 04 (soil and stones other than those mentioned in 17 05 03) which is not hazardous. Results of chemical analysis of soil samples will be used to determine whether soil waste is hazardous or non-hazardous, using the HazWasteOnline™ tool, which is a method accepted by the Environmental Protection Agency for classification of waste.

A sampling and analysis plan will be provided by the Environmental Consultant appointed by the Contractor which will address all required sampling and analysis following the removal of the buildings and infrastructure on site in order to classify the waste for removal off site.

Excavation works will be monitored by a suitably qualified person to ensure contaminated soil is identified and segregated from any potentially uncontaminated soil, where encountered. Additional soil testing will be required in order to reclassify excavated soil and the material will be required to be classified as hazardous or non-hazardous using the HazWasteOnline™ application and then classified as inert, non- hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC for acceptance of waste at landfills.

Stockpiles will be manged in accordance with the stockpile management measures set out in the CEMP to ensure traceability of all waste soil and stone material and corresponding classification and sampling results.

Waste soil and stone shall only be consigned from the site to destinations which are licenced by the EPA, hold a waste management facility permit or certificate of registration issued by the relevant local authority and for which planning permission is in place thus confirming that the waste destination has been fully assessed through the regulatory consent process in relation to potential impacts on the environment.

Contaminated soils must be removed from site under the supervision of a suitably qualified Environmental Consultant.

11.2.7.1.5 Removal of asbestos containing materials and contaminated soil

Contaminated soils must be removed from site under the supervision of a suitably qualified Environmental Consultant.

All contaminated soil excavation will be handled in accordance with the procedures outlined in the Waste Management and Management of Stockpile sections of the CEMP and will have due regard to the measures set out in the Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth.

Excavation works will be monitored by a suitably qualified person to ensure contaminated soil is identified and segregated from any potentially uncontaminated soil, where encountered.

Additional soil testing will be carried out order to reclassify soil and the material will be required to be classified as hazardous or non-hazardous using the HazWasteOnline ™ application and then classified as inert, non- hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC for acceptance of waste at landfills.

Contaminated material will be removed from site for treatment or disposal as appropriate. The contaminated material will either be suitable for recovery or disposal in Ireland depending on the limitations of the receiving facility’s licence. If not suitable, the material will require recovery or disposal abroad and will be exported in accordance with the requirements of Transfrontier Shipment of Wastes (TFS) Regulations.

Soils containing asbestos will be managed in accordance with the measures set out in OHSS Safety Consultants October 2019 A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos including :

- Wetting at the point of dust release;
- Damping down of exposed soil during dry weather;

- Measures to prevent material being transferred onto the local road network (e.g. wheel wash);
- Measures to prevent soil being transferred off site by workers on their clothes or feet.

The quantity of asbestos present in soil on this site is very small and normal good construction practice will be in place during the works. The soils excavated are likely to be very damp however provision will be made for additional use of water to minimise the release of dust during handling. Good site management measures to prevent mud being transported onto the local road network on vehicle wheels or workers taking the soil home in their vehicles, on their feet or on their clothes will be in place in line with the CEMP. It is therefore anticipated that exposures to airborne fibre will be negligible.

Asbestos containing waste must be removed from site according to the Asbestos Removal Plan of Work prepared for the Proposed Development.

The asbestos removal contractor/Demolition contractor is required under the Safety Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 to develop a plan of work prior to commencing demolition activities. This Plan of Work (POW) will specify how the ACM's will be removed, transported and disposed of. The POW will also have details of quantities and receipts for the quantities of ACMs taken off site including List of Waste Coding (17-06-05 or 17-06-01). The plan of work must be submitted to the Health and Safety Authority (HSA) 14 days in advance of the works commencing and as part of the notification of the project. Both the HSA and Local Authority inspectors or waste enforcement officers have powers to inspect the POW and the site under the asbestos regulations.

The POW will be based on the HSA guidelines for removal of asbestos containing materials. A competent independent analyst will be employed on the project to oversee the asbestos removal works and to undertake air monitoring and clearance testing as required by the regulations. All of these reports can be made available to the regulatory bodies.

Asbestos containing waste will only be removed by competent persons and transferred offsite by a suitably permitted hazardous waste contractor and will be brought to a suitably authorised hazardous waste facility.

11.2.7.1.6 Traffic management

Waste loading and removal should be carried out in line with the Traffic Management Plan for the Construction Phase of the Proposed Development and in accordance with measures outlined for traffic management in the CMP and the CEMP.

11.2.7.2 OPERATIONAL PHASE

Mitigation measures are proposed to manage and mitigate the impacts identified in relation to waste during the Operational Phase of the Proposed Development to address the following:

11.2.7.2.1 Demand for waste services in the area as a result of increased residents, retail and non-retail uses.

Increased demand for waste services in the area requires adequate waste collection, treatment and disposal facilities.

There is adequate capacity in the Dublin region to cater for collections and treatment of waste arising which is described in the Baseline Environment section of this chapter of the EIAR.

Waste will be managed in accordance with the OWMP for the development

11.2.7.2.2 Lack of proper segregation and recycling

The management of waste will be in accordance with the Eastern–Midlands Regional Waste Management Plan 2015-2021 and the National Hazardous Waste Management Plan 2014-2020 and will be in compliance with the Waste Management Act 1996, as amended and all associated regulations.

Waste shall be managed in line with the OWMP for the Proposed Development .

Adequate receptacles of a suitable type and size shall be provided and shall include at a minimum receptacles for the source segregation of mixed general waste, mixed dry recyclable waste and source segregated biodegradable kitchen and garden waste (commonly known as 'compost' or 'brown' bins).

Waste shall be presented for collection in compliance with the Fingal County Council Storage, Presentation and Collection of Household Waste Bye-Laws 2006 (hereinafter referred to as 'the bye-laws'). Waste collections shall be frequent enough so as not to allow bin storage areas to over fill. This shall be a condition of contract with the appointed waste management contractor.

Residents and tenants should receive information in relation to waste prevention, reduction, the proper segregation of waste and the correct method of deposit in the waste storage compound. Information on nearby bring banks and recycling centres should be furnished to the residents and tenants of the Proposed Development to encourage recycling.

11.2.7.2.3 Improper collection, transport or disposal of waste

All collections must take place in compliance with conditions of the waste contractor's Waste Collection Permit for the region and in line with any Local Authority Bye-Laws and the Waste Management (Waste Collection Permit) Regulations 2007 as amended. All tenants are obliged by law to avail of the waste management service and must comply with local Bye-Laws and Statutory Instruments in relation to the presentation of waste for collection.

Waste collection vehicles will service the bins and the empty bins will be returned to the waste storage area.

Records of the collections will be maintained by the management company for the development including reports from the facilities to which the waste is taken. This will be a condition of the management contract as set out in the OWMP.

Access and egress of the waste collection vehicles will be in accordance with the Traffic Management Plan for the facility. *BS 5906: 2005 – Waste Management in Buildings – Code of Practice* has been taken into consideration when detailing vehicular access and egress to the development for the purposes of waste collection.

11.2.7.2.4 Runoff from bin stores and Poorly designed bin storage areas

Poor design of bin storage areas may lead to poor usage, poor segregation and recycling rates and safety issues, unauthorised use of these facilities, vandalism or fly tipping.

The design of the waste compound areas shall be in line with The Department of Housing, Planning and Local Government published guidelines in March 2018 – "*Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities*". These Guidelines detail the provisions that need to be made for the storage and collection of waste materials in apartment schemes. These guidelines have been taken into account when preparing the design of the waste compound area.

The bin compounds will have the following provisions as minimum:

i. **Access:** The bin compounds will be accessible for the mobility impaired.

ii. **Lighting:** Bin compounds will have adequate lighting. Energy saving lighting operated on motion sensors is proposed. This is to ensure that waste will not be tipped in dimly lit areas and that the areas do not pose as a safety risk.
iii. **Spillage & drainage:** A non-slip surface will be provided to prevent slips or falls, and the compounds will have adequate drainage which will be directed to foul sewer.
iv. **Security:** The bin compounds will have restricted access and will be accessible by tenants and residents only. Security measures will be in place and CCTV will be provided in the bin compounds. This is to prevent unauthorised access to the bins by the general public.
v. **Ventilation:** A natural vent will be provided. All vents will be ducted to an external opening so that the bin storage areas will not cause an odour nuisance, taking into account the avoidance of nuisance for habitable rooms nearby.
vi. **Signage:** Pictorial signage will be provided to show residents and tenants what wastes can and cannot be placed in each bin. All signage will be provided by the management company appointed. This will be a requirement in their agreement to ensure this is included in any agreement with a waste contractor or provided by them directly.
vii. **Environmental nuisance:** The compounds will be enclosed areas to avoid environmental nuisances such as litter. Regular waste collections will be required from the waste collection providers to prevent any other environmental nuisances such as odour or vermin. The management company appointed will be required to ensure there is adequate vermin control in place.
viii. **Vehicular Access:** Both compounds have ample space provided for waste collection vehicles to access the development and to collect the bins. Vehicular access for waste collection is included in the traffic management plan for the development.

11.2.7.2.5 Bins not collected on time (Inclement weather or industrial strike action could lead to waste not being collected on time)

Contracts with the property management company will include :

- provision for adequate budgets to provide the appropriate waste management services and receptacles.
- Requirements for ongoing monitoring of waste contractors permits and recovery and recycling data from the development
- Provision of waste education and awareness information to tenants and residents

11.2.8 RESIDUAL IMPACTS

11.2.8.1 CONSTRUCTION PHASE

The implementation of the mitigation measures outlined above will ensure that there will be no significant adverse residual impacts associated with the Proposed Development in terms of waste during the construction Phase.

A best practice approach to waste management during the Construction and demolition Phase, and compliance with the CMP and the CEMP will ensure that the likely impact is **imperceptible, with short term negative effect.**

11.2.8.2 OPERATIONAL PHASE

During the operational Phase, a structured approach to waste management as set out in the OWMP will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the Operational Phase on the environment will **be imperceptible with long term neutral effect.**

11.2.9 INTERACTIONS

11.2.9.1 POPULATION AND HUMAN HEALTH

The potential impacts on human health in relation to the generation of waste during the construction and operational Phase s arise from the risk of poor management of waste giving rise to littering, odour issues and health hazards which could cause also odour nuisance and attract vermin. The design of the Proposed Development in terms of waste storage areas, a planned approach to waste management and control and adherence to the CMP, CEMP and OWMP for the Proposed Development accompanying this planning application, will ensure appropriate management of waste and avoid any negative impacts on the local population. The likely impact will be imperceptible with long term neutral effect.

11.2.9.2 LAND AND SOILS

Excavation of soil to facilitate the Proposed Development will include the removal of contaminated and uncontaminated soil from the site. The mitigations measures set out together with adherence to the CEMP and the CMP for the Proposed Development will ensure the impact is imperceptible with long term positive effect. Land and Soils is fully assessed in Chapter 4 Land Soil, Geology, Hydrogeology of this EIAR.

11.2.9.3 TRAFFIC AND TRANSPORTATION

There will be a temporary increase in local traffic due to the movement of HGVs associated with waste removal during the Construction Phase of the Proposed Development. There will be a long term increase in vehicle movements associated with waste collection activity during the Operational Phase but these movement will be imperceptible in the context of the overall traffic increase which has been addressed in Chapter 11 (Material Assets, Part 1 Traffic) of this EIAR. Provided the mitigation measures detailed in Chapter 11 (Material Assets, Part 1 Traffic) and the requirements of the OWMP accompanying this planning application are adhered to, the impact will be imperceptible with short to long term neutral effects.

11.2.9.4 AIR

There is the potential for dust arising from stockpiles of waste during the Construction Phase and from HGV movements during both the construction and operational Phases. This has been adequately mitigated and has been assessed in Chapter 6 Air Quality and Climate of this EIAR. The overall impact of waste on air is not significant with a short term negative effect.

11.2.9.5 ECOLOGY

There is the potential for dust arising from stockpiles of waste during the Construction Phase and from HGV movements during both the construction and operational Phase s. This has been adequately mitigated and has been assessed in Chapter 6 Air Quality and Climate of this EIAR. Impacts on removal of contaminated material from site on water has been assessed in Chapter 4 Land Soil, Geology, Hydrogeology. The overall effect of the development on ecology has been assessed in Chapter 8 Biodiversity of this EIAR and in the Natura Impact Statement accompanying this planning application.

The overall impact of waste on ecology is imperceptible with a short term negative effect.

11.2.9.6 NOISE

Noise form waste management activities has been assessed in Chapter 7 Noise and Vibration of this EIAR.

The overall impact of waste on noise is not significant with a short term negative effect.

11.2.10 DIFFICULTIES ENCOUNTERED IN COMPILING REQUIRED INFORMATION

There were no difficulties encountered in compiling this material assets, waste assessment.

11.2.11 REFERENCES

- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment including amendment directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014.;
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, August 2017).;
- Draft Advice Notes for preparing Environmental Impact Statements (EPA, September 2015).;
- Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002).;
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003).;
- The management of Waste from National Road Construction Projects. (TII, December 2017).;
- NRA Guidelines (NRA, 2009).
- EPA National Waste (Database) Reports;
- The Fingal Development Plan (FCDP) 2017-2022;
- Environmental Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended;
- Waste Management Act 1996 (No. 10 of 1996), as amended.
- Protection of the Environment Act 2003, as amended.
- Litter Pollution Act 1997, as amended.
- Eastern-Midlands Waste Region Waste Management Plan, 2015-2021, Eastern-Midlands Region, 2015.
- The Fingal County Council Storage, Presentation and Collection of Household Waste Bye-Laws 2006.
- Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste).
- European Communities (Waste Directive) Regulations 2011, S.I. No. 126/2011.
- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended
- Waste Management (Facility Permit and Registration) Regulations 2007, as amended
- Waste Management: Changing Our Ways, The Department of the Environment and Local Government, 1998.
- Preventing and Recycling Waste: Delivering Change, The Department of the Environment and Local Government, 2002.
- Taking Stock & Moving Forward, The Department of the Environment and Local Government, 2004.
- National Strategy on Biodegradable Waste Management, Department Environment, Heritage and Local Government, 2006.

- A Resource Opportunity – Waste Management Policy in Ireland, Department of the Environment, Community and Local Government, 2012.
- Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous, Environmental Protection Agency, 2015.
- Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities, Department of Housing, Planning and Local Government, March 2018.
- Waste Management in Buildings – Code of Practice, British Standard, BS 5906:2005, 2005.
- Mobile Waste and Recycling Containers Part 1: Containers with 2 wheels with a capacity up to 400 l for comb lifting devices — Dimensions and design, British Standard, BS EN 840-1:2012, 2012.
- Mobile waste containers. Containers with four wheels with a capacity from 750 l to 1700 l with flat lid(s), for wide trunnion or BG-and/or wide comb lifting devices. Dimensions and design, British Standard, BS EN 840-4:1997, 1997.
- Municipal Waste Statistics for Ireland, EPA Waste Data Release, 31 October 2018
- Barrett Mahony Consulting Engineers Civil and Structural, July 2019. Civil Infrastructure Report;
- Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth (Golder, 2019c) – note this report incorporates previous site investigation report by IGSL;
- Henry J Lyons, October 2019. Claremont Project. Block B – Basement Plan. Drawing No. CLR-HJL-02-B01-DR-A-1008;
- Barrett Mahony Consulting Engineers Civil and Structural, October 2019. Construction Management Plan for the Proposed Development
- Enviroguide Consulting, October 2019, Construction Environmental Management Plan for the Proposed Development
- Enviroguide Consulting, October 2019, Operational Phase Waste Management Plan (OWMP) for the Proposed Development .
- OHSS Safety Consultants October 2019 Asbestos Demolition Survey Report for Former Techcrete Site Howth Road Howth Co. Dublin
- by OHSS Safety Consultants October 2019 A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos.

APPENDIX 1 Summary Table of Impacts

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
	Construction Phase								
1	Accidental uncontrolled release of waste to the receiving environment	land, water or air	Contamination of soil on site, contamination of surface or groundwater, release of dust to air, litter and vermin nuisance	Negative	Significant	Short-term	Direct	All waste materials will be dealt with in accordance with regional and national legislation namely the Waste Management act, 1996, as amended and all subordinate regulations. A Construction Waste Manager will be dedicated to ensuring the mitigation measures are implemented. In the event of an environmental pollution incident, the local authority will be notified immediately. Waste will be stored and managed in line with the CEMP and CMP pending collection by a permitted waste contractor Dedicated areas for waste skips and bins will be identified across the site. These areas will be easily accessible to waste collection vehicles. A stockpile compound will be designated at the site and in line with the CMP and CEMP for the Proposed Development . All construction wastes will be stored in a secure segregated area in suitable containers which identify the waste material to be deposited in order to encourage good segregation, recycling and recovery. Waste materials will be stored remote from any sensitive receptors such as water courses, drains and preferably on impermeable hardstand or in sealed containers.	Not significant with short-term negative effects.

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								Wastes identified for re-use will be stored separately to avoid the risk of mixing with wastes destined for off-site recovery. While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows: • A suitable temporary storage area shall be identified and designated; • All stockpiles shall be assigned a stockpile number; • Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on site drawings; • Erroneous pieces of concrete will be screened from the stockpiled soils and segregated separately; • Non-hazardous and hazardous soil (if required to be stockpiled) shall be stockpiled only on hard-standing or high grade polythene sheeting to prevent cross-contamination of the soil below; • Soil stockpiles shall be sealed to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust; When a stockpile has been sampled for classification purposes, it shall be considered to	

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								be complete and no more soil shall be added to that stockpile prior to disposal. An excavation/stockpile register shall be maintained on site showing at least the following information: • Stockpile number; • Origin (i.e. location and depth of excavation); • Approximate volume of stockpile; • Date of creation; • Description and Classification of material; • Date sampled; • Date removed from site; • Disposal/recovery destination; and • Photograph; Stockpile management will be carried out in accordance with the CEMP and the mitigation measures therein for dust management. Waste storage and movement will be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable); and Waste will be stored on site, including concrete, asphalt and soil stockpiles, in such a manner as to: • Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and	

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								implement dust/odour control measures, as may be required); • Prevent hazards to site workers and the general public during Construction Phase (largely noise, vibration and dust). Wastes arising will be taken to suitably registered/ permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate.	
2	Excess quantities of waste arising	Waste reduction and recycling rates	Failure to meet objectives of the EMR Waste Management Plan	Negative	slight	Short-term	Indirect	The management of waste will be in accordance with the Eastern–Midlands Regional Waste Management Plan 2015-2021 and the National Hazardous Waste Management Plan 2014-2020 and will be in compliance with the Waste Management Act 1996, as amended and all associated regulations. The contractor will establish recovery/reuse/recycling targets for the site, and these will be reviewed in relation to waste arisings and removal records to encourage continuous improvement of recycling rates. The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised. Waste segregation will be implemented to minimise potential cross contamination of waste	Imperceptible with short-term neutral effects.

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								streams and facilitate subsequent re-use, recycling and recovery.	
3	Consignment of waste to treatment facilities	Off-site destinations	Risk of waste being deposited at an unauthorised waste facility	Negative	Significant	Long-term	Direct	The transport and consignment of waste will be in compliance with the Waste Management Act 1996, as amended and all associated regulations. Wastes arising will be taken to suitably registered/ permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate. Waste will be transported from site by holders of Waste Collection Permits which authorise the collector to collect waste in the area and to transport the specific waste type to the destination facility. A register of waste collection contractor waste collection permits will be maintained on site. Waste will be consigned to facilities which are authorised to accept the waste type and which hold the appropriate waste management facility permit or EPA licence. The removal of all waste from site shall be supervised at all times. Waste records will be maintained and a register of all waste consignments from site will be recorded at the site in line with the requirements set out in the CMP and CEMP. Waste records will include documentation from the destination facility for each load of waste received.	Not significant with short-term negative effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								Waste audits will be carried out at regular intervals to monitor waste management practices, record keeping, traceability of all waste arising and removed from site and evidence of acceptance at the end destination.	
4	Classification of excavated soil and stone	Off-site destinations	Risk of waste being deposited at an unauthorised waste facility	Negative	Significant	long term	Direct	Waste soil and stone excavated at the site will be classified as set out in the CEMP and consigned to facilities which are licenced to accept that classification. Excavation works will be monitored by a suitably qualified person to ensure contaminated soil is identified and segregated from any potentially uncontaminated soil, where encountered. Additional soil testing will be required in order to reclassify soil and the material will be required to be classified as hazardous or non-hazardous using the HazWasteOnline application (or other similar application) and then classified as inert, non- hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC for acceptance of waste at landfills Stockpiles will be manged in accordance with the stockpile management measures set out in the CEMP to ensure traceability of all waste soil and stone material and corresponding classification and sampling results. Waste soil and stone shall only be consigned from the site to destinations which are licenced by the EPA, hold a waste management facility permit or certificate of registration issued by the relevant local authority and for which planning permission is in place thus confirming that the waste destination has been fully assessed	Imperceptible with short-term neutral effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								through the regulatory consent process in relation to potential impacts on the environment	
5	Removal of asbestos containing materials	Air, water, land	Risk of release of asbestos fibres to air, water or land	Negative	Significant	Short-term	Direct	Asbestos containing materials will be removed from site in line with the measures set out in OHSS Safety Consultants October 2019 Asbestos Demolition Survey Report for Former Techcrete Site Howth Road Howth Co. Dublin and OHSS Safety Consultants in October, 2019 A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos in particular: •the exterior of the building has all the asbestos removed prior to any site set ups as any large vehicles going to site would easily damage and disturb the asbestos debris which is present and in bad condition. Test holes will ned to be dug and soil samples taken prior to any ground works. • Where asbestos containing materials were identified they should be removed and disposed of following all HSA guidelines prior to commencement of refurbishment works. • Areas that could not be accessed are presumed to contain asbestos and should be investigated prior to any disturbance of those areas. Asbestos containing waste must be removed from site according to the Asbestos Removal Plan of Work prepared for the Proposed Development.	Imperceptible with short-term negative effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								The asbestos removal contractor/Demolition contractor is required under the Safety Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 to develop a plan of work prior o commencing demolition activities. This plan of work (POW) will specify how the ACM's will be removed, transported and disposed of. The POW will also have details of quantities and receipts for the quantities of ACMs taken off site including List of Waste Coding (17-06-05 or 17-06-01). The plan of work must be submitted to the Health and Safety Authority (HSA) 14 days in advance of the works commencing and as part of the notification of the project. Both the HSA and Local Authority inspectors or waste enforcement officers have powers to inspect the POW and the site under the asbestos regulations. The POW will be based on the HSA guidelines for removal of asbestos containing materials. A competent independent analyst will be employed on the project to oversee the asbestos removal works and to undertake air monitoring and clearance testing as required by the regulations. All of these reports can be made available to the regulatory bodies. Asbestos containing waste will only be removed by competent persons and transferred offsite by a suitably permitted hazardous waste contractor and will be brought to a suitably authorised hazardous waste facility.	
6	Management of contaminated soils	Air, water, land	Risk of release of asbestos fibres to air, water or land or release of other contaminants to water or land	Negative	Significant	Short-term	Direct	Contaminated soils must be removed from site under the supervision of a suitably qualified Environmental Consultant. All contaminated soil excavation will be handled in accordance with the procedures outlined in	Not significant with short-term negative effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								the Waste Management and Management of Stockpile sections of the CEMP and will have due regard to the measures set out in the Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth. Excavation works will be monitored by a suitably qualified person to ensure contaminated soil is identified and segregated from any potentially uncontaminated soil, where encountered. Additional soil testing will be carried out order to reclassify soil and the material will be required to be classified as hazardous or non-hazardous using the HazWasteOnline application (or other similar application) and then classified as inert, non- hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC for acceptance of waste at landfills. Contaminated material will be removed from site for treatment or disposal as appropriate. The contaminated material will either be suitable for recovery or disposal in Ireland depending on the limitations of the receiving facility's licence. If not suitable, the material will require recovery or disposal abroad and will be exported in accordance with the requirements of Transfrontier Shipment of Wastes (TFS) Regulations. Soils containing asbestos will be managed in accordance with the measures set out in OHSS Safety Consultants October 2019 A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos including :	

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								o Wetting at the point of dust release; o Damping down of exposed soil during dry weather; o Measures to prevent material being transferred onto the local road network (e.g. wheel wash); o Measures to prevent soil being transferred off site by workers on their clothes or feet. The quantity of asbestos present in soil on this site is very small and normal good construction practice will be in place during the works. The soils excavated are likely to be very damp however provision will be made for additional use of water to minimise the release of dust during handling. Good site management measures to prevent mud being transported onto the local road network on vehicle wheels or workers taking the soil home in their vehicles, on their feet or on their clothes will be in place in line with the CEMP. It is therefore anticipated that exposures to airborne fibre will be negligible.	
7	Movement of HGVs onto and off site	Aire pollution, noise	Traffic and exhaust emissions	Negative	Not significant	Short-term	Indirect	Waste loading and removal should be carried out in line with the Traffic Management Plan for the Construction Phase of the Proposed Development and in accordance with measures outlined for traffic management in the CMP	Imperceptible, short-term with negative effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
	Operation Phase								
1.	Demand for waste services in the area as a result of increased residents, retail and non-retail uses.	Waste services (collection and facilities)	Inadequate capacity to deal with the waste arising	Negative	Significant	Long Term	Direct	There is adequate capacity in the Dublin region to cater for collections and treatment of waste arising Waste will be managed in accordance with the OWMP for the development	Not significant with long term neutral effects
2.	Lack of proper segregation and recycling	Regional recycling rates	Failure to achieve segregation and recycling in accordance with the Eastern-Midlands Regional Waste Management Plan	Negative	Not-significant	Long Term	Direct	The management of waste will be in accordance with the Eastern–Midlands Regional Waste Management Plan 2015-2021 and the National Hazardous Waste Management Plan 2014-2020 and will be in compliance with the Waste Management Act 1996, as amended and all associated regulations. Waste will be managed in accordance with the OWMP for the development which sets out the measures for the provision of adequate facilities to encourage good waste segregation and recycling Residents and tenants will receive information in relation to waste prevention, reduction, the proper segregation of waste and the correct	Imperceptible with long term neutral effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								method of deposit in the waste storage compound. Information on nearby bring banks and recycling centres will be furnished to the residents and tenants of the Proposed Development to encourage recycling.	
3.	Runoff from bin stores	Surface water, local area	Contamination of surface water and odour and vermin nuisance	Negative	Not-significant	Short Term	Direct	Waste will be managed in accordance with the OWMP for the development which sets out the measures for the provision of adequate facilities including the design of drainage from the waste storage areas to foul drain	Imperceptible with short term neutral effects
4.	Bins not collected on time (Inclement weather or industrial strike action could lead to waste not being collected on time)	Local area	Bin overflow attracting vermin and creating odour	Negative	Not-significant	Short Term	Direct	Waste will be managed in accordance with the OWMP for the development which provides for contract conditions to be put in place with property management and waste management contractors relating to the provision of adequate waste management services Storage capacity at the development allows for sufficient storage of waste in the event of a missed collection Adequate receptacles of a suitable type and size shall be provided and shall include at a minimum receptacles for the source segregation of mixed general waste, mixed dry recyclable waste and source segregated biodegradable kitchen and garden	Imperceptible with short term negative effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								waste (commonly known as 'compost' or 'brown' bins). Waste shall be presented for collection in compliance with the Fingal County Council Storage, Presentation and Collection of Household Waste Bye-Laws 2006 (hereinafter referred to as 'the bye-laws'). Waste collections shall be frequent enough so as not to allow bin storage areas to over fill. This shall be a condition of contract with the appointed waste management contractor.	
5.	Improper collection, transport or disposal of waste	Destination of waste	Waste deposited at an unauthorised destination	Negative	Significant	Short Term	Direct	All collections will take place in compliance with conditions of the waste contractor's Waste Collection Permit for the region and in line with any Local Authority Bye-Laws and the Waste Management (Waste Collection Permit) Regulations 2007 as amended. All tenants are obliged by law to avail of the waste management service and must comply with local Bye-Laws and Statutory Instruments in relation to the presentation of waste for collection. Waste will be consigned to facilities which are authorised to accept the waste type and which hold the appropriate waste management facility permit or EPA licence.	Imperceptible with short term neutral effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								Waste will be managed in accordance with the OWMP for the development. Records of the collections will be maintained by the management company for the development including reports from the facilities to which the waste is taken. Contracts with the property management company will include : • provision for adequate budgets to provide the appropriate waste management services and receptacles. • Requirements for ongoing monitoring of waste contractors permits and recovery and recycling data from the development • Provision of waste education and awareness information to tenants and residents	
6.	Poorly designed bin storage areas	Local area	Poor usage, poor segregation and recycling rates and safety issues Unauthorised use of these facilities, vandalism or fly tipping	negative	Not-significant	Short -term	direct	Waste will be managed in accordance with the OWMP for the development The design of the waste compound areas shall be in line with The Department of Housing, Planning and Local Government published guidelines in March 2018 – "Sustainable Urban Housing: Design Standards for New	Imperceptible with short term neutral effects

NO	Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact (significance)
								Apartments, Guidelines for Planning Authorities". These Guidelines detail the provisions that need to be made for the storage and collection of waste materials in apartment schemes. These guidelines have been taken into account when preparing the design of the waste compound area.	
7.	Inadequate capacity provided in bin stores		Bins overflowing and attracting vermin	negative	Not-significant	Short -term	direct	Bin stores and capacity will be designed in accordance with eh OWMP Waste collection vehicles will service the bins and the empty bins will be returned to the waste storage area.	Imperceptible with short term neutral effects

11.3 UTILITIES

11.3.1 INTRODUCTION

This section presents the likely and significant impacts associated with the material asset (built services) environments associated with the proposed mixed-use development at Claremont development in Howth County Dublin (the Proposed Development). Relevant mitigation and monitoring measures are also presented in this section.

The potential impacts associated with the Proposed Development, if any, are assessed with regards to the following proposed built services:

1. Potable Water Supply Infrastructure;
2. Waste Water Infrastructure;
3. Electricity;
4. Gas;
5. Telecommunications.

The impact from and on the surface water infrastructure is detailed in Chapter 8 (Water and Hydrology) and Chapter 12 (Risk Assessment).

The assessment of the proposed built services environment has been prepared by Margaret Costello, Chartered Engineer with over 10-years' experience at Barrett Mahony Civil and Structural Consulting Engineers and Rory Burke, Chartered Engineer with over 20 years' experience of JV Tierney and Company Mechanical, Electrical and Sustainable Consulting Engineers for, and on behalf of, Atlas Trading GP Limited.

11.3.2 METHODOLOGY

The assessment of the potential impact of the Proposed Development on the material assets in the area was carried out according to the methodology specified by the EPA and the specific criteria set out in the Guidelines on the Information to be Contained in an Environmental Impact Assessment Report (Aug 2017 (Draft)) and the EIA Directive 2014/EU/52.

This section of the EIAR assesses the impacts of the proposed mixed-use residential development at the Proposed Development, on the surrounding utility network in the area.

As part of a desktop study of the existing services infrastructure, serving the development site, the following data was sourced online, for information:

- Public Water Main Networks (Irish Water Networks);
- Public Foul Drainage (Irish Water Records);
- Electricity Supply Networks (ESB Networks);
- Gas Supply (Gas Networks Ireland);
- Telecommunications (eir).

All of the above information was reviewed, in order to gain and determine how the development site is currently served and determine its adequacy in terms of the proposed overall mixed-use development.

The assessment of potential impacts on the built services for the Proposed Development were assessed through a desktop study of the information provided in consultation with the relevant utility providers, listed above.

As part of the research, meetings, phone calls and email correspondence were carried out with Irish Water and Fingal County Council to discuss the relevant networks.

Meetings were held as follows:

1) 12,13 &14 Nov 2018 – On site of proposed development.
2) 20 May 2019- Fingal County Council Office Swords
3) 1st July 2019 – Proposed Development

Email and phone discussions with Donal O'Dwyer from Irish Water regarding wayleave, portable water and public sewers. Letter of Design Acceptance received on 3rd October 2019 – Irish Water Reference: 7287699079, copy included in appendix to this section (Appendix 11.3.1– Irish Water - Statement of Design Acceptance).

In line with the EPA Draft Guidelines (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 11.3.1

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

Table 11.3.1 – Definition of Quality of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts. See Table 11.3.2.

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

Table 11.3.2- Definition of Significance of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See Table 11.3.3

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

Table 11.3.3- Definition of Duration of Effects

11.3.3 Description of Development

The Proposed Development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

Figure 11.3.*1* shows the Ariel view indicating the location of the Proposed Development.

Figure 11.3.1- Site Location

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

11.3.4 CHARACTERISTICS OF DEVELOPMENT

11.3.4.1 WATER SUPPLY

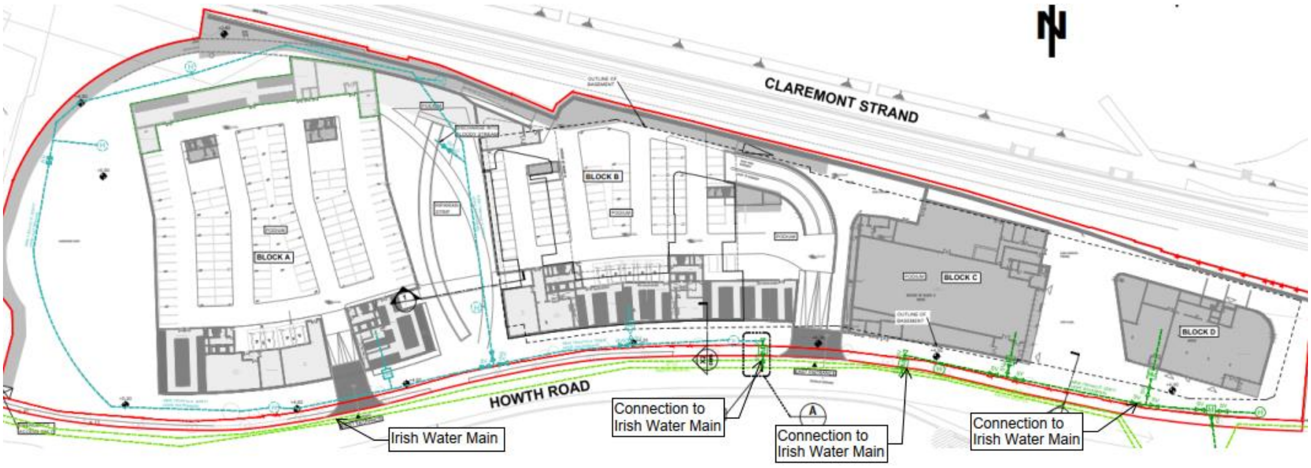

Figure 11.3.2- Proposed Portable Water Supply

Figure 11.3.2- Shows the portable water plan for the development. The new development will be supplied via the existing 160mm uPVC water main in Howth Road. It is planned to connect to the watermain with a 150mm diameter HDPE pipe at three locations along Howth Road. Onsite the water main will run parallel with Howth road and supply water to all blocks. This will be metered on entering the site.

The peak water demand for the development calculated in Section 11.3.7 is 13.01 l/day, Table **11.3.*4*** below.

The development will have a 24 hour cold water storage provision.

11.3.4.2 FOUL WATER DRAINAGE

The foul for each block will be collected, brought down through the structure to the carpark level to discharge out through the retaining wall/secant piled wall and discharged to the main outfall sewer outside basement footprint. This new main outfall sewer runs from east to west, turns north after Block A, and connects to the existing 450mm dia. public foul sewer in Baltray Park.

It has been agreed with Fingal County Council and Irish Water that surface water collected in the basement carpark is to be discharged into the foul sewer.

The peak waste water discharge for the development is 15.62 l/day, Table 11.3.5 below. This is calculated in section 11.3.7.

Figure 11.3.3 – show the foul drainage systems for the Proposed Development.

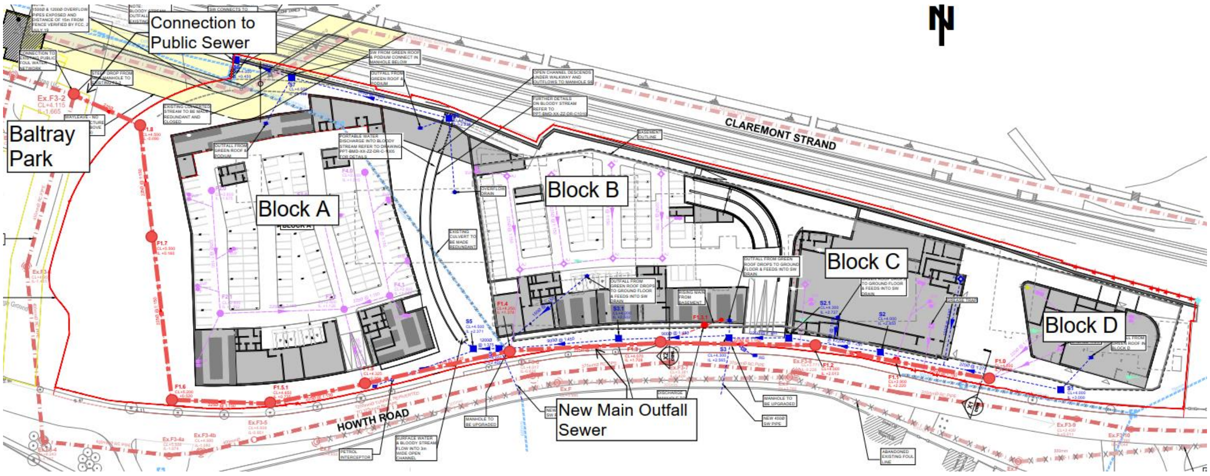

Figure 11.3.3- Foul Drainage

11.3.4.3 ELECTRICITY

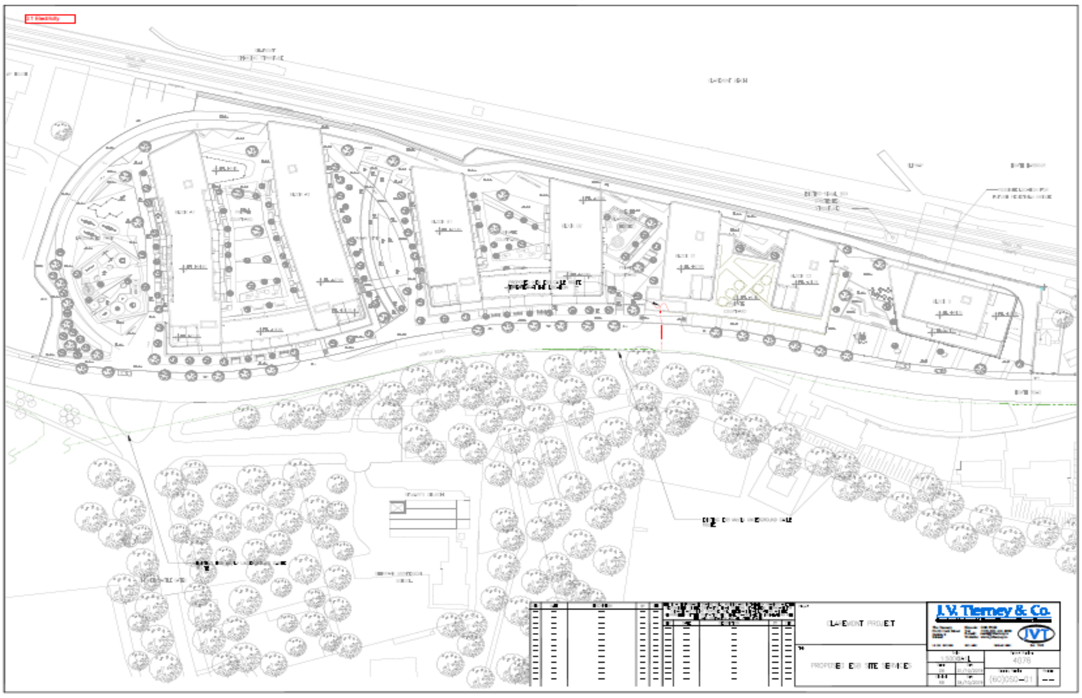

Figure 11.3.4– Proposed ESB Infrastructure

Figure 11.3.4– show the proposed electrical infrastructure for the Proposed Development. A new underground cable run is proposed to service two new Sub-stations on the site with the final location to be agreed with ESB Networks.

11.3.4.4 GAS

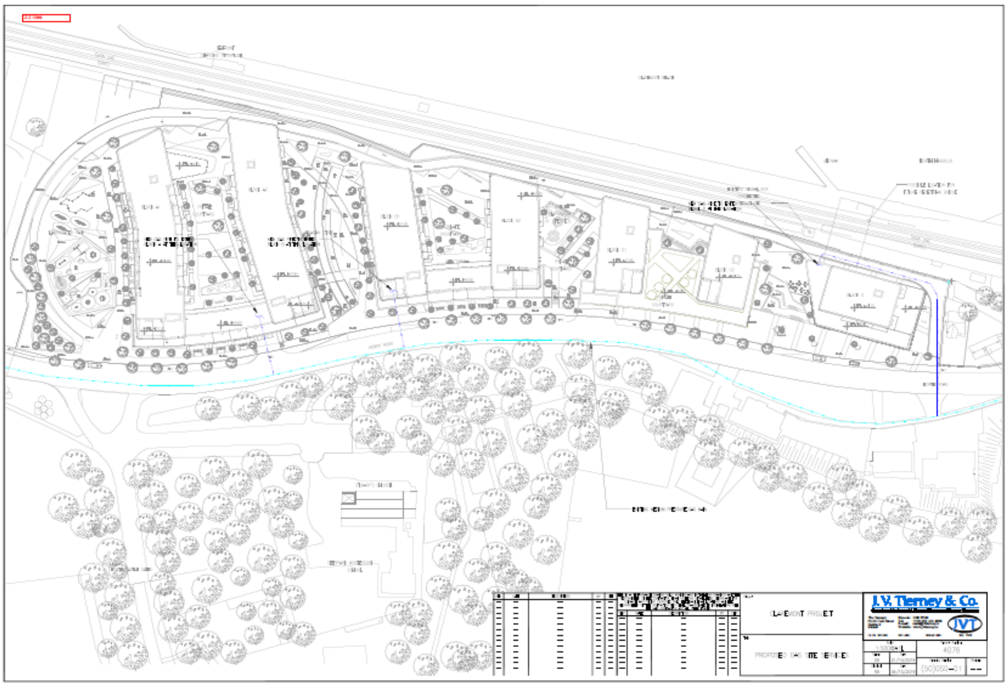

Figure 11.3.5- Proposed Gas Infrastructure

Figure 11.3.5– show the proposed gas infrastructure for the Proposed Development. The supply of gas to the Proposed Development site will be provided by way of a metered connection to the main plant room(s) from the existing Gas Networks Irelands national gas supply network.

11.3.4.5 TELECOMMUNICATIONS

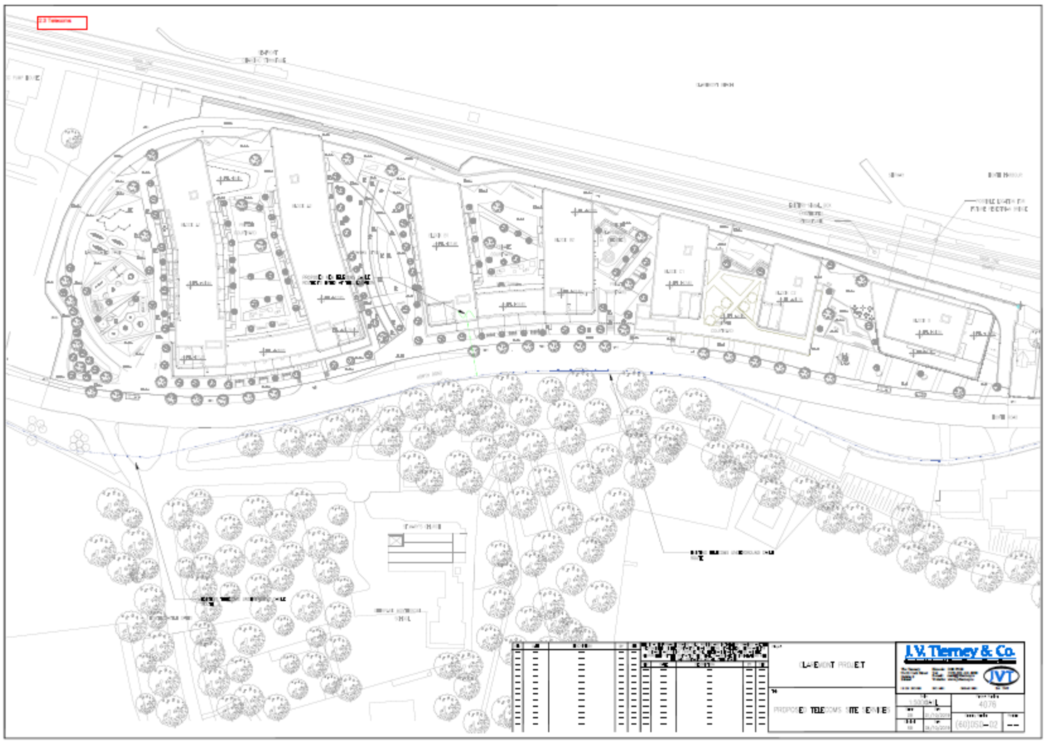

Figure 11.3.6– Proposed Telecoms Infrastructure

Figure 11.3.6– show the proposed telecoms infrastructure for the Proposed Development. The supply of telecoms infrastructure to the Proposed Development site will be provided by way of a connection to a telecoms control room from the existing eir network.

11.3.5 BASELINE ENVIRONMENT

11.3.5.1 WATER SUPPLY

Currently the development is serviced by the 160mm MoPVC potable watermain owned by Irish Water in Howth Road. This is the main supply for the area. This is supplemented by a 9" (220mm) Cast Iron and a 4" (100mm) Cast Iron main. The portable water supply for this area comes from the Local Authority reservoir at Malahide.

11.3.5.2 FOUL WATER DRAINAGE

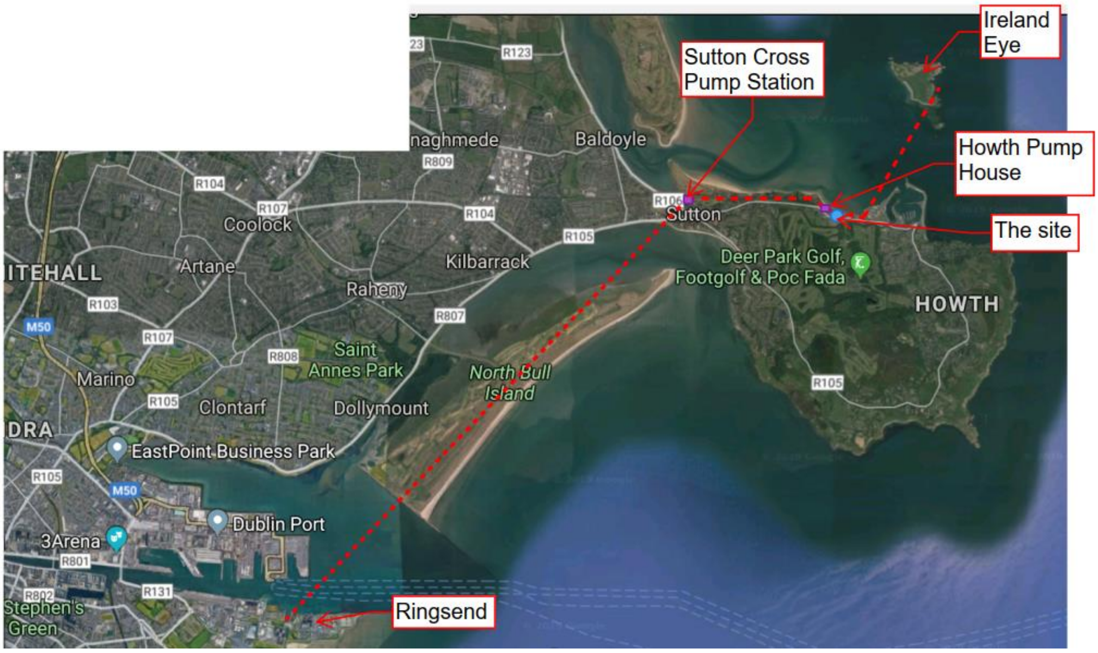

Figure 11.3.7- Existing Foul Discharge

The current discharge of wastewater on site is into the 450mm dia public wastewater sewer in the centre of Howth Road. The public sewer runs from east to west along Howth road parallel with the site. After the site it turns north and outfalls into the pump house. From here it is pumped to Sutton Cross, pumped across Dublin Bay and into Ringsend Wastewater treatment plant where it is treated before being discharged into the Irish Sea. Figure 11.3.7

11.3.5.3 ELECTRICITY

Based on information received from ESB Networks during November 2018, the existing site is serviced by an existing Electricity sub-station (Parsons). Consultation has taken place with the ESB Networks with regard to the availability of electrical power and no concerns have been raised by ESB Networks. New Sub-Stations are proposed to service the development with the existing Sub-Station at Parsons being retired (See Figure 11.3.8).

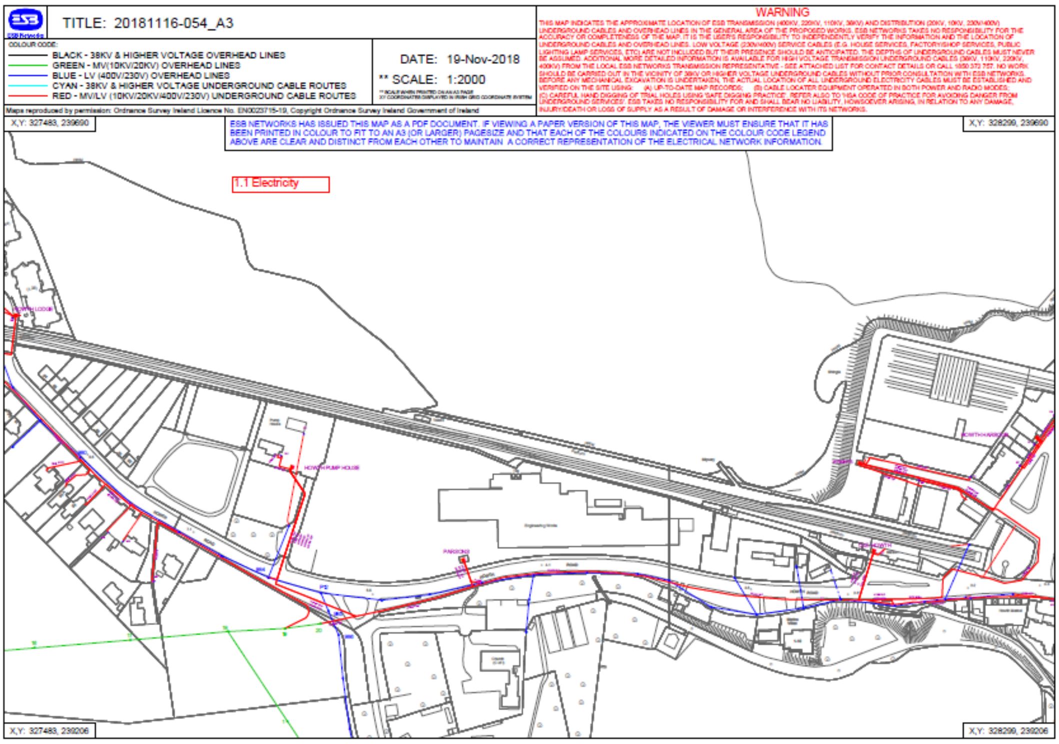

Figure 11.3.8– Existing ESB Infrastructure

11.3.5.4 GAS

Based on information received from Gas Networks Ireland (GNI) during November 2018, there is a 180mm medium pressure supply network running adjacent to the development site. Consultation has taken place with GNI with regard to the availability of gas supplies and no concerns have been raised by GNI (See Figure 11.3.9).

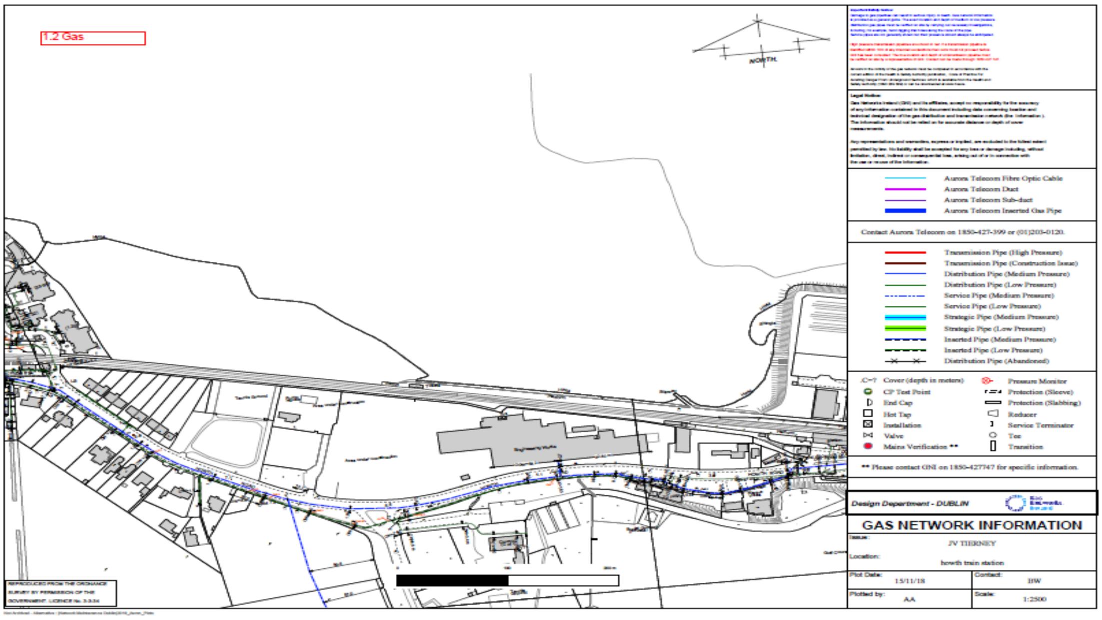

Figure 11.3.9– Existing Gas Networks Infrastructure

11.3.5.5 TELECOMMUNICATIONS

Bases on information received from eir during November 2018, the site is currently well serviced. Consultation has taken place with the relevant telecommunications provider with regard to the availability of infrastructure to support the development and no concerns have been raised.

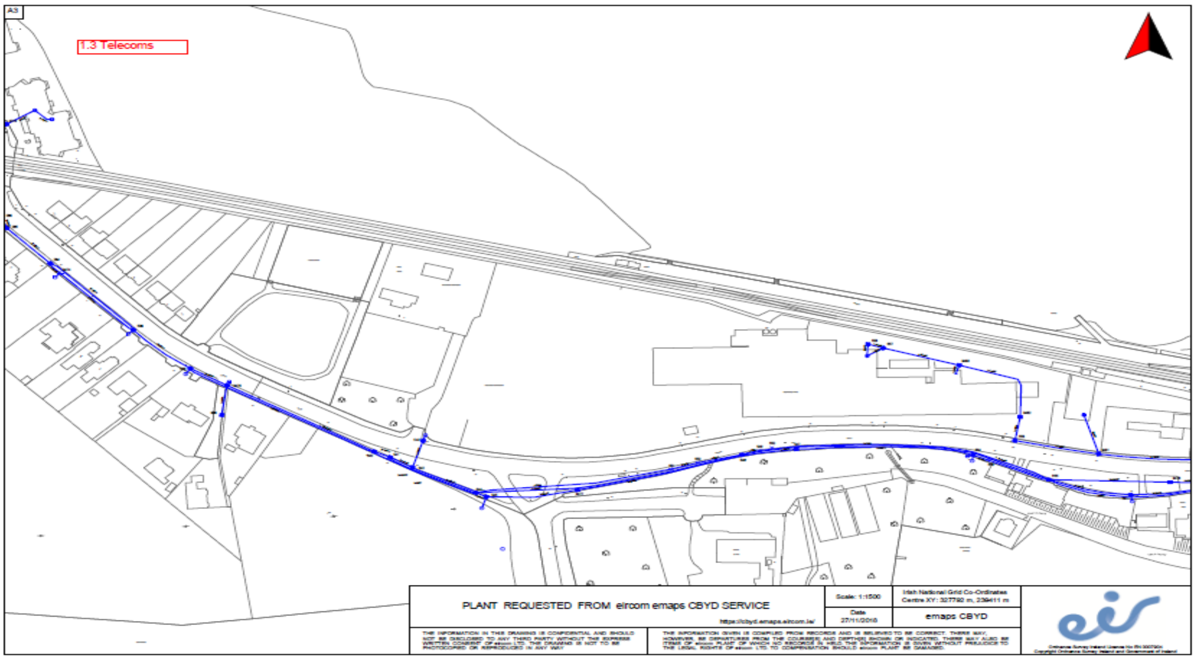

Figure 11.3.10– Existing eir Telecoms Infrastructure

11.3.6 Impacts of the Proposed Development - Construction Phase

11.3.6.1 WATER SUPPLY

<u>Direct/Indirect</u>

Irish Water has set out that the following upgrade works are required:

1. A new 300mm trunk main between the North Fringe Water Supply pipeline and Corr Bridge PS - Works by Irish Water
2. DMA reconfiguration required; (by developer)
    a. A new cross connection upstream of Corr Bridge PS between the new trunk main and existing 9" pipe
    b. New pressure reducing valve and DMA meter downstream of the new cross connection in the 9" pipe.
3. 220m of existing 100m UPV in Howth Road to be upgraded to 150mm NB (by developer)

During these works and connections from the new mains to the existing 160mm MoPVC watermain there is a small risk that contamination of the existing supply may occur. Appropriate methodogy such as Irish Water- Water Guidelines, will be employed to ensure against such contaminated risk and thus the likely impact on the local public water supply network would be imperceptible of short term and neutral effect.

All works will be carried out in accordance with Irish Water – Code of Practice for Water Supply and Irish Water – Water Standard Details.

There is a risk of the following occurring during the construction stage:

- Accidental spills of harmful substances such as petrol/diesel or oil during the delivery and storage of harmful substances or by leakages from construction machinery;
- Potential for building materials or silts to be washed into the water supply system, causing blockages and pollution.

The likely impacts during construction phase are imperceptible with short term neutral effects

During the construction phase portable water will be required to serve the workforce and for dust control. This will be significantly less than what is required for the development in operational phase. The sites previous function was a precast manufacturing plant, which would have required significant water demand. Therefore, water demand from the public watermain in Howth road will have imperceptible impact of short term and neutral effect on area supply during the construction phase.

Cumulative

New developments constructed in the area along with the proposed development will may have an effect the water supply. Irish water is responsible for the water supply in the area. The proposed development has received a statement of design acceptance, based on agreed network upgrades. Therefore, the potential impact of the development with should be slight with long term neutral effect.

11.3.6.2 FOUL WATER DRAINAGE

Direct/Indirect

During the construction phase, it is anticipated that the foul generated on site will be discharged into the public sewer through existing connection. The wastewater discharge during the construction phase will be less than the wastewater volumes calculated for the development in the operational phase. Irish water has confirmed that the existing pubic sewer in Howth Road has sufficient capacity.

It should also be noted that the site formerly was a precast manufacturing plant, which would have had over 300 staff and would have discharged significant foul plus waste water from polishing/cleaning into the public sewer. Therefore, the impact during the construction phase will have imperceptible impact of short-term and neutral effect on the existing public sewer.

There is a risk of the following occurring during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement, which may be flushed into the foul drainage system during rainfall events;
- Accidental spills of harmful substances such as petrol or oil during the delivery and storage of harmful substances or by leakages from construction machinery.

The likely impacts during construction phase are not significant with medium neutral effect.

11.3.6.2.1 Cumulative

New developments constructed in the area will have an effect on the public waste water sewer. Irish water is responsible for the public sewer in the area. The proposed development has received a statement of design acceptance, therefore the potential impact of the development with future development should be slight and has been approved by Irish Water. Electricity

Direct

There is a risk of the following occurring during the construction stage:

- Electricity cable currently located in the development serving the Parsons Sub-Station could be damaged during excavation works. This would result in a loss of power to the site and may impact the wider area.
- The striking of an underground electricity cable during construction operations could potentially result in serious injury or death of site staff.
- Power will be required for the construction activities, for temporary lighting and temporary signals required during construction works with power coming from the existing Parsons sub-station.
- The power demands during the construction phase on the existing electricity network will have a slight impact, of negative and short-term effect.

The likely impacts during construction phase are likely to be not significant, temporary and of a negative effect.

Indirect

There is a risk of the following occurring during the construction stage:

- Due to a cable strike outside of the proposed site, the potential to disrupt electricity services inside the development site is a possibility causing slight effects to the construction site.

The likely impacts during construction phase are to be not significant, temporary and of a negative effect.

Secondary

Refer to Indirect effects

Cumulative

None

11.3.6.3 GAS

Direct

There is a risk of the following occurring during the construction stage:

- The striking of an underground gas main during construction operations could potentially result in serious injury or death of site staff due to a potential explosion.
- Excavation works causing damage and leaks to gas mains with a resultant negative impact on the climate and human health.
- The potential impact from the construction phase of the Proposed Development on the local gas supply network is likely to be imperceptible and neutral as the site is unlikely to use natural gas during the construction phase.

The likely impacts during construction phase are imperceptible, of short term and neutral effect.

Indirect

None

Secondary/ Cumulative

None

11.3.6.4 TELECOMMUNICATIONS

Direct

There is a risk of the following occurring during the construction stage:

- The striking of an underground/overhead telecommunications lines during construction operations could potentially result in serious downtime of the network in the development site leading to communication difficulties for the Construction Teams.
- The construction phase is likely to give rise to the requirement to divert existing fixed telecom lines. If not undertaken in accordance with best practise procedure, this has the potential to impact on local telecoms connectivity.
- The potential impact from the construction phase of the Proposed Development on the local telecoms network is likely to be imperceptible, short-term and neutral effect.

Indirect

None

Secondary/Cumulative

None

11.3.7 IMPACT OF PROPOSED DEVELOPMENT – OPERATIONAL PHASE

11.3.7.1 WATER SUPPLY

Direct/Indirect

The water consumption is a function of the usage of the development. The volume has been estimated based on the Irish Water –Water code of practice.

The proposed portable water demand is calculated as follows:

Total Number of Units: 512
Allow 2.7 people per unit, in accordance with Irish Water Guidelines
Anchor Unit: 20 Staff
Retail: 16 Staff
Restaurant: 10 Staff + 100 Customers
Café: 5 Staff + 30 Customers
Creche: 20 staff + 80 Children

Flow rates

Domestic Standard Residence:	150 l/day per person
Industrial Open Industry:	60 l/day per person
Restaurant:	15 l/day per person
Creche:	90 l/day per person

Water Demand		No. of People	Flow *l/day*	Water Demand *l/day*	Average Day / Peak Rate *l/s*	Peak Demand *l/s*
Domestic						
Units	512	1382	150	207300	2.4	12
Commercial						
Supermarket	Staff	20	60	1200	0.02	0.09
Specialist Store	Staff	16	60	960	0.01	0.07
Restaurant	Staff	10	60	600	0.01	0.04
	Customer	100	15	1500	0.02	0.11
Café	Staff	5	60	300	0.00	0.02
	Customer	30	15	450	0.01	0.03
Creche/ Other	Staff	20	90	1800	0.03	0.13
	Children	80	90	7200	0.10	0.52
Daily Water Demand					**2.6**	**13.01**

Table 11.3.4- Portable Water Demand – In accordance with Irish Water Guidelines

The peak water demand for the development is 5 DWF. Using the figure mentioned above the water demand for the development is 13.01 l/day, Table 11.3.4

The development will have a 24 hour cold water storage provision.

An application has been submitted to Irish Water and a statement of design acceptance has been received from Irish Water. (Appendix 11.3.1– Irish Water - Statement of Design Acceptance).

It should be noted that the previous function of the development site was a precast concrete factory, which had a very high demand on the potable water network and there is no reports of a previous issue. Provided the measures in the Irish water statement of design acceptance are completed the development will have an imperceptible impact of permanent neutral effect on the surrounding network.

<u>Cumulative</u>

The Balscadden development located in Howth village, see Figure 11.3.11 is another development currently in the planning process by the same promoter. The development comprises of 164 residential units.

Figure 11.3.11 - Separate construction traffic routes for proposed Balscadden and Claremont developments

There is a possibility that this development and other proposed development could effect the water supply. However, this check is carried out Irish Water prior to planning application. In this situation a statement of design consent has been received and therefore the impact of the proposed development will have slight impact on the water supply with neutral long-term effects.

11.3.7.2 FOUL WATER DRAINAGE

Direct/Indirect

The foul water flow is a function of the usage of the development. The volume has been estimated based on the Irish Water – Wastewater code of practice.

The proposed foul effluent is calculated as follows:

Total Number of Units: 512
Allow 2.7 people per unit, in accordance with Irish Water Guidelines
Anchor Unit: 20 Staff
Retail: 16 Staff
Restaurant: 10 Staff + 100 Customers
Café: 5 Staff + 30 Customers
Creche: 20 staff + 80 Children

Flow rates

Domestic Standard Residence:	150 l/day per person
Industrial Open Industry:	60 l/day per person
Restaurant:	15 l/day per person
Creche:	90 l/day per person

Foul Waste Water Discharge		No. of People	Flow *l/day*	Water Demand *l/day*	Average Day / Peak Rate *l/s*	Peak Discharge *l/s*
Domestic						
Units	512	1382	150	207360	2.4	14.4
Commercial						
Supermarket	Staff	20	60	1200	0.02	0.10
Specialist Store	Staff	16	60	960	0.01	0.08
Restaurant	Staff	10	60	600	0.01	0.05
	Customer	100	15	1500	0.02	0.13
Café	Staff	5	60	300	0.00	0.03
	Customer	30	15	450	0.01	0.04
Creche/ Other	Staff	20	90	1800	0.03	0.16
	Children	80	90	7200	0.10	0.63
Total Foul Waste Water Discharge					**2.6**	**15.62**

Table 11.3.5- Foul Discharge – In accordance with Irish Water Guidelines

The peak foul water discharge for the development is 6 DWF. Using the figure mentioned above the water demand for the development is 15.62 l/day, Table 11.3.5.

The proposed foul outfall pipe is 225mm diameter pipe at 1:150 minimum fall has a capacity = 38 l/s which is more than adequate. 100mm and 150mm diameter pipes with a capacity of at least 6 l/s and 17 l/s (at 1:150) respectively will be used for all other foul pipework within the site.

The proposed peak discharge flow is less than 42% of the capacity of the pipe as stated above.

This will be discharge into the public sewer in Baltray Park. The proposed foul outfall pipe is 225mm diameter pipe at 1:150 minimum fall and has a capacity = 38 l/s which is more than adequate. This discharges into the 450dia pipe in Baltray Park, which has a capacity of 228 l/s. The peak outfall from this development is 6.6% of this capacity. Irish Water have approved the development proposal and therefore the potential impact from the operational phase of the development is imperceptible.

An application has been submitted to Irish Water and a statement of design acceptance has been received from Irish Water Reference: 7287699079. (Appendix 11.3.1– Irish Water - Statement of Design Acceptance)

Irish Water have acceptable the design and no upgrades are required, therefore the development will have imperceptible impact, of neutral long term effect on the surrounding network.

Cumulative

This section addresses the general issue of potential cumulative impacts with Ringsend Wastewater Treatment Plant arising from the Proposed Development and other developments, including future developments.

In summary, the impact of the Proposed Development and any future development has already been appropriately considered and assessed as part of the application process for the existing planning permissions pertaining to Ringsend Wastewater Treatment Plant.

The 2012 Ringsend Wastewater Treatment Plant application for planning permission (Ref. PL.29N.YA0010) was for a population equivalent of 2.4 million and was predicated on the findings of the 2005 Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS set out the drainage requirements for the Greater Dublin Area (GDA) up to 2031. The GDSDS relied on the Regional Planning Guidelines (RPGs) and the National Spatial Strategy (NSS) in order to estimate the future projected population increases for the GDA. The studies indicated a predicted growth in population from 1.2 million in 2002 to just over 2 million in 2031 for the GDA region.

Therefore, both the initially permitted 2012 upgrade and the permitted 2019 revised upgrade (Ref. ABP-301798-18) for Ringsend Wastewater Treatment Plant take account of population growth up to 2.4 million population equivalent. Both applications were subject to EIA and therefore accompanied by an EIAR. Additionally, both applications were accompanied by an AA screening report and a NIS (though it appears that only parts of the 2012 application were screened out for AA).

Notwithstanding the above, on an individual basis, the Proposed Development will have an imperceptible impact of neutral effect on the wastewater capacity, in terms of flows, relative to the total amount of waste water currently being received at Ringsend Wastewater Treatment Plant.

In addition, Irish Water has provided a Confirmation of Feasibility Letter and Statement of Design Acceptance for the foul sewer design of the Proposed Development (see

Appendix **11.3.1 – IRISH** Water). Irish Water is in control of this infrastructure and the purpose of the Confirmation of Feasibility Letter and Statement of Design Acceptance is to confirm the viability of the Proposed Development with respect to its potential impact on the capacity of Ringsend Wastewater Treatment Plant and Howth and Sutton Cross Pump Stations, as the receiving infrastructure.

By providing a Confirmation of Feasibility Letter and Statement of Design Acceptance, Irish Water has confirmed that, based on current projected infrastructure, the Proposed Development can be accommodated within the drainage network.

Under the heading of "Potential impact – Discharge of treated effluent, impacts on water quality, effects on qualifying interests", the NIS for the Ringsend Wastewater Treatment Plant 2019 revised upgrade provides as follows:

"In the operational phase, the proposed upgrade of the Ringsend WwTP Component will result in an increase in the plant capacity and also an improvement in the final effluent quality. This will result in a reduction in the licensed parameters discharged into the receiving water, with significantly reduced quantities in respect of ammonia and phosphorous."

This NIS goes on to state as follows:

"Overall no significant adverse effects on are foreseen and indeed, a slight positive effect is possible. Effects of discharge during the operational phase of the project from the upgrade project will therefore have imperceptible impact on habitats listed within these European sites."

In respect of this issue, the NIS concludes as follows:

"Thus there is no potential for in-combination impacts of any other plan and project with the Ringsend WwTP Component of the proposed Upgrade Project."

11.3.7.3 ELECTRICITY

Direct

The Proposed Development will require electricity supplies during the operational phase of the scheme and these will be provided by the installation of new sub-stations within the development and the decommissioning of the existing sub-station (Parsons) based on its current location all in agreement with ESB Networks. As the new cable services will be located underground, this will result in a permanent but imperceptible effect. The buildings will be constructed to the Near Zero Energy Building standard and with the incorporation of renewable technology, the demand on the electrical supply should be reduced. The likely impact from the operational phase on the electricity supply network is likely to slight, of long term and positive effect.

Indirect

The indirect impact will allow ESB Networks to provide additional resilience in their network through the provision of new Sub-Stations (Assuming agreement with ESB Networks) which in turn should have a slight impact of positive effect on the wider Howth area’s electrical infrastructure.

Secondary/Cumulative

None

11.3.7.4 GAS

Direct

The Proposed Development will require gas supplies during the operational phase of the scheme and these will be provided by the installation of new connections to the development site. As the new services will be located underground this will result in a permanent but imperceptible effect. The buildings will be constructed to the Near Zero Energy Building standard with improved thermal performance and with the incorporation of renewable technology, the demand on the gas network supply should be reduced. The likely impact from the operational phase on the gas network is likely to slight, of long term and positive effect.

Indirect

The additional demand on the gas network will have an imperceptible impact of long term and neutral effect on the surrounding area as there is sufficient capacity in the gas network system to manage the additional demand created by the development.

Secondary/Cumulative

None

11.3.7.5 TELECOMMUNICATIONS

Direct

The Proposed Development will require telecommunication connections during the operational phase of the scheme and given the number of telecommunication providers with infrastructure available within the Howth area ,this will provide the building users with a greater choice of service and will result in a positive effect for the users. As the new services will be located underground this will result in an imperceptible impact of long term and positive effect.

Indirect

The additional demand on the telecoms network is not deemed to have any material impact on the surrounding area as there is sufficient capacity in the telecoms network system to manage the additional demand created by the development. The likely impact from the operational phase on the telecoms network is likely to be imperceptible impact of long term and neutral effect

Secondary/Cumulative

None

11.3.8 "Do Nothing" Impact

11.3.8.1 WATER SUPPLY

If the Proposed Development were not to go ahead there would be no increase in the demand on the existing water supply network. The likely impact would be imperceptible, of neutral long term effect.

However Irish water planned upgrade works would be completed.

11.3.8.2 FOUL WATER DRAINAGE

If the Proposed Development were not constructed the site would continue to be discharged to the existing system. Any existing leaks would remain unidentified. The likely impact on the existing foul water network would be imperceptible of neutral effect.

11.3.8.3 GAS

If the Proposed Development were not to go ahead there would be no diversion or removal of existing GNI infrastructure. The likely impact would be imperceptible, of neutral effect.

11.3.8.4 ELECTRICITY

If the Proposed Development were not to go ahead there would be no diversion or removal of the existing Electrical infrastructure. The likely impact would be imperceptible, of neutral effect.

11.3.8.5 TELECOMMUNICATIONS

If the Proposed Development were not to go ahead there would be no diversion or removal of existing Telecommunication infrastructure. The likely impact would be imperceptible, of neutral effect.

11.3.9 MITIGATION MEASURES

Provided that the proposed standard of good practice measures are employed, there will be imperceptible impact of the Proposed Development during the construction stage on the portable water network in the area.

11.3.9.1 WATER SUPPLY

Construction Phase

The following mitigation measures are to be use to ensure the potential impact of the proposed development during the construction stage has an has a neutral short term imperceptible impact.

Water Supply

- To ensure water there is an imperceptible impact on the water supply, the local authority to adhere to the measures required for introducing a new watermain connection.
- To reduce leaks, prior to connection to the public watermain, all watermains in the development will be tested and cleaned to the requirements of Irish Water.

Operational Phase

The following mitigation measures are to be use to ensure the potential impact of the proposed development during the operational stage has an has a positive long term imperceptible impact.

Water Supply

- The water demand for the development was calculated using Irish Water-Water Guidelines. This calculation and drawings were sent to Irish water and have been approved. A statement of Design Consent has been issued on the bases that upgrade works listed are carried out. This ensures that the correct figures have been used to determine water usage of the development. Irish Water Reference: 7287699079
- The site water main system will be metered as directed by the Council to facilitate detection of leakage and the prevention of water loss.
- Dual & low flush toilets and water economy outlets will all be considered to reduce the water demand.

11.3.9.2 FOUL WATER DRAINAGE

Construction Phase

The following mitigation measures are to be use to ensure the potential impact of the proposed development during the construction stage has an has a neutral short term imperceptible impact.

Foul Water Drainage

- All onsite sewers will be tested and surveyed prior to connection to the public sewer to prevent any possibility of ingress of ground water;
- All sewers will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur;
- Any leakage from the foul sewer will be cordoned off and the contaminated effluent and soil collected and disposed by licensed contractors.

Operational Phase

The following mitigation measures are to be use to ensure the potential impact of the proposed development during the operational stage has an has a positive long term imperceptible impact on the wastewater sewer.

Drainage

- The foul water discharge for the development was calculated using Irish Water-WasteWater Guidelines. This calculation and drawings were sent to Irish water and have been approved. A statement of Design Consent has been issued with no upgrades required This ensures that the correct figures have been used to determine wastewater discharge for the development. Irish Water Reference: 7287699079 **.** This is a check carried out by Irish Water to ensure the network can handle the additional quantities.
- Any foul water leakage could result in contamination of groundwater in the area. The current foul sewer drainage system that is on site will be replaced. Placing a new system on site reduces the overall risk of leakage from damaged sewers.
- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

11.3.9.3 GAS

Construction Phase

- The locations of the gas network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase to mitigate the risk of a gas main hit before construction starts.
- The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with Gas Networks Ireland (GNI).
- Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, as a mitigation, in order to determine the exact location of the gas network in close

proximity to the works area. This will ensure that the underground gas network will not be damaged during the construction phase.

- All works in the vicinity of GNI infrastructure will be carried out in ongoing consultation with GNI and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live gas mains.
- Where new services are required, the Contractor will apply to GNI for a connection permit where appropriate and will adhere to their requirements to ensure safety of installation.

Operational Phase

- The gas demands during the operational phase on the existing gas network are considered to be low due to the NZEB energy efficient design, thermal performance of the buildings and the use of renewable technology to reduce the heating demand.

11.3.9.4 TELECOMMUNICATION

Construction Phase

- The locations of the telecommunications network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase to mitigate the risk of damage to the telecoms infrastructure before construction starts.
- The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant telecommunication provider.
- Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the telecommunications network in close proximity to the works area. This will ensure that the underground telecommunications network will not be damaged during the construction phase.
- All works in the vicinity of the telecommunications providers infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines they may have.
- Where new services are required, the Contractor will apply to the relevant provider for a connection permit where appropriate and will adhere to their requirements to ensure safety of installation.
- It is considered that any likely impacts to overhead cables in the vicinity will be mitigated by applying standard construction practices

Operational Phase

- The design and construction of the required Telecommunication services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential service outage impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

11.3.9.5 ELECTRICITY

Construction Phase

- The locations of the electricity network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase to mitigate the risk of damage to the electricity infrastructure before construction starts.
- The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.
- Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase
- All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB Networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.
- Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements to ensure safety of installation.

Operational Phase

- The power demands during the operational phase on the existing electricity network are considered to be imperceptible due to the energy efficient design including LED lighting, high performance heating equipment.
- The design and construction of the required electrical services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

11.3.10 RESIDUAL IMPACTS

11.3.10.1 WATER SUPPLY

Construction Phase

Taking into account the above-mentioned mitigation measures which are design to avoid and prevent any adverse issues arising during construction, there should be no residual impact to the water supply infrastructure following the construction phase. Any residual impacts on the built services during the construction phase is considered to be temporary in nature and imperceptible, where supply is unavoidably disrupted to facilitate the construction phase.

Operational Phase

All excavations will be fully reinstated to the requirements of Irish Water and Fingal County Council guidelines ensuring there are no residual impacts to the portable water infrastructure remaining on the site.

11.3.10.2 FOUL WATER DRAINAGE

Construction Phase

Taking into account the above-mentioned mitigation measures which are design to avoid and prevent any adverse issues arising during construction, there should be no residual impact to the wastewater network infrastructure following the construction phase. Any should be no residual impacts on the built services during the construction phase.

Operational Phase

All excavations will be fully reinstated to the requirements of Irish Water and Fingal County Council guidelines ensuring there are no residual impacts to the wastewater network infrastructure remaining on the site.

11.3.10.3 ELECTRICITY

Construction Phase

Taking into account the above-mentioned mitigation measures which are design to avoid and prevent any adverse issues arising during construction. there should be no residual impact to the electrical infrastructure following the construction phase. Any residual impacts on the built services during the construction phase is considered to be temporary in nature and imperceptible, where service is unavoidably disrupted to facilitate the construction phase.

Operational Phase

All excavations will be fully reinstated to the requirements of ESB Networks ensuring there are no residual impacts to the electrical infrastructure remaining on the site.

11.3.10.4 GAS

Construction Phase

Neutral Impact -Taking into account the above mentioned mitigation measures, there will be no residual impact to the gas mains following the construction phase. Any residual impacts on the built services during the construction phase is considered to be temporary in nature and imperceptible, where service is unavoidably disrupted to facilitate the construction phase

Operational Phase

All excavations will be fully reinstated to the requirements of GNI ensuring there are no residual impacts to the gas infrastructure remaining on the site.

11.3.10.5 TELECOMMUNICATIONS

Construction Phase

Neutral Impact - Taking into account the above mentioned mitigation measures there will be no residual impact to the telecommunications infrastructure following the construction phase. Any residual impacts on the built services during the construction phase is considered to be temporary in nature and imperceptible, where service is unavoidably disrupted to facilitate the construction phase.

Operational Phase

All excavations will be fully reinstated to the requirements of the relevant telecommunications provider ensuring there are no residual impacts to the telecoms infrastructure remaining on the site.

11.3.11 INTERACTIONS

11.3.11.1 CHAPTER 3 (POPULATION AND HUMAN HEALTH)

Construction Phase

The construction phase of the Proposed Development may give rise to imperceptible short-term neutral effect associated with migration of surface contaminants.

Construction impacts on human health are dealt with separately in the relevant in Chapter 3 of Population and Human Health, and will be subject to control through a Construction and Environmental Management Plan. The construction methods employed, and the hours of construction proposed will be designed to minimise potential impacts.

Operational Phase

The operational stage of the development is unlikely to precipitate any significant impacts in terms of human health. The design of the Proposed Development has been formulated to provide for a safe environment for future residents and visitors alike. The proposed residential units and neighbourhood centre facilities accord with the relevant guidelines will meet all relevant safety and building standards and regulations, ensuring a development which promotes a high standard of health and safety for all occupants and visitors.

The Proposed Development will not result in any significant impacts on human health and safety once completed and operational. Infrastructure will be constructed in line with the specifications of the relevant service provider. All wastewater will discharge to the municipal sewer and will be treated Ringsend Wastewater Treatment Plant prior to discharge. There is no likely significant impact on human health due to the material assets of built services resulting from the construction or operation of the Proposed Development. The Proposed Development therefore is unlikely to result in negative impacts in relation to population and human health.

Biodiversity

Enviroguide have carried out an assessment of the potential impacts of the Proposed Development on the Biodiversity of the Site, set out in Chapter 8. There is a requirement to detail how the habitats, flora and fauna may be impacted a result of construction activities, from utility upgrade works at the Proposed Development.

11.3.12 DIFFICULTIES ENCOUNTER IN COMPILING REQUIRED INFORMATION

11.3.12.1 WATER SUPPLY

No difficulties were encountered.

11.3.12.2 FOUL WATER DRAINAGE

No difficulties were encountered.

11.3.12.3 ELECTRICITY

Full details of the scheme will be discussed in detail with ESB Networks following the grant of permission.

11.3.12.4 GAS

No difficulties were encountered.

11.3.12.5 TELECOMMUNICATIONS

No difficulties were encountered.

11.3.13 REFERENCES

- Irish Water – Code of Practice for Water Supply
- Irish Water – Wastewater Code of Practice
- Irish Water – WasteWater Standard Details
- Irish Water – Water Standard Details
- BS EN 752:2008 “Drain and Sewer Systems outside Buildings”
- Part H of the Building Regulations
- Greater Dublin Strategic Drainage Study
- Ciria C697 “The SUDS Manual”
- Sewers for adoption: 6th Edition
- Guidelines on the information to be contained in Environmental Impact Assessment Report (EPA Draft Aug 2017)
- BS EN 752:2008 “Drain and Sewer Systems outside Buildings”
- Part H of the Building Regulations
- Greater Dublin Strategic Drainage Study
- Ciria C697 “The SUDS Manual”
- Sewers for adoption: 6th Edition
- Fingal County Council Water Main Map.
- ESB Construction Standards for MV Sub-Station Buildings.
- ESB electrical services handbook for housing schemes.
- GNI – Guidelines for Designers and Builders Domestic Sites
- https://www.esbnetworks.ie/staying-safe/contractor-safety/digging-and-excavation-work
- https://www.gasnetworks.ie/corporate/freedom-of-information/make-a-request/
- https://cbyd.emaps.eircom.ie/Eircom-CBYD/

APPENDIX 11.3.1 – IRISH WATER

Marlet Property Group c/o Vincent Barrett
Barrett Mahony, 52-54 Sandwith St Lower, Dublin 2
D02WR26

UISCE ÉIREANN : IRISH WATER

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www.water.ie

04 February 2019

Dear Sir/Madam,

Re: Customer Reference No 7287699079 pre-connection enquiry - Subject to contract | Contract denied [Connection for 570 no. domestic and 5 no. retail units]

Irish Water has reviewed your pre-connection enquiry in relation to water and wastewater connections at Project Pier, Former Techcrete Site, Howth Road, Dublin. Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated.

In the case of wastewater connections this assessment does not confirm that a gravity connection is achievable. Therefore a suitably sized pumping station may be required to be installed on your site. All infrastructure should be designed and installed in accordance with the Irish Water Code of Practice.

Water:
New connection is feasible subject to following:
1. A new 300mm trunk main between the North Fringe Water Supply pipeline and Corr Bridge PS to be constructed and in function. The works will be funded by Irish Water. The construction will start in Q" 2019 with estimated completion date in Q4 2020 (subject to change)
2. DMA reconfiguration is required including:
   a) a new cross connection upstream of Corr Bridge PS between the new trunk main and existing 9'' pipe.
   b) New pressure reducing valve and DMA meter downstream of the new cross connection in the 9'' pipe
3. 220m of existing 100 mm uPVC in Howth Road to be upgraded to 150mm NB
4. The Development to be supplied by 160mm PVC main in Howth Road.
Note: prior to connection application the Developer is required to have entered into a Project Works Services Agreement to deliver infrastructure upgrades to facilitate the connection of the development to Irish Water infrastructure.

Wastewater:
Proposed connection to the existing network is feasible without network upgrade.
There are 1500mm and 1200mm concrete sewers within the site boundaries. The Developer will be required to survey the site to determine the exact location of the infrastructure. Any trial investigations shall be carried out with the agreement and in the presence of Fingal County Council Inspector. You are advised that structures or works over or in close proximity to IW infrastructure that will inhibit access for maintenance or endanger structural or functional integrity of the infrastructure are not allowed. A wayleave in favour of Irish Water will be required over the Infrastructure.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and wastewater infrastructure should be submitted to Irish Water for assessment.

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities.

If you have any further questions, please contact Marina Byrne from the design team on 018925991 or email mzbyrne@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services

Uisce Éireann
Bosca OP 448
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Irish Water
PO Box 448,
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Marlet Property Group
c/o Vincent Barrett
Barrett Mahony,
52-54 Sandwith St Lower,
Dublin 2
D02 WR26

3 October 2019

Re: Design Submission for connections at Project Pier, Former Techcrete Site, Howth Road, Dublin (the "Development") (the "Design Submission") / Connection Reference No: 7287699079

Dear Vincent Barrett,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:

Name: Donal O'Dwyer
Phone: (022) 54606
Email: dodwyer@water.ie

Yours sincerely,

M O'Dwyer

Maria O'Dwyer
Connections and Developer Services

Appendix A

Document Title & Revision

- [18386_PPT-BMD-XX-ZZ-DR-C-1002 Rev. P6 Foul & Surface Water Layout]
- [18386_PPT-BMD-XX-ZZ-DR-C-1005 Rev. P6 Watermain Layout]
- [18386_PPT-BMD-XX-ZZ-DR-C-1015 Rev. P4 Foul Water Longitudinal Sections]
- [18386_PPT-BMD-XX-ZZ-DR-C-1200 Rev. PL4 Standard Drainage Detials]
- [18389_PPT-BMD-XX-ZZ-DR-C-1220 Rev. PL4 Watermain Details]

Standard Details/Code of Practice Exemption:
<N/A>

For further information, visit ***www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

Chapter 12

Risk Management

12.1 RISK MANAGEMENT

12.1.1 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development will occur at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

12.1.2 INTRODUCTION

The 2014 EIA Directive (2014/52/EU) lists the topics to be addressed in an EIAR and this includes 'Risk Management'. Article 3 of the EIA Directive requires that the EIA shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage, and landscape deriving from (amongst other things) the "vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".

This chapter identifies and assesses the likelihood and potential adverse impacts on the environment arising from the vulnerability of the proposed development to risks of major accidents and/or natural disasters. It considers whether the proposed development is likely to cause accidents and/or disasters and its vulnerability to them.

The purpose of the chapter is to ensure that the safety and precautionary measures necessary to protect the proposed development in the event of a major accident and/or natural disaster are identified and that appropriate mitigation measures are provided that would protect the environment in the event of such occurrences.

This chapter identifies the type of major accidents / natural disasters that the project is vulnerable to; whether major accidents or natural disasters and the responses to these give rise to significant adverse environmental impacts; the nature of these impacts and the measures needed to prevent or mitigate any likely adverse impact of such events on the environment.

This chapter also considers the risks associated with the construction, operation/use and maintenance of the project, as well as the project's interface with adjoining properties, such as the DART train line and R105 regional road.

12.1.3 METHODOLOGY

This risk assessment is developed with the knowledge that the project will be constructed in line with best practice and, as such, major accidents and / or natural disasters will be very unlikely. The identification, control, and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle. For example, a Flood Risk Assessment has been completed and the project has been designed from the outset in consultation with Fire Safety Consultants. Measures to control risks associated with Construction Phase activities are incorporated into the Construction Environmental Management Plan and also will be included in a Construction Safety & Health Plan.

The Flood Risk Assessment was completed by Barrett Mahony Consulting Engineers, in accordance with the guidelines outlined in the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities". The Flood Risk Assessment identified the development as a 'Highly Vulnerable Development', in Flood Zone C (probability of flooding from rivers and the sea is low) and the justification test deemed the development as 'Appropriate' for the geographical location. This document makes further references to this 'Flood Risk Assessment' and the OPW document.

Contaminated ground was identified in early site investigation works by IGSL. Golder Associates have completed extensive further investigation of ground, soil and water contamination. The results and analysis of this investigation is included in reports on:

- Human Health Risk Assessment
- Interpretative Ground Investigation Report
- Controlled Waters Risk Assessment
- Materials Management & Remedial Strategy Plan

The reports identify the contaminated materials and remedial strategy and are referenced in other areas of this chapter.

The following sections set out the requirements as stated in the EIA Directive and the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft, August 2017).

The scope and methodology presented is based on the EIA Directive, the EPA Guidelines, on other published risk assessments and on professional judgement of the consultants with this responsibility in the construction and operation of the proposed development. A risk analysis-based approach methodology which covers the identification, likelihood and consequence of major accidents and / or natural disasters has been used for the assessment. This type of risk assessment approach is an accepted methodology.

Recital 15 of the EIA Directive states that:

In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council1 and Council Directive 2009/71/Euratom2, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met.

The intent of the directive is that a major accident and/or natural disaster assessment should be mainly applied to COMAH (Control of Major Accident Hazards involving Dangerous Substances) sites or nuclear installations. The proposed development in this instance is a residential and commercial mixed-use development, which when completed, will not give rise to any ongoing significant risks in its operating environment.

The *EPA Guidelines* on the information to be contained in an EIAR refer to major accidents and/or natural disasters in a number of sections:

Characteristics of the Project – the EPA Guidelines state that the project characteristics should "a description of the Risk of Accidents – having regard to substances or technologies used."

Impact assessment - the EPA Guidelines state that the impact assessment should include "the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)".

Likelihood of Impacts - the EPA Guidelines state the following:

"*To address unforeseen or unplanned effects the Directive further requires that the EIAR takes 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). This may be supported by general risk assessment methods or by systematic risk assessments required under other regulations e.g. a COMAH assessment*."

There are also several mechanisms which currently manage incidents outside of the EIA process. These would include the Construction Environmental Management Plan, which deals with pollution risks during construction (see chapters 4: Land & Soils, 5: Water and 6: Air Quality & Climate). The Construction Safety & Health Plan will deal with safety management and risk of incidents during construction, including traffic incidents.

Separately, the risk of fire is managed through the Fire Safety Certification process, which is an integral part of the design of the proposed development.

12.1.3.1 RISK ASSESSMENT METHODOLOGY

This section identifies the potential of unplanned but potential events that could occur during construction and operation of the proposed development.

Risks are set out according to the classification of likelihood, taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010), as follows:

Table 12.1.1 Risk Classification

Table 2 - Classification of Likelihood

Ranking	Classification	Likelihood
1	Extremely Unlikely	May occur only in exceptional circumstances; Once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur; May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

12.1.3.2 HAZARD IDENTIFICATION

Hazards associated with the project (both construction and operational phases) have been identified by the design team during the design process, based on the experience of the various disciplines.

The risks are then tested in terms of consequences. It should be noted that when categorising the Consequence Rating, the rating assigned assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster. In addition, Fingal County Council have in place a Major Emergency Plan (2011) which would work to reduce the impact of any major accident or disaster.

The impact ratings are taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010).

A risk matrix can be prepared against which the proposed development can be tested.

Table 12.1.2 Risk Matrix

Likelihood Rating	**Very likely**	**5**					
	Likely	**4**					
	Unlikely	**3**					
	Very unlikely	**2**					
	Extremely Unlikely	**1**					
			Minor	**Limited**	**Serious**	**Very Serious**	**Catastrophic**
			1	**2**	**3**	**4**	**5**
			Consequence Rating				

The Consolidated List of National Hazards from 'A National Risk Assessment for Ireland' (Department of Defence) was referenced to assist in identifying potential hazards associated with the proposed development.

Table 12.1.3 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

12.1.4 BASELINE ENVIRONMENT

The proposed development site is a brownfield area, with a derelict manufacturing facility. From a desktop study of the site and information available (e.g. surveys and reports by other disciplines), the baseline hazards and risk associated with the site are minimal. As the site is unoccupied, there is no interaction with road traffic, rail traffic or pedestrians on the adjacent footpath.

The derelict buildings on site present a hazard to any unauthorised members of the public that may access the site. The contaminated ground may also present a hazard (through skin contact) to unauthorised members of the public.

12.1.5 IMPACT OF THE PROPOSED DEVELOPMENT - CONSTRUCTION PHASE

The assessment of the hazards and risks during the construction of the project, assumes that the project will be constructed in accordance with current regulations and best practice. Therefore, it is assessed that the potential for major accidents during the construction phase is very low. However, the main risks associated with the proposed development will arise during the construction phase.

The risk assessment below identifies some of the main risks expected during construction, who is responsible, the severity of consequences, how likely they are to occur and some of the mitigation measures. As varying construction techniques and management procedures may be used, this does not capture in detail all the potential hazards or mitigation measures at construction stage.

Risk Assessment – Construction Phase					
No.	**Description**	**Responsible**	**Consequence**	**Likelihood**	**Mitigation**
1.	Logistics and Traffic	Project Supervisor Construction Stage	Serious	Unlikely	Construction Traffic Management Plan to include: • Just in time deliveries • Booking system for heavy vehicles to site • Internal vehicle/pedestrian segregation
2.	Work at Height	Project Supervisor Construction Stage	Very Serious	Unlikely	Work at Height to be managed in accordance with regulations and hierarchy of controls: collective controls to have preference over individual PPE. Scaffolding to be managed in accordance with HSA Code of Practice
3.	Fire	Project Supervisor Construction Stage	Very Serious	Unlikely	Fire & Emergency Plan to include: • Trained fire marshals • Schedule of drills • Plan of emergency routes and equipment
4.	Exposure to Asbestos	Project Supervisor Construction Stage	Serious	Likely	Demolition/removal and disposal by specialist contractor.
5.	Occupational Health Injury	Project Supervisor Construction Stage	Serious	Likely	Construction Safety & Health Plan to include: • Control measures • Schedule of TBTs • List of hazardous substances
6.	Pollution to land, groundwater or air	Project Supervisor Construction Stage	Serious	Unlikely	Minimal hazardous substances to be stored on site. Secure, vented and bunded chemical store to be provided. Spill kits to be available.

7.	Pollution to land, groundwater or air (from existing contaminated material)	Project Supervisor Construction Stage	Serious	Unlikely	Material Management & Remedial Strategy Plan (Golder Assoc.) to be implemented.
8.	Unauthorised access	Project Supervisor Construction Stage	Serious	Unlikely	Min. 2.2 metre hoarding to site perimeter. Site gates manned by Flagman. Security around tower crane bases. Scaffold access removed when not in use.

Table 12.1.4 Risk Assessment Construction Phase

The hazards identified above have been applied to the risk matrix below. The red zone represents 'high risk' scenarios, the orange zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.

Table 12.1.5 Risk Evaluation Construction Phase

Risk Evaluation – Construction Phase							
Likelihood Rating	**Very Likely**	**5**					
	Likely	**4**			**4 - 12, 5 – 12,**		
	Unlikely	**3**			**1 – 9, 6 – 9, , 7-9, 8 - 9**	**2 – 12, 3 – 12,**	
	Very Unlikely	**2**					
	Extremely Unlikely	**1**					
			1	**2**	**3**	**4**	**5**
			Minor	**Limited**	**Serious**	**Very Serious**	**Catastrophic**
			Consequence Rating				

Direct
The construction phase may have a slight direct impact, relating to a number of hazards and risks. These include:

- Demolition of the current buildings will be required. An asbestos survey has identified asbestos containing materials (ACMs) on site. Removal and disposal of ACMs will be by a specialist contractor, using permitted waste hauliers and licensed waste facilities.
- Traffic interface on the R105. Details of controls will be included in a Construction Traffic Management Plan, and will include trained flagmen and proactive delivery scheduling/booking
- Hazardous materials used during construction will be kept in secure stores, considering their physical properties (i.e. bunded and ventilated stores, with reactive materials stored separately). Personnel using hazardous materials for construction will be briefed on first aid measures and accidental release actions.
- Work at height and lifting operations close to DART line. This will be mitigated by close liaison with Irish Rail, carefully planned lifting operations and physical restrictions on tower crane lifting radius.
- The Interpretative Ground Investigation Report (Golder Associates) (see Volume 3, Chapter 4 Appendix A) identifies a high risk to ground and construction workers, from exposure to contaminated material. Management controls and use of PPE will offer protection and contaminated remedial works will be completed prior to main construction works.

Indirect
The indirect hazards and risks during construction are:

- An increase in HGV traffic to the area. During the excavation process, there will be 1 HGV passing through Sutton Cross every 2.6 minutes. The cumulative impact, when considered with the permitted Balscadden development, will be 1 HGV passing through Sutton Cross every 2.3 minutes. (See Chapter 11: Material Assets: Traffic, Waste and Utilities).
- There is a Low to Low/Moderate risk of contaminated soil and water entering the ground water aquifer. There is a Very Low to Low risk, and minor consequence, of contaminants entering the Baldoyle Bay SAC (Golder Associates: *Interpretative Ground Investigation Report)*. The Controlled Waters Risk Assessment identifies the required construction controls, in detail.

Cumulative
The potential risk impact during the construction phase would be considered to have a ‘slight effect’, and cumulatively would also be considered to have a ‘slight effect’. There is no cumulative impact that would increase the likelihood of a major accident or the susceptibility of the site to a natural disaster.

Negative/adverse effects during construction would only be expected in the rare event that good construction management techniques are not applied.

12.1.6 IMPACT OF THE PROPOSED DEVELOPMENT – OPERATIONAL PHASE

The development comprises the provision of a mixed use residential, retail, café, restaurant, and a creche in 4 no. blocks (A to D), over part basement. The residential component will consist of 512 units.

Risk Assessment – Operational Phase				
No.	**Description**	**Consequence**	**Likelihood**	**Mitigation**
1.	Flooding	Serious	Unlikely	• Flood Risk Assessment Completed • Design includes riparian strip • Design includes improvements to management of Bloody Stream • Design mitigates for rare flood defence breach and protection of basement
2.	Structural Failure	Very Serious	Very Unlikely	• Constructed according to Building Regulations
3.	Fire	Very Serious	Unlikely	• Constructed according to building regulations • Fire Safety Consultant involved in design and Fire Safety Certificate • Fire Emergency Evacuation Plan Prepared for each of the blocks
4.	Road Traffic Accident	Serious	Very Unlikely	• Mobility Management Plan encourages alternatives to private cars • Traffic & Transport Assessment completed

Table 12.1.6 Risk Assessment Operational Phase

The hazards identified above have been applied to the risk matrix below. The red zone represents 'high risk' scenarios, the orange zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.

Risk Evaluation – Operational Phase							
Likelihood Rating	**Very Likely**	**5**					
	Likely	**4**					
	Unlikely	**3**			1 – 9	3 – 12	
	Very Unlikely	**2**			4 – 6	2 – 8	
	Extremely Unlikely	**1**					
			1	**2**	**3**	**4**	**5**
			Minor	**Limited**	**Serious**	**Very Serious**	**Catastrophic**
			Consequence Rating				

Table 12.1.7 Risk Evaluation Operational Phase

Direct

The main direct hazard during operation, in a mixed-use residential development is the risk of fire. Maurice Johnson & Partners note that the proposed uses are considered normal hazard fire risks as would be encountered in most developments and do not include any hazards which would be regarded as presenting an exceptional environmental fire hazard or major accident.

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 Fingal County Council.

The measures will include:

- 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 Guidance Document B, BS:9991 and BS:9999. These measures will serve to control and limit the size of any fires.
- 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, to internal wall and ceiling linings and external wall cladding. With reference to the latter it is noted that the external walls will all comprise an inert masonry outer skin. Accordingly, there is negligible risk of the external surfaces acting as a 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.
- A bespoke Fire Emergency Evacuation Plan (FEEP) will be prepared for each of the blocks in advance of occupation.

The flood risk assessment has identified a low risk of flooding during the operational phase, and has considered 1 in 1,000 year flood events, as well as combined 1 in 200 year & 1 in 2 year fluvial/tidal flood events.

According to the Materials Management & Remedial Strategy Plan, the contaminated material will be removed and remediated during the construction phase. Contaminated material to remain on site will be protected by a physical barrier of at least 1 metre of inert soil. The Interpretative Ground Investigation Report identifies a very low risk to the health of future site users (assuming the ‘Residential Without Home Grown Produce’ end use scenario).

Indirect

There are no indirect hazards or risks during the operational phase of the development that would be considered to contribute to major hazards, or make the site more susceptible to natural disasters.

The opening of the Bloody Stream to become a feature in the development, will present the new hazard of an open body of water on site, whereby the stream was previously covered. The new stream will be 3 metres wide and 0.8 metres deep. The area surrounding the strip will be landscaped with slopes at 1:3 or 0.5 metre stepped tiers. Considering the depth and adjacent landscape, the open stream would not be considered a significant hazard. The riparian strip has been designed to permit flooding and the area can be closed to the public during these periods.

Cumulative
The potential impacts during the operational phase are considered 'not significant', and cumulatively would also be considered 'not significant'. There is no cumulative impact that would increase the likelihood of a major accident or the susceptibility of the site to a natural disaster.

12.1.7 DO NOTHING IMPACT

The current brownfield site consists of areas of overgrown vegetation and derelict buildings (containing some asbestos containing materials). In the event of no development on the site, there would be no change in the risk of major accidents or susceptibility to natural disasters.

In the event of no development on the site, it would be expected that the derelict buildings would fall into a further state of disrepair. This would increase the hazard to anyone gaining (unauthorised) access to the site. The presence and degradation of asbestos containing materials would continue to present a hazard to anyone gaining access to the site.

The Flood Risk Assessment identified 2 previous flood events in the area in 2002, both blamed on the Bloody Steam, as the existing underground culvert is not working as intended and in need of repair. Therefore, further flooding of the site and adjacent properties would be expected.

The Interpretative Ground Investigation Report identifies contaminated made ground on site, with the potential to enter the groundwater below. In the event of no development on site, the contaminated material will remain, and remain a potential pollutant to the ground water / aquifer.

12.1.8 MITIGATION MEASURES

Construction Phase
During construction, the following strategies will be put in place, with detailed control measures:

- Construction Safety & Health Plan
- Construction Environmental Management Plan
- Emergency & Incident Response Plan
- Traffic Management Plan
- Materials Management & Remedial Strategy

Asbestos containing materials (in buildings and soils) will be removed by a specialist contractor and transported with a permitted haulier to a licensed facility.

Working adjacent to the DART line will be coordinated with an ongoing liaison with Irish Rail, and their required control measures put in place.

Operational Phase
During operation, fire safety will have been mitigated via consideration during the design stage of the project and ongoing control by the estate management company. The possibility of falls from height have been managed during the design stage via compliance with building regulations.

The open Bloody Stream is designed with a riparian strip that will be a designated flood zone. Other measures for mitigating flooding of the Bloody Steam include:

- A water gate to collect any large items before entering the underground section
- Installation of an easily accessible manhole for maintenance

- Underground section has been designed to facilitate access for maintenance personnel
- An alternative overflow route has been provided, in the event of blockage

Major Accident or Disaster	Risk	Receptor	Mitigation	Residual Significance
Construction Phase				
Flooding	Damage to temporary/incomplete structure, injury to personnel, release of hazardous construction materials.	Construction Personnel, Ground Water, Soil	Flood Risk Assessment completed at design stage.	Low
Building Fire	Damage to temporary/incomplete structure, injury to personnel, release of hazardous construction materials.	Construction Personnel, Ground Water, Soil	Fire safety measures to be detailed in Construction Safety & Health Plan and Emergency & Incident Response Plan.	Medium
Building Failure	Collapse of structure, injury to personnel.	Construction Personnel	Constructed in accordance with building regulations and international best practice, with supervisory visits by members of the Design Team.	Low
Road Accidents	Collision of heavy construction vehicle with public vehicle (especially at site entrance)	Public – pedestrians, cyclists, vehicle drivers	Construction Traffic Management Plan	Medium
Contaminated Ground	Impact on health of construction personnel, spread of contamination to other site areas or outside site	Construction Personnel, Ground Water, Soil, Pubic	Materials Management & Remedial Strategy to be implemented	Low
Removal of asbestos containing materials (ACMs)	Impact on health of construction personnel, spread of ACMs to other site areas or outside site	Construction Personnel, Ground Water, Soil, Pubic	ACMs to be removed by specialist contractor, prior to other works on site.	Low
Rail incident	DART incident as a result of construction activities, causing serious injury or death.	Public, residents.	Adherence to Irish Rail safety guidance for third party works. Regular liaison with Irish Rail. Lifting Operations Management Plan for site to consider programming slew limitations on cranes.	Low
Operational Phase				
Flooding	Drowning.	Residents, Public	Flood Risk Assessment completed at Design Stage. Inclusion of riparian strip for Bloody Stream	Low
Building Fire	Serious injury and death. Damage to structure.	Residents, Public.	Fire Safety Consultant involved in design process. Constructed according to fire safety regulations and fire safety certificate.	Low
Structural Failure	Serious injury and death.	Residents, Public	Design by appropriately qualified structural engineers. Construction supervised and certified according to BCAR.	Low
Fall from height	Serious injury and death.	Residents, Public	Design in compliance with building regulations	Low

Table 12.1.8: Hazards and Mitigation Measures

12.1.9 IDENTIFICATION MAJOR ACCIDENTS OR DISASTERS

Major Accident or Disaster	Relevant for the Project Claremont	Why relevant?	Potential Receptor	Covered within EIAR?
Civil				
Human disease/epidemic	No			
Terrorist Attack	No			
Animal Disease	No			
Foodborne Disease	No			
Waterborne Disease	No			
Crowd Safety	No			
Civil Disorder	No			
Loss of Critical Infrastructure	No			
Transportation				
Road Accidents	Yes	Adjacent to and interface with R105 route between Howth and Dublin/all other areas.	Public / Road Users	Chapter 11
Rail accidents	Yes	Construction adjacent to operational DART line.	Public / Rail Passengers	Chapter 12
Aircraft disasters	No			
Maritime Disaster	No			
Transport Hub	No			
Natural				
Cultural, Archaeological and Architectural Heritage	No			
Avalanche and landslides	No			

Sinkholes	No			
Earthquakes	No			
Floods	No			
Storm surge/tidal flooding	No			
Blizzards	No			
Droughts	No			
Severe weather such as Tornados, heatwaves	No			
Air Quality events	No			
Wildfires	No			
Dam, Bridge or Tunnel Failure	No			
Flood defence failure	Yes	Project area protected by existing defences for DART line.	Public / Residents / Visitors	Chapter 12 references Flood Risk Assessment
Natural				
Fire	Yes	Identified hazard for high density housing.	Public / Residents / Visitors	Chapter 12 references involvement of Fire Safety Consultant
Cyber Attacks	No			
Industrial accidents (defence, energy, oil and gas refinery, food industry, chemical industry, manufacturing, quarrying, mining)	No			
Disruption to electricity/gas supply	No			
Invasive species	No			

Disruption to oil supply	No			
Nuclear accident	No			
Other				
Road signs and masts failure	No			
Utilities failure	No			
Crime or civil unrest	No			
Building Failure	No			

12.1.10 RESIDUAL IMPACTS

The residual impact of the development, as designed and constructed in accordance with current regulations and best practice, is negligible in regard to major accidents or natural disasters. As a derelict building (identified to contain asbestos) will be removed and management of the Bloody Stream improved, there is the potential for positive residual effects on completion of the development.

The Materials Management & Remedial Strategy Plan describes the strategy to remove contaminated materials from sit, with an estimated 62,744m^3 of material removed from site. Contaminated material to remain on site will have a physical barrier of at least 1 metre of non-hazardous soil. The removal and remediation of contaminated ground on site also has the potential for a positive residual impact.

12.1.11 INTERACTIONS

Public Health

The impact on Population & Human Health has been thoroughly analysed and described in Chapter 3. The chapter indicates a positive effect or potential positive effect on population and human health as a result of the proposed development. Interactions with topics from this chapter are mentioned below.

There may be possible short-term nuisance to the public from noise, dust, vibration and construction traffic during the construction phase. This will be minimised and managed to industry accepted best practice standards.

The development includes a pumping station, with a low-level noise output. The nearest residential units are located approximately 50 metres from the pumping station, and the background local traffic noise masks its operation.

In terms of human health, the operational impacts are likely to be not significant. During operation, there is the potential for a number of facility and traffic related emissions (e.g. NO^2, PM^{10}, $PM^{2.5}$, CO, benzene, NOx, VOCs and CO^2) to the atmosphere. These are likely to have an imperceptible impact on local air quality.

The Human Health Risk Assessment (Golders Associates) has identified contaminated soils which may pose an unacceptable risk to human health. The methodology described in the Materials Management & Remedial Strategy Plan mitigates these hazards to human health, via removal of contaminated material and non-hazardous soil as a physical barrier, in addition to other management controls.

12.1.12 DIFFICULTIES ENCOUNTERED IN COMPILING REQUIRED INFORMATION

No difficulties were encountered.

The reports on ground contamination state that the ground under the existing structures could not be sampled, and therefore the potential for contamination in this area is unknown. The Materials Management & Remedial Strategy Plan recommends further testing, investigation and analysis when the structures have been removed and access to the area is possible.

12.1.13 CONCLUSION

The design has considered the potential for fire, flooding, contaminated ground, hazardous materials and the defined ‘particular risks’ (as in the Safety Health & Welfare at Work (Construction) Regulations 2013) within the design and construction of the proposed development. The risks have been addressed by the design and mitigation methods during the construction period. The vulnerability of the proposed development to major accidents and/or disasters is considered to be not significant.

12.1.14 REFERENCES

- Environmental Protection Agency: *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* 2017
- Department of Housing, Planning and Local Government: *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* 2018
- Department of Defence: *A National Risk Assessment for Ireland* 2017
- Department of Housing, Planning and Local Government: Causes of Fire Attended by Brigades 2015
- Department of Environment, Heritage and Local Government: *A Framework for Major Emergency Management Guidance Document 1: A Guide to Risk Assessment in Major Emergency Management* 2010
- Department of the Taoiseach: *National Risk Assessment Overview of Strategic Risks* 2017
- EPA: *Guidance on Assessing and Costing Environmental Liabilities* 2014
- Jacobs - Tobin: *Greater Dublin Drainage Project for Irish Water* 2018
- Fingal County Council: *Major Emergency Plan 2011*
- HSA: *Summary of Workplace Injury, Illness and Fatality Statistics 2016 – 2017*
- Irish Rail: *I-DEP-0121: Third Party Works: Additional Details of Railway Safety Requirements*

12.2 SITE FLOOD RISK ASSESSMENT

12.2.1 INTRODUCTION

Barrett Mahony Consulting Engineers have been instructed to carry out a detailed assessment of the possible flood risks at the proposed mixed use development at the Claremont Development, Howth Road, Howth, Co. Dublin (the **Proposed Development**) and to provide mitigation measures to mitigate any impacts.

This section has been authored by Vincent Barrett of Barrett Mahony Consulting Engineers. Vincent holds a Bachelor of Engineering Science Degree (1979), a Master of Science degree and a DIC from Imperial College (1983), A Diploma in Structural engineering, and is a Chartered Member of the Institution of Structural Engineers (1985) and a Chartered Member of Engineers Ireland (1983). He is a registered consulting engineer (RConsEI) since 1992 and has forty years' experience working in the field of Civil and Structural.

12.2.2 METHODOLOGY

The assessment of the potential impact of the Proposed Development as a flood risk in the area was carried out according to the methodology specified by the EPA and the specific criteria set out in the Guidelines on Information to be Contained in an Environmental Impact Assessment Report 2017 (Draft).

The Methodology used for the Impact assessment is as follows:

- Conduct a desk study to ascertain all available background information on all possible flood risk relevant to the development site, and the local surrounding area;
- Undertake field investigations to determine baseline conditions;
- Assess the potential impact of the proposed works on the Bloody Stream, Irish Sea and ground water and recommend suitable mitigation measures where appropriate.

Flood risk for the development was assessed in accordance with guidelines outlined in the OPW publication "The Planning System and Flood Risk Assessment Guidelines for Planning Authorities". The stages involved in the assessment of flood risk are listed in that publication as follows:

Stage 1: Flood Risk Identification

Stage 2: Initial Flood Risk Assessment

Stage 3: Detailed Flood Risk Assessment

Data sources and Guidelines referred to:

1. Flood Zone - The possibility of Fluvial flooding on the site is considered utilizing the guidelines outlined in Chapter 3 of the OPW publication referenced in section 3.1, Strategic Flood Risk Assessment for Fingal Development Plan.
2. High End Future Scenario(HEFS) – Flood Parameters taken from Fingal County Council
3. River/Stream flow velocity -calculated using the Institute of Hydrology Report No. 124 method.
4. $Q_{bar} = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

5. Tide levels – https://www.marine.ie/Home/home

6. Ground Water Level - Site Investigation

7. Fingal County Council – Drainage maps

The proposed scheme has taken the recommendations of these documents and applied them to the scheme.

Meetings were carried out with Fingal County Council, in November 2019, May 2019 and July 2019. These were split between on site and in the Fingal County Council office in Swords.

A survey was carried out on the 2nd July 2019, in the presence of Margaret Costello (BMCE), Vincent Barrett (BMCE), Niall McKiernan (FCC), Michael King (FCC), Patrick Wallace (FCC), Dave O Rourke (FCC).

- Assessment of Impacts.

In line with the EPA Draft Guidelines (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 12.2.1

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

Table 12.2.1 - Definition of Quality of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the significance of impacts. See Table 12.2.2.

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

Table 12.2.2 - Definition of Significance of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See Table 12.2.3

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

Table 12.2.3 - Definition of Duration of Effects

12.2.3 Description of Development

12.2.3.1 Existing

The site is currently occupied with 8,162m^2 of industrial type buildings and associated yards and hardstanding areas approx. 8878m^2. The total area of the site is 2.64hectares. The existing site is relatively flat ranging from a level of 4.5mOD to 4.0mOD generally with the slight fall to the east in line with the fall in the Howth Road itself toward Howth village/harbour.

Figure 12.2.1 shows the Aerial view indicating the location of the subject site.

Figure 12.2.1 - Site Location

Currently the site has a stream crossing the site. This stream, "The Bloody Stream", is culverted under the existing Techrete site, Figure 12.2.2. This stream rises in the Hill of Howth and navigates it way towards Howth Castle. Presently there are water control measure in place, via three large retaining walls, which attenuate the flow before entering a piped system that traverses the site, flows under the Irish water Assets, into a series of settlement tank and outfalls via the "Bob Davis Culvert" into Baldoyle Bay. This stream is tidal influenced but only during high tide.

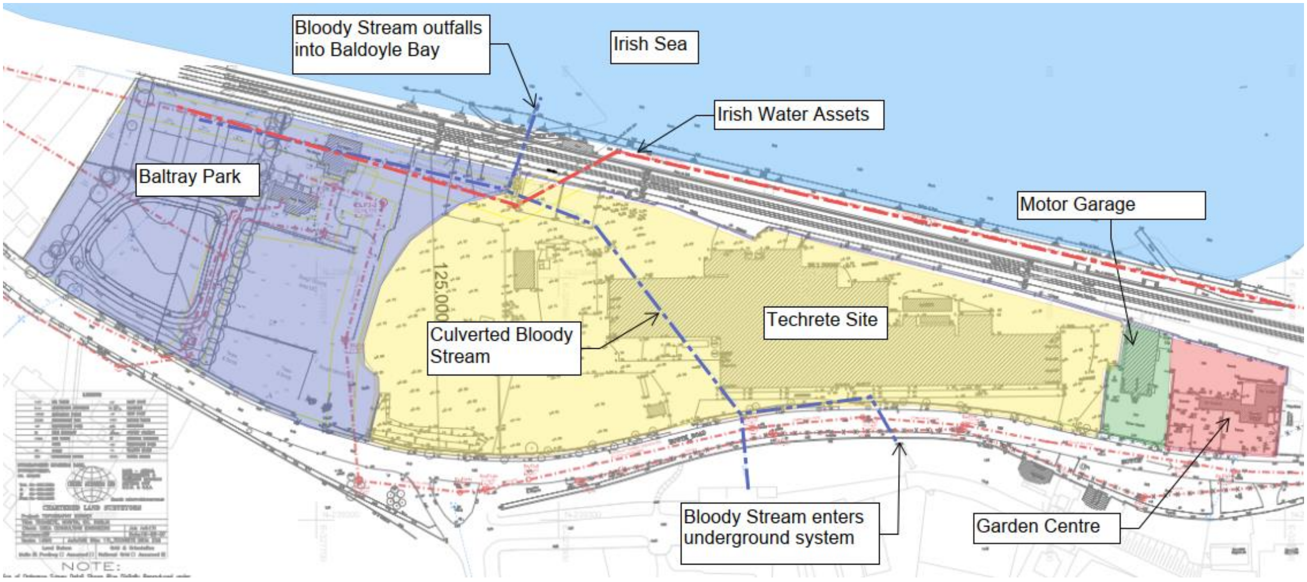


Figure 12.2.2 –Bloody Stream crossing

Historical records show two incidents of blockage to the bloody stream causing local flooding within the site these were associated with storm events and complete blockage of the system. Even in those scenarios the site levels are such that, water makes its way over ground to the (lower)western end of the development site and flows on the roadside toward Howth harbour.

12.2.3.2 Proposed

The proposed development will arise at a site bounded to the south by the Howth Road, to the east by a private dwelling, to the north by the DART line, and to the west by Local Authority lands. The site incorporates the former Techrete manufacturing facility, the former Beshoff's Motors showroom, and the former Howth Garden Centre.

The proposed development will include the demolition of all structures on site (c.8,162sqm GFA) and excavation of a basement. The proposed development comprises of the provision of a mixed use development of residential, retail/restaurant/cafe uses and a creche in 4 no. blocks (A to D), over part basement. Blocks A, B, C and D with a height up to a maximum of seven storeys of apartments over lower ground floor and basement car parking levels (a total of eight storeys over basement level). The residential component will consist of 512 no. residential units. The proposed development includes the provision of two vehicular entrances on to Howth Road, excavation of basement to provide for car parking, plant, waste storage and ancillary use. Additional car parking spaces shall be provided at lower ground floor level. A total of 439 no. car parking spaces and 1,335 no. bicycle parking spaces, including 49 no. bicycle spaces to cater for the retail units and creche shall be provided. One vehicular access is located at Block A, serving car parking spaces. The second is at Block C, providing access to the basement, residential and retail parking, and a service area for the retail units. A service route will be provided along part of the northern perimeter of the site with access from the western end of the site at a junction with Howth Road and at the main vehicular entrance at Block C;

A publicly accessible walkway/cycleway to the north of the site shall be provided at podium level. A civic plaza will be provided between Blocks D and C, and a landscaped park to the west of Block A. A channel to the sea for the Bloody Stream with associated riparian strip shall be incorporated as a feature within a designed open space between Blocks A and B. Communal gardens will be provided for Blocks A, B and C;

The residential component consists of 512 no. residential units, which includes 4 no. studio, 222 no. one bed, 276 no. two bed, 10 no. three bed apartments, and communal facilities of 708 sqm. Ground floor units onto the Howth Road will have own door access. The units will be served by balconies or terraces on all elevations;

Block A, with a maximum height of seven storeys of apartments over lower ground level car park (a total of eight storeys), will provide for 234 residential units, with residents' amenities to include a gym, residents' lounge, residents' support office, and 2 no. residents' multi-purpose rooms. Block B, with a maximum height of seven storeys of apartments over lower ground floor and basement car park (a total of eight storeys over basement), shall provide for 154 no. units, residents' lounge, residents' multi-purpose room, and creche of 236 sqm with outdoor play area. Own door access will be provided at ground floor. Block C, with a maximum height of seven storeys over basement car parking (a total of seven storeys) will provide for 83 no. residential units in two wings over a retail unit and Block D, with a maximum of 6 storeys over basement, shall provide for 41 no. residential units over retail units;

The commercial component in Blocks C and D consists of 4 no. units with 2,637 sqm gross floor area. In Block C, it consists of a 1,705 sqm anchor unit, accessed from the civic plaza. In Block D, it consists of a restaurant (243 sqm) and retail unit (603 sqm) and café (86 sqm). The restaurant and retail units are accessed from Howth Road, and the café is accessed from the upper level of the civic plaza.

The proposed development includes the provision of public and communal open space, green roofs, landscaping, boundary treatments, set down locations, substations, meter rooms, waste management and all ancillary site works, including upgrading of the public paths along Howth Road and relocation of bus stop in new setback with a bus shelter. Two set down areas are provided at either end of the site;

The gross floor area of the proposed development is 48,252 sqm (excluding enclosed car parking) on a site of 2.68 ha.

12.2.4 Characteristics of Development Relevant to this Chapter

For information regarding drainage design refer to Chapter 5 - Water.

<u>OPW Classification</u>

Outlined in the OPW publication, new developments are divided into three categories which are as follows:

- 'Highly Vulnerable Development' – hospitals, schools, houses, student halls of residence etc.;
- 'Less Vulnerable Development' – retail, commercial, industrial, agriculture etc.; and
- 'Water-compatible Development' – docks, marinas, amenity open space etc.

The proposed development falls into the classification of Less Vulnerable Development. People can safely exit onto Howth Road from the podium at +6.4m OD level during a flood event. This rationale is set out based on Clause 2.16 of the OPW guidance document 'The Planning System and Flood Risk Management' which states;

'*The classification of different land uses and types of development as highly vulnerable, less vulnerable and water-compatible is influenced primarily by the ability to manage the safety of people in flood events and the long-term implications for recovery of the function and structure of buildings*'

The lowest habitable area is at 5.2m OD, however these make up a very small proportion of the proposed development and they have direct access onto Howth road. The remainder of habitable accommodation starts at 6.4m OD and retail starts at 4.0m OD. All lower areas are non-habitable and primarily parking with some service areas.

Geographical areas are similarly divided into three categories, based on their risk of river and tidal flooding. The three categories are as follows:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding i.e. all areas which are not within zone A or B).

Irish Coastal Protection Strategy Study and the RPS Fluvial Flood Risk Assessment both put the Site in the Flood Zone C category. (Appendix III)

Table 12. -Matrix from the OPW document, to determine if a development is 'Appropriate' for a geographical location. This development falls into the "Appropriate" category and a justification test is not required.

	Flood Zone A	**Flood Zone B**	**Flood Zone C**
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	<u>Appropriate</u>
Water compatible development	Appropriate	Appropriate	Appropriate

Table 12.2.4–Matrix of vulnerability versus flood zone

Possible sources of flood water are listed in Table 12.2.5 below:

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Fluvial	Overtop Breach	People Property	Unlikely	High	Low
Tidal	Overtop Breach	People Property	Very unlikely	High	Low
Pluvial Surface water Snow Melt	Overflow/ Blockage	People Property	Unlikely	Low	Low
Groundwater	Rising groundwater levels	People Property	Unlikely	Medium	Medium
Embankment Breach	Bank Failure/Slippage	People Property	Unlikely	Low	Low
Watermain Burst	Excavation Works	People Property	Unlikely	Low	Low

Table 12.2.5 – Proposed development Sources of Flood Water

12.2.4.1 Fluvial/Pluvial

The proposed development will have a riparian strip, which will include a section of the Bloody Stream de-culverted in line with previous applications. All surface water collected from the development will be discharged into the stream. The scheme will raise the level of the stream at the crossing point before Howth road, reducing the depth of the riparian strip and creating a more usable amenity, Figure 12.2.3.

Figure 12.2.3 - Proposed Development Layout

Figure 12.2.4- is a typical section through the riparian strip. This has been designed in accordance with OPW Planning System and Flood Risk Management Guidelines for Local Authorities to contain excess water in the event of flooding.

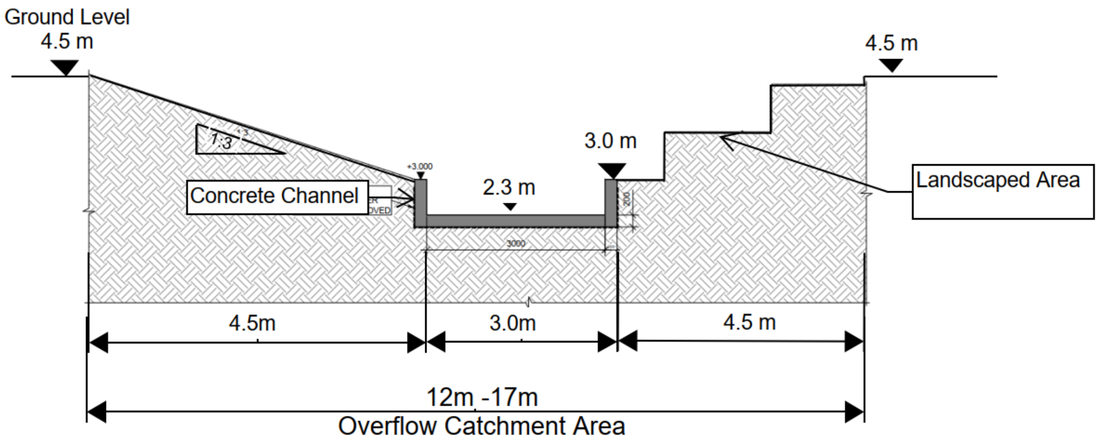


Figure 12.2.4 - Typical Section through Riparian Strip

The raised level of the stream allows the proposed development to change the existing configuration around the Irish Water Assets, Figure 12.2.11 .This will allows the stream to flow over rather than under and removes the need for the settlement tanks as shown in Figure 12.2.5

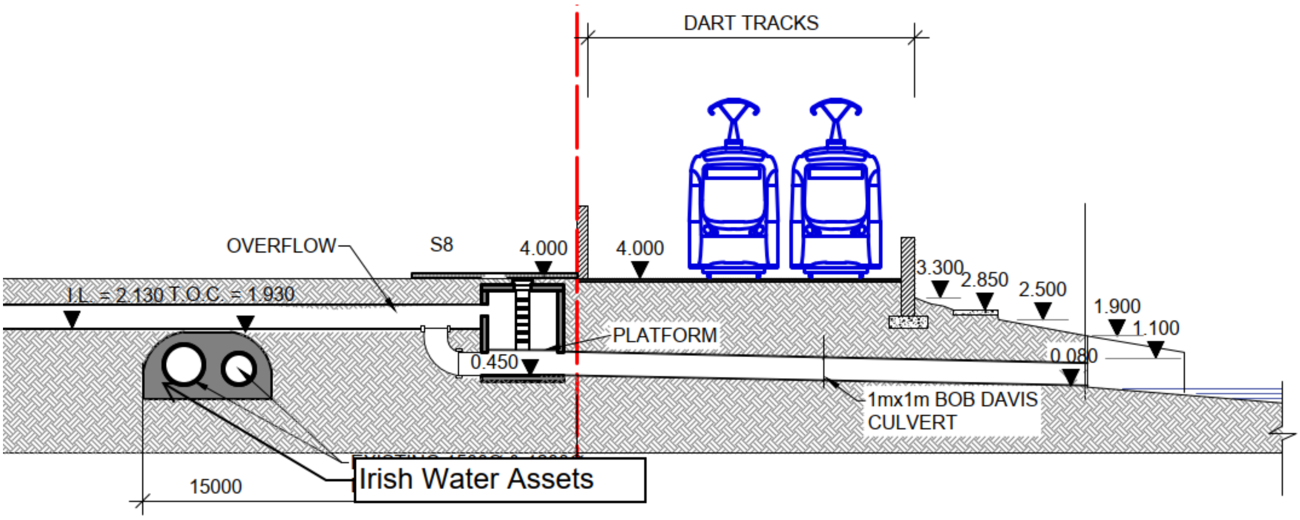


Figure 12.2.5- Proposed Outfall Configuration

The area surrounding the development will be graded so that fluvial water is directed to ground drainage network and diverted away from the residential buildings. In the event of a blockage water will flow towards either Baltray Park, the riparian strip or as a last resort to Howth Road. All access ramps to lower areas, are raised at the entrance to prevent water entering from Howth Road. Therefore, resulting in a low likelihood of flooding with neutral potential long term impact.

12.2.4.2 Tidal

The proposed development is beside the Irish Sea, separated via the public promenade and the DART line. Overtop breach is only possible if the promenade and the DART line sea defence wall is removed which is highly unlikely. To cater for such event a retaining wall is to be constructed along the site northern boundary with the Dart line to a level of 4.5m OD (1 in 1000 year sea level plus 1m freeboard), taken from the Flood Parameters taken from Fingal County Council, Figure 12.2.6 and Figure 12.2.7 below. Therefore, the risk of flooding due to tidal is low with natural long term impact.

Figure 12.2.6, shows ground floor layout for the development.

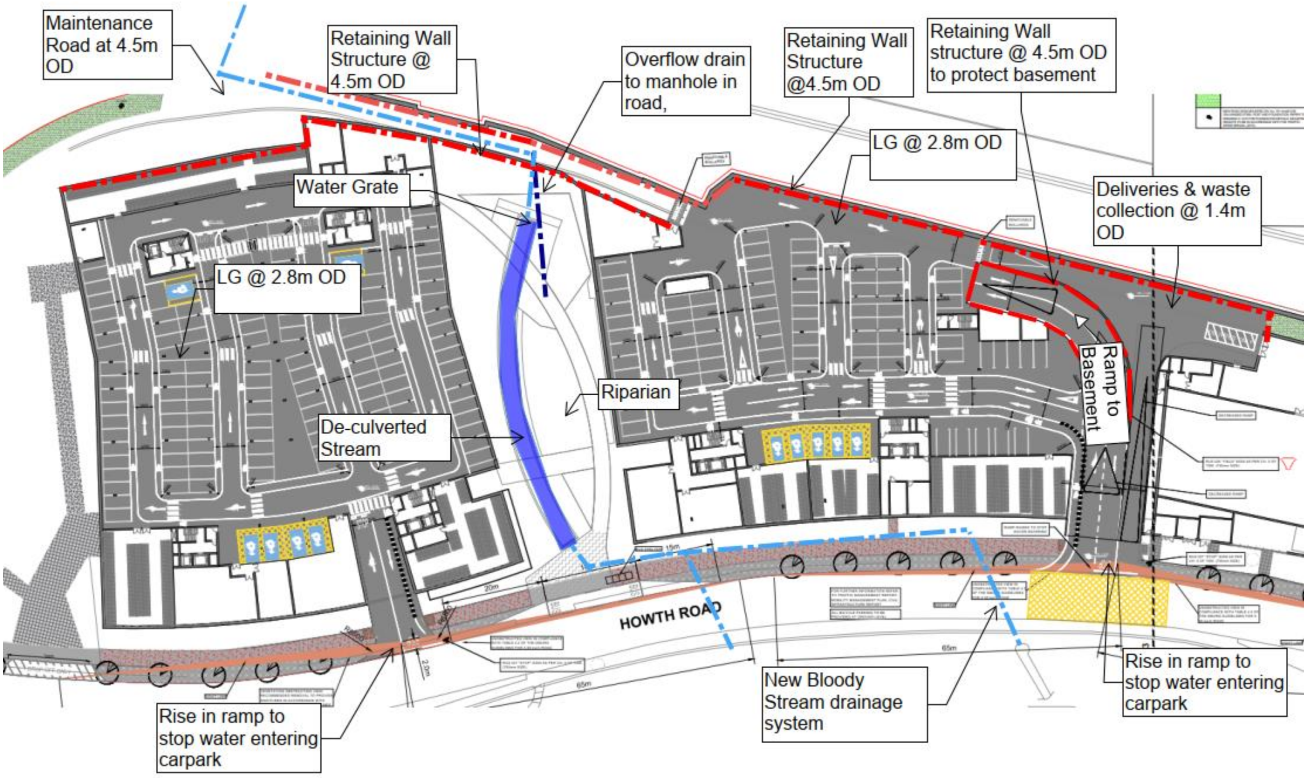


Figure 12.2.6- Ground Floor Layout

Figure 12.2.7, shows a typical section along the site boundary, showing the existing and proposed sea defence structure.

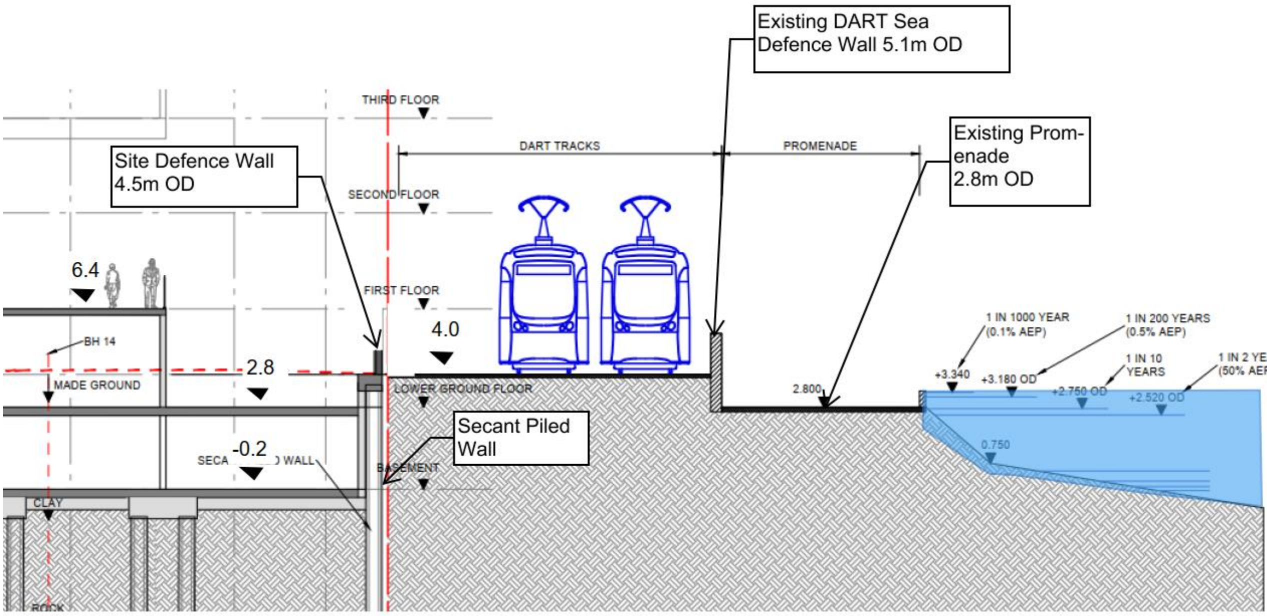


Figure 12.2.7 - Typical Section

12.2.4.3 Climate Change

Fingal County Council, Meath County Council and the Office of Public Works have recognized the existing flood risk in the Fingal and East Meath area and the potential for significant increases in this risk due to climate change, ongoing development and other pressures that may arise in the future.

OPW document "The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009" recommends that a precautionary approach to climate change is adopted due to the level of uncertainty involved in the potential effects.

Rising sea levels and more frequent and more severe storms will significantly increase the risk of coastal flooding and estuarial flooding as well as coastal erosion. 'The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009' set out that there is a great deal of uncertainty in relation to the potential effects of climate change and therefore a precautionary approach should be adopted.

Advice on the expected impacts of climate change and the allowances to be provided for future flood risk management in Ireland is given in the OPW Assessment of potential future scenarios. Flood Risk Management Draft Guidelines. Two climate change scenarios are considered. These are the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). The MRFS is intended to represent a 'likely' future scenario based on the wide range of future predictions available. The HEFS represents a more 'extreme' future scenario at the upper boundaries of future projections. Based on these two scenarios OPW recommended allowances for climate change in relation to river flows and sea levels are given in Table 12.. These climate change allowances are particularly important at the development management stage of planning and will ensure that proposed development is designed and constructed to take into account best current knowledge. For this assessment the HEFS criteria has been adopted as a minimum on top of the 1 in 1000 year high tide level(3.34mOD).

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year[1]	- 0.5 mm / year[1]
Urbanisation	*No General Allowance – Review on Case-by-Case Basis*	*No General Allowance – Review on Case-by-Case Basis*
Forestation	- 1/6 Tp[2]	- 1/3 Tp[2] + 10% SPR[3]

Table 12.2.6 - Flood Parameters taken from Fingal County Council - Surface Water Management Plan

12.2.4.4 Ground Water

Extensive site investigations carried out show the ground water table is reasonably stable at levels measured (Golder) range from 1.05mOD(BH05, 13/09/19) to 1.76 (BH09, 18/09/19). The development plans to construct a basement under blocks B, C & D, which will extend below the water table. The basement is to be used for carparking and waste storage, this will be constructed to a Grade 1 in accordance with BS 8102.

Figure 12.2.8 – Is a typical section through the blocks B, C & D. This show the existing rock profile and proposed floor levels. The perimeter of the basement will be formed using a secant piled wall socketed into the bedrock.

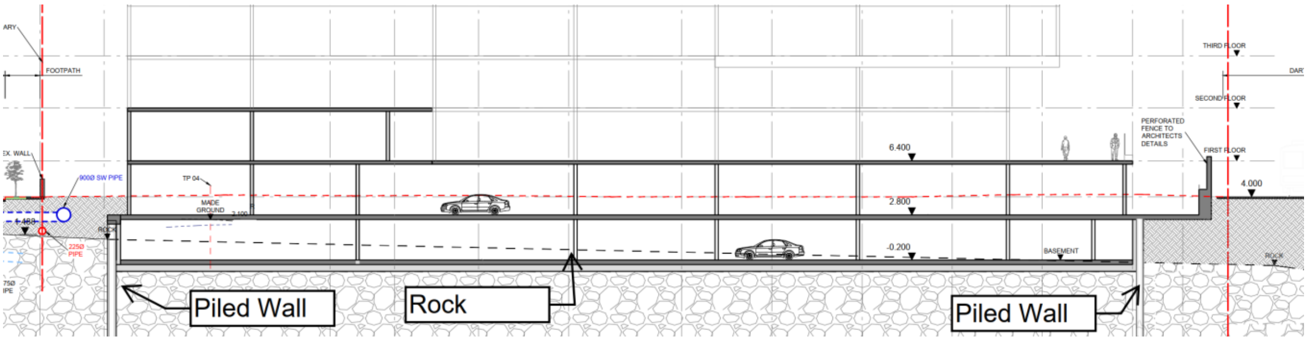


Figure 12.2.8- Blocks B, C & D

Figure 12.2.9 - Typical section through block A. No basement is to be construction beneath this structure and the ground floor slab will be above the ground water table.

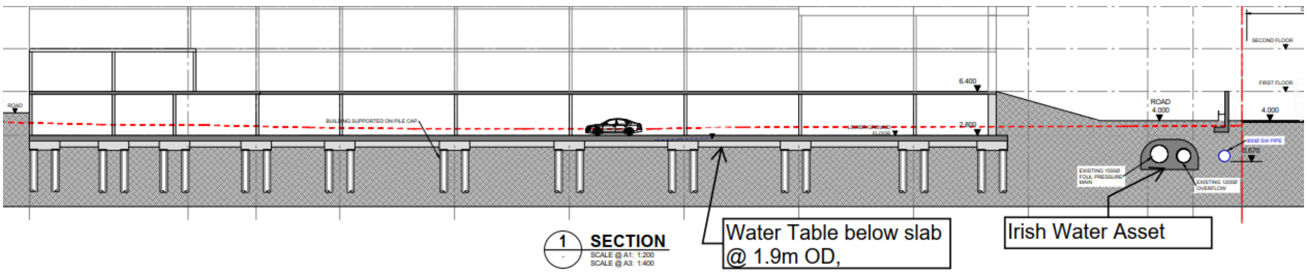


Figure 12.2.9- Block A

12.2.4.5 Watermain Burst

Refer to Fluvial/Pluvial Surface Water

12.2.4.6 Embankment Breach

Refer to Tidal section above

12.2.5 BASELINE ENVIRONMENT

Possible sources of flood water

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Fluvial	Overtop Breach	People Property	Unlikely	High	Low
Tidal	Overtop Breach	People Property	Very unlikely	High	Low
Pluvial Surface water Snow Melt	Overflow/ Blockage	People Property	Likely	Low	Low
Groundwater	Rising groundwater levels	People Property	Unlikely	medium	Low
Embankment Breach	Bank Failure/Slippage	People Property	Unlikely	Low	Low
Watermain Burst	Excavation Works	People Property	Likely	Low	Low

Table 12.2.7- Existing Site Sources of flood Water

12.2.5.1 Fluvial/Pluvial

The Bloody Stream as set out in 12.2.1 above, is currently culverted under the site, it rises on the Hill of Howth and makes it way towards Howth Castle and eventually across the Howth road onto the development site. Presently there are water control measures in place, via three large retaining walls, which attenuate the flow upstream from the road crossing. At Howth Road the water enters a piped system that traverses the site in a 600 dia pipe discharges via settlement tanks into the Bob Davis Culvert and out to Baldoyle Bay, which is designated as a “Special Area of Conservation (S.A.C)”. Currently flooding can only happen if the underground system is blocked and the manholes on site surcharge over their cover levels.

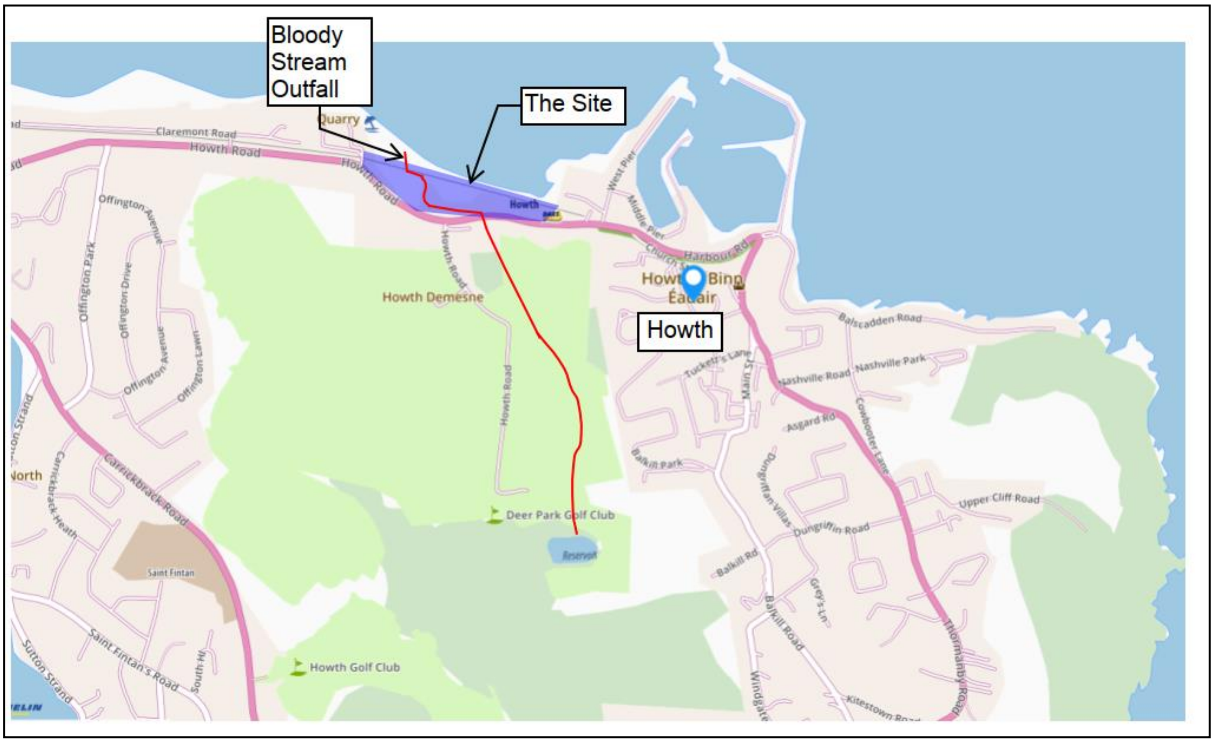


Figure 12.2.10- The Bloody Stream

The piped system makes its way across the site and enters a series of settlement tanks which are located on the north west corner of the development site and were necessary because of the existence of two Irish water assets, 1500mm and the 1200mm concrete sewers, which cross paths on route to Baldoyle Bay.

A survey was carried out to establish the exact location of these sewers. This was overseen by members from Fingal County Council and BMCE. The survey involved a series of excavations to determine the exact route of these sewers. The excavation found that the pipes were laid together and encased in concrete, forming a 3m to 4.7m wide mound @ 2.360m OD, at a gradient of 1:150 towards the DART line.

A CCTV survey was carried out to understand the current underground drainage system around the bloody stream. The effectiveness of the existing configuration results in a very poor hydraulic gradient for flows out falling through the Bob Davis Culvert. Figure 12.2.11 below shows the existing outfall configuration. As set out the stream goes under the Irish Water Assets and as a result is below the outfall levels in the Bob Davis Culvert. This means that in the current configuration, for water to discharge, a certain amount of surcharge has to occur in the existing Bloody Stream network. This results in sediment build up with associated ongoing maintenance issues.

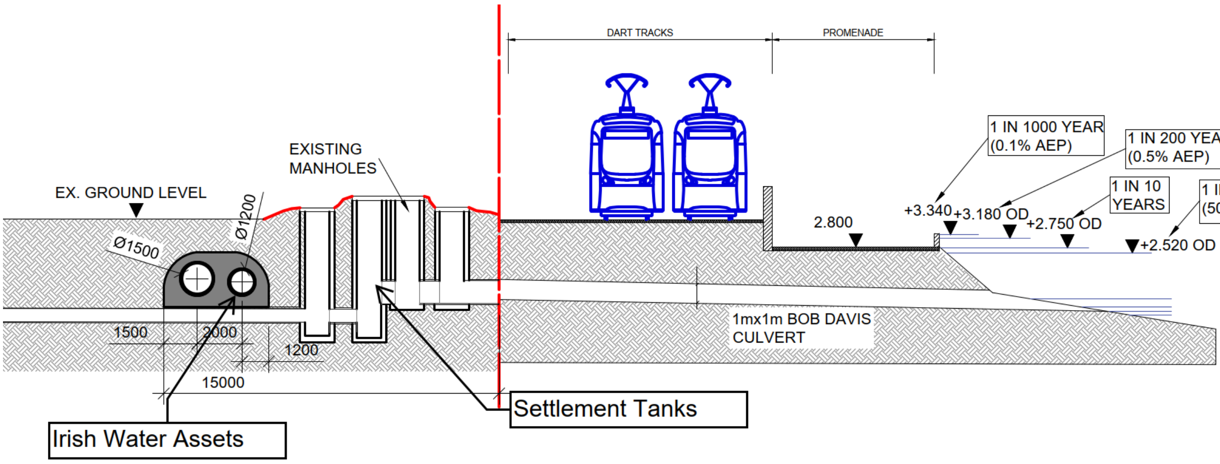


Figure 12.2.11 - Existing Outfall Configuration

Currently pluvial runoff collected on site is discharged without treatment into the Bloody Stream.

12.2.5.2 Tidal

The site is currently protected by the existing promenade and DART line defence wall. The promenade is at 2.8m OD and the defence wall at 5.1m OD, the latter being over 1.5m higher than 4.5m OD - 0.1% AEP plus 1m freeboard. (Figure 12.2.12– Existing Sea Defence). Therefore, the possibility of flooding due to tidal is low.

Figure 12.2.12 – Shows a typical section of the current situation along the norther boundary.

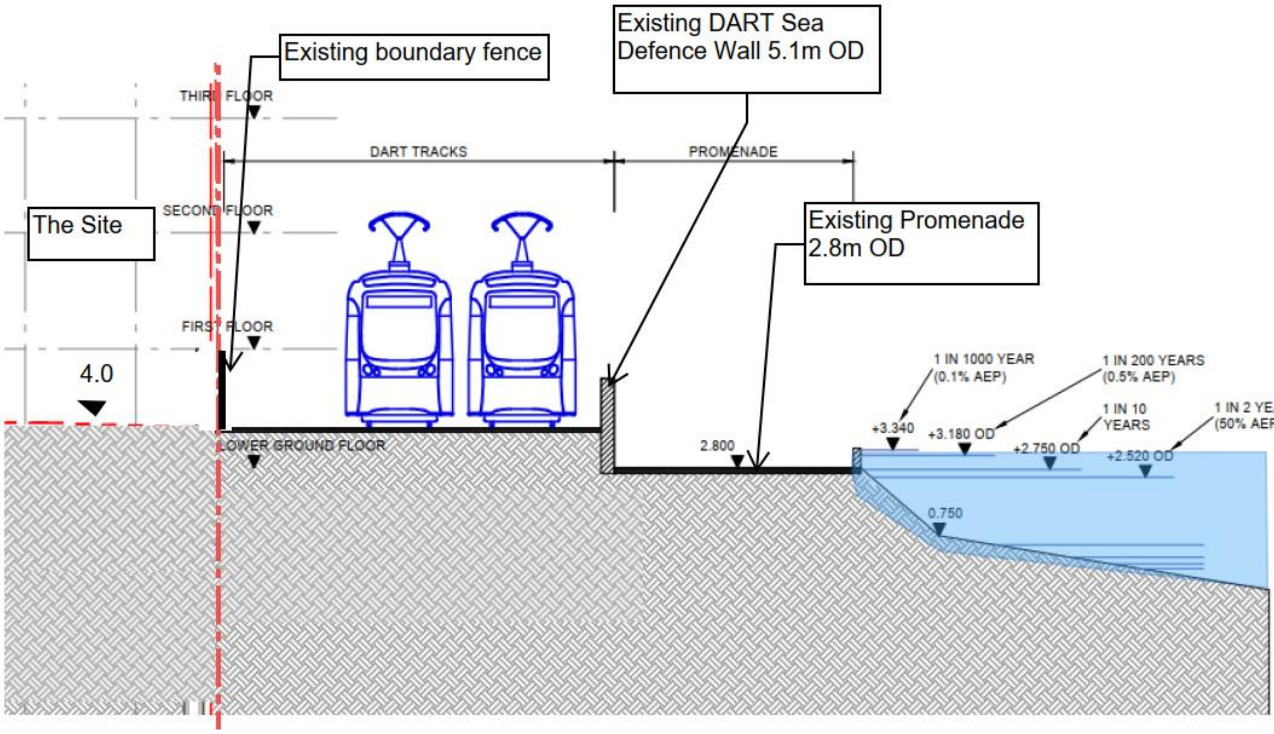


Figure 12.2.12 - Existing Sea Defence

12.2.5.3 Ground Water

The site is relatively flat varying between 4.0m OD and 4.5m OD. Site investigations carried out found the ground water to be relatively stable at a depth of between 1.05m OD and 1.76m OD. This allows a freeboard of over 2m.

Some tidal response in respect to rising sea levels is expected to influence the ground water level. However, 2m freeboard is significantly greater than OPW requirement for HEFS of 1m, therefore risk of flooding due to rising groundwater level is low.

12.2.5.4 Embankment

Refer to Tidal section above

12.2.5.5 Watermain Burst

Excess water would pond on site and drain into the surface water system, which would carry the water into the Bob Davis Culvert and out into Baldoyle Bay.

12.2.5.6 Historical Records

Historical records taken from the OPW website show two reports of flooding, both between October and November of 2002.

1) In the Claremont Development – formerly the Techrete grounds.
2) The Bloody Stream Pub

Both have been a result of vandalism or sediment build up. Access to the current system at and after Howth Road is limited if none existent, therefore maintenance is hard to achieve.

12.2.6 IMPACT OF PROPOSED DEVELOPMENT – CONSTRUCTION PHASE

12.2.6.1 Fluvial/Pluvial

Direct/Indirect

The existing site is covered by buildings and hard standing areas that make up 70% of the total site area. Surface water from this, flows, into the piped bloody stream that crosses the site and part in undefined simple run off from hard standing areas to open ground. The bloody stream comes from the hill of Howth trough the golf course and outfalls on the southern side of Howth road where it is brought across the road in a 450mm*225mm culvert and into the site and is piped via a 600mm diameter pipe across the site. The level of this is such that it was interrupted by two existing large storm overflow pipes (1200mm and 1500mm) coming from Howth pump station managed by Irish water. The Bloody stream pipe goes under these and discharges through a culvert referred to by Fingal County personnel as the “Bob Davis” culvert. The culvert flows under the Dart line and discharges to Baldoyle bay. The level of the culvert is above the invert of the Irish water storm overflow pipes so the bloody stream pipe discharges into a holding tank configuration that is designed to surcharge in order to facilitate outflows to the ”Bob Davis” culvert. The existing configuration causes an interruption in flow and results in significant maintenance issues associated with silt build up. There is also a 600mm diameter surface water pipe crossing Howth road further west that takes surface water from the castle, but the bulk of the surface water is coming through the aforementioned 450mm*225mm culvert under the road.

During the construction phase the Bloody Stream will continue to flow underground ground. However, to allow construction a diversion will be carried out on the stream. The stream currently flows in a 600 dia pipe across the site, this will be increased to 750mm dia and the route slightly altered. The new pipes will provide a clean system, removing some of the inaccessible blockages currently shown in CCTV survey and reduce the likely hood of flooding. Figure 12.2.13

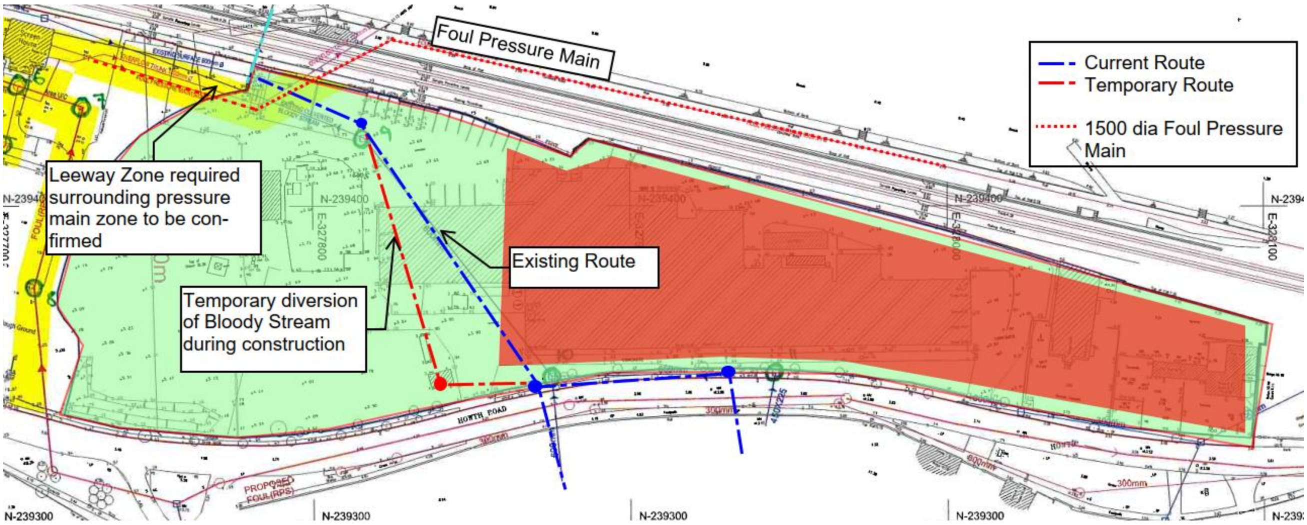


Figure 12.2.13 - Bloody Stream Diversion

Currently surface water runoff from the development site is discharged into the Bloody Stream. During the construction phase, surface water will be collected and pumped through a treatment system to remove elevated suspended solids and any hydrocarbons and discharged into a designated soakaway in the western end of the site, thereby improving the stream water quality.

Therefore, the potential impact during the construction phase will have a positive short term effect on the Bloody Stream and there are no indirect effects.

Cumulative

None

12.2.6.2 Tidal

Direct/Indirect

The site is currently protected by the promenade and the DART line, this will remain unchanged for the duration of the construction phase.

Cumulative

None

12.2.6.3 Ground Water

Direct

The basement formation level will be below the water table, meaning ground water will be an issue during the construction phase. To resolve this the basement perimeter will be formed using secant piles socketed into the bedrock, this will significantly reduce the quantity of ground water entering the basement during construction. The remaining ground water seepage will be controlled though a series of dewatering wells drilled inside the basement perimeter and will extend circa 3m below the basement formation level. The water collected in these wells will be pumped into a treatment system and discharged to the public sewer. However, in the situation that dewatering leads to unacceptable groundwater levels and decreases the aquifers supporting the SAC in the north, this water will be pumped into recharge wells outside the basement perimeter. Figure 12.2.14

The planned treatment system will remove elevated metals and hydrocarbons but not sulphate and Ammoniacal Nitrogen. It is anticipated that up to 15l/sec is expected to be pumped off site to maintain a dry site once the excavation is complete primarily due to the weathered and fractured nature of the bedrock.

Block A ground floor slab is above the ground water table, however depending on the time of year some local dewatering will be required during the construction phase. This will be done using shallow sumps as shown in Figure 12.2.15. This water will be pumped into a treatment system and discharge to the public sewer.

Therefore, the potential impact during the construction phase will have a neutral short term effect on the ground water.

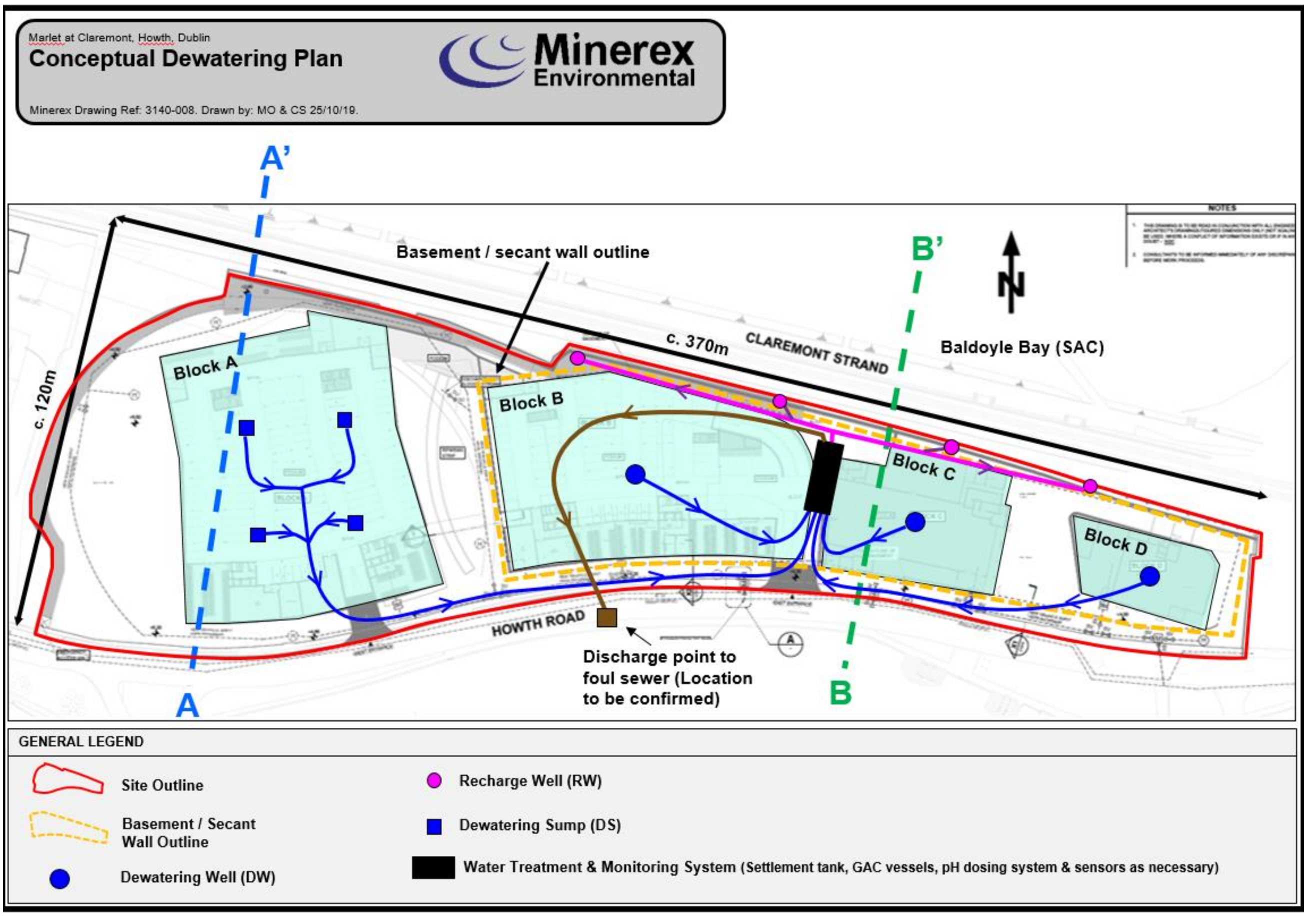


Figure 12.2.14- Dewatering Plan

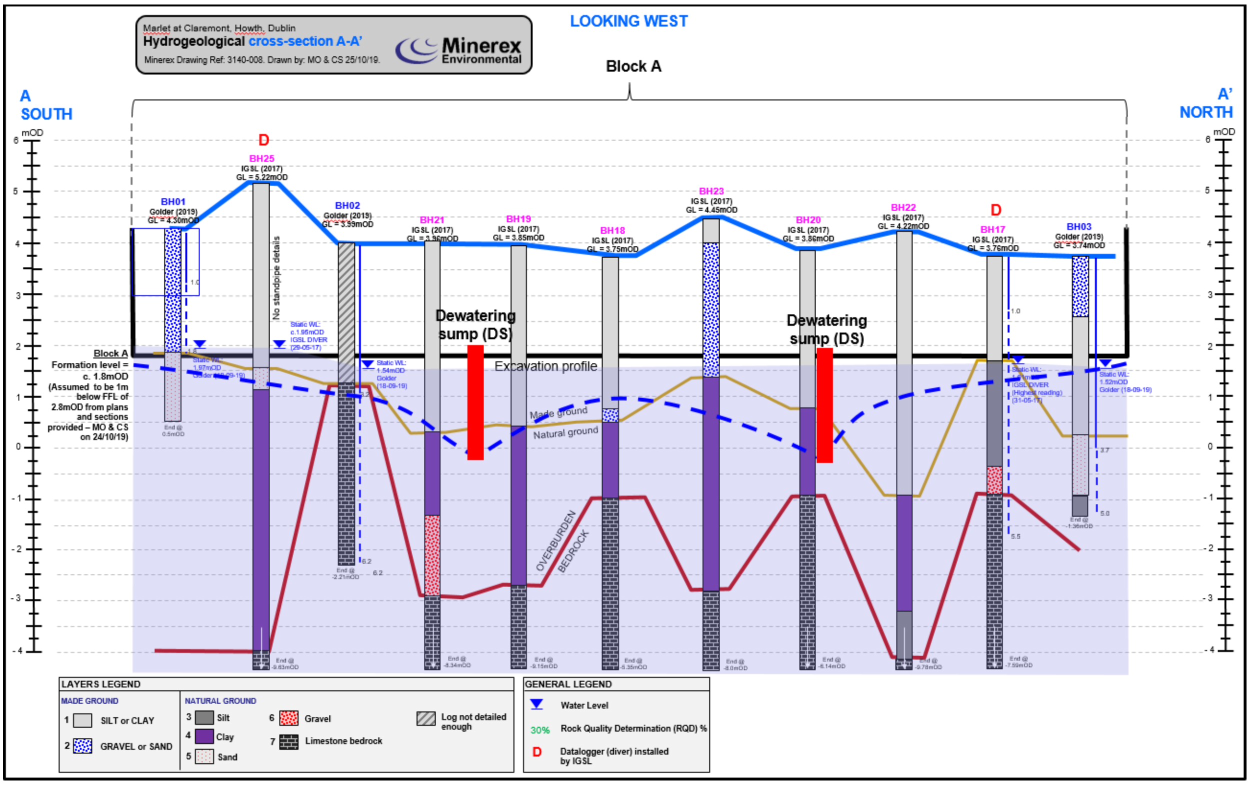


Figure 12.2.15 - Section A-A – Ref to Figure 12.2.14

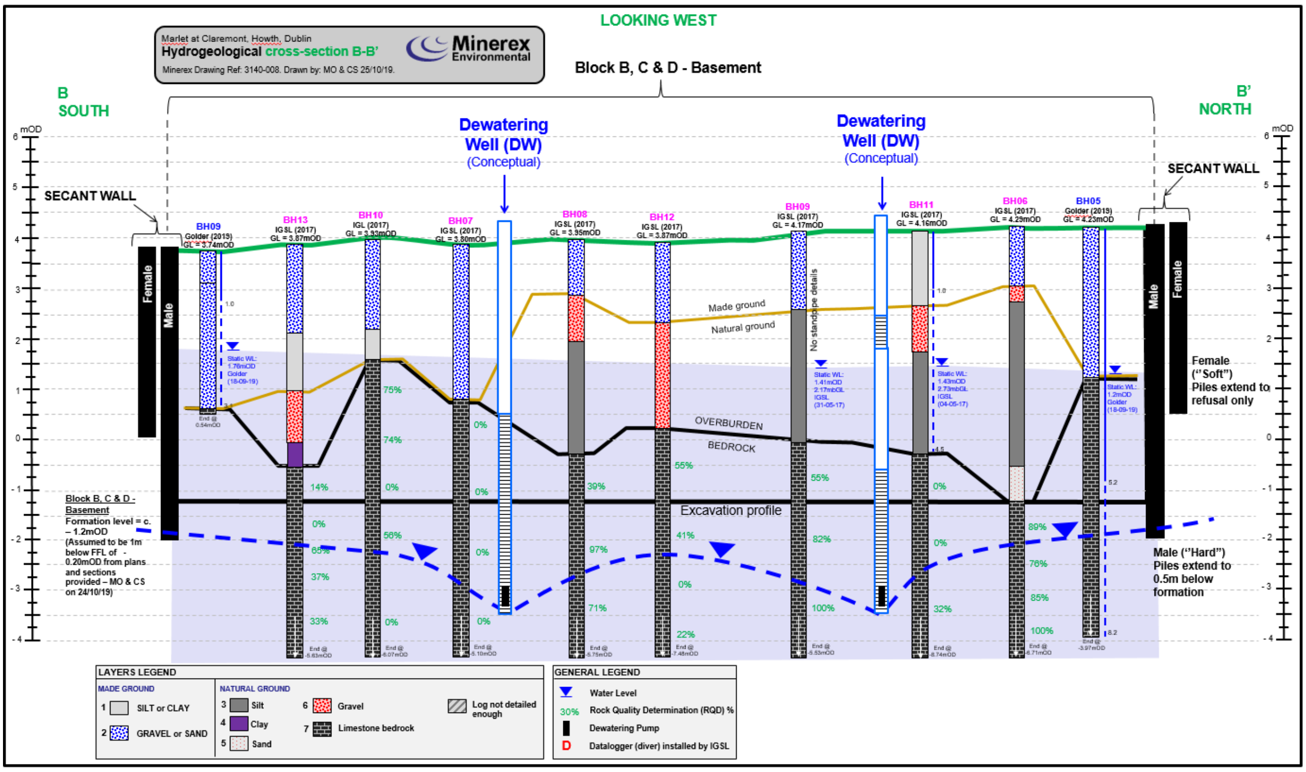


Figure 12.2.16- Section B-B- Ref to Figure 12.2.14

Cumulative

Storm events during the construction phase will increase the flow of water in the bloody stream as it flows through the site. These flows are fully piped through the site during the construction phase and the pipe size set out is substantially greater than the existing pipe sizes through which the stream currently flows and is sized to take account of increased flows during such events. Rainwater on the site itself during such events will be collected via the well point dewatering system set out and such events have been taken into account in flow prediction estimates set out in the dewatering plan.

12.2.7 IMPACT OF PROPOSED DEVELOPMENT-OPERATIONAL PHASE

12.2.7.1 Direct

The planned development analysis is to be carried out to allow for High End Future Scenario (HEFS), as per Flood Parameters taken from Fingal County Council, as discussed above in section 12.2.4.

The riparian strip has been designed to accommodate the following flows to mitigate the flood risk within the building:

- 1 in 1000 year tidal
- 1 in 1000 year fluvial
- Combined 1 in 2 year coastal + 1 in 2 year fluvial
- Combined 1 in 2 year coastal + 1 in 200 year fluvial

Fluvial High Water Levels

Maximum flood levels for the site have been estimated using the Institute of Hydrology Report No. 124 method outlines as:

$Q_{bar} = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

The Stream is introduced to the site via a 3m channel at 2.3m OD traversing the site in a landscaped riparian strip. The riparian strip will be approximately 65m long and varying in width from 12-17m. The banks of the channel will be either sloped @ 1:3 or stepped to a level of 4.5m as shown in Figure 12.2.17, increasing the capacity of the channel in the event of high flows.

Figure 12.2.17 –Shows a typical section through the riparian strip.

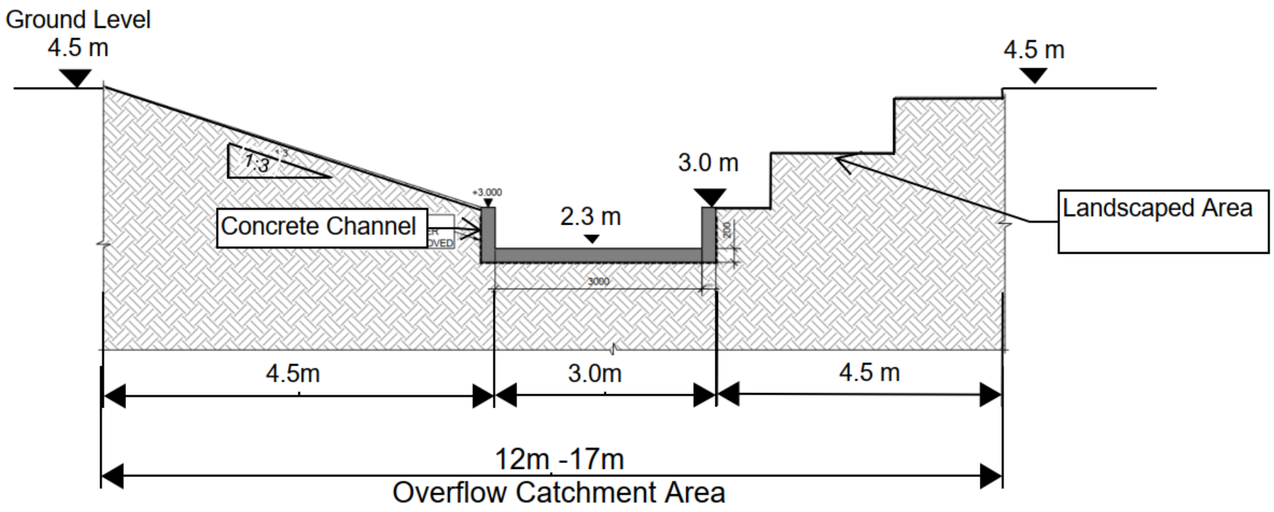


Figure 12.2.17- Typical Section

The level of the channel is below 1 in 2 year high tide (2.52m OD) and the sea will enter the channel on average 2 times a year. Combining the coastal and fluvial, for different situation finds that there will be times the channel will surcharge and will be contained in the overflow catchment area but will never exceed the 4.5m OD.

The proposed upstream invert level of the channel is 2.3m OD which gives a top water level of 2.99m OD during the 0.1% AEP fluvial event. The proposed FFL of residential buildings adjacent to the channel is 6.4m OD, with access points set at 4.5m OD in the cores at a split level, therefore representing a freeboard of 1.51m from the openings. (Figure 12.2.18)

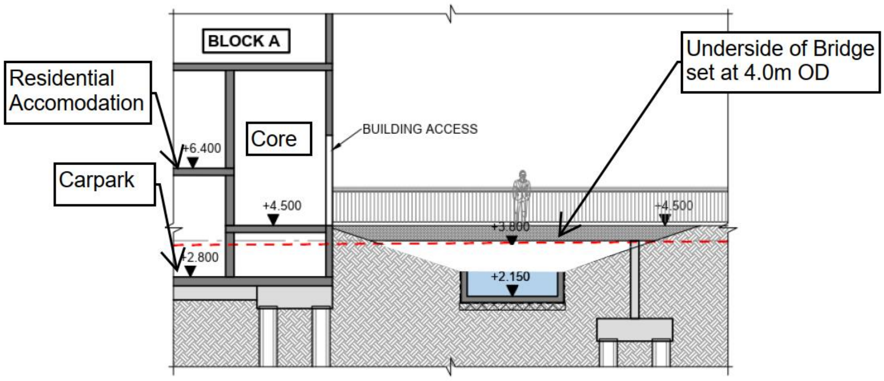


Figure 12.2.18- Typical cross section through Riparian strip

High Tide Water Levels

High tide water levels near the site have been taken from Point 17 shown on ICPSS map NE/RA/EXT/17 Rev 1. (Appendix III)

- 1 in 2 year (50% AEP) = 2.52m OD (Extrapolated value)
- 1 in 10 year (10% AEP) = 2.75m OD
- 1 in 200 year (0.5% AEP) = 3.18m OD
- 1 in 1000 year (0.1% AEP) = 3.34m OD

The proposed openings adjacent to the channel is set at 4.5m OD representing a freeboard of 1.16m during the 0.1% AEP coastal event.

Joint Probability Analysis

A joint probability analysis has been undertaken for various scenarios to determine the worst-case scenario for combined fluvial and tidal effects. Refer to Appendix 1 for detailed calculation.

The scenarios investigated are as follows:

a) 1 in 200 year coastal + 1 in 2 year fluvial = 3.360m OD

The proposed openings adjacent to the channel is set at 4.5m OD representing a freeboard of 1.140m during the combined 0.5% AEP coastal + 50% AEP fluvial event.

b) 1 in 2 year coastal + 1 in 200 year fluvial. = 2.920m OD

The proposed openings adjacent to the channel is set at 4.5m OD representing a freeboard of 1.58m during the combined 50 % AEP coastal + 0.5% AEP fluvial event.

Based on the flood levels calculated above, the proposed site is located outside 0.1% AEP flood extent and a freeboard of over 1 meter has been provided. This relates to Flood Zone C and is therefore appropriate for residential and commercial development.

The following are the potential impacts of the proposed scheme during the operational stage:

- Accidental spills of harmful substances such as petrol/diesel or fertilizer during the operational phase, during maintenance landscaped areas.
- Potential for building materials or silts to be washed into the surface water system, causing blockages and pollution.
- Potential for large items to be dropped into the open channel in the riparian strip causing blockage and pollution.

In the event that the Bloody Stream conveys larger volumes of storm water during times of extreme rainfall than predicted the open channel has been designed in accordance with the OPW Planning System and Flood Risk Management Guidelines for Local Authorities to take account of this scenario.

Figure 12.2.19 shows the proposed outfall stream configuration. It can be seen by comparison with Figure 12.2.11 that it is proposed to raise the invert of the Bloody Stream as it traverses through the site, so that it discharges over the Irish Water assets. The introduction of proper inspection chambers will rectify the existing deficiencies in relation to inspection and maintenance. The pre existing tank arrangement which interrupted the flow, will no longer exist and the hydraulic gradient associated with this configuration will ensure proper flows through the Bob Davis culvert and mitigate against silt build up. It is further proposed to line the base of the existing Bob Davis culvert with the concrete V-channel to ensure self washing flows.

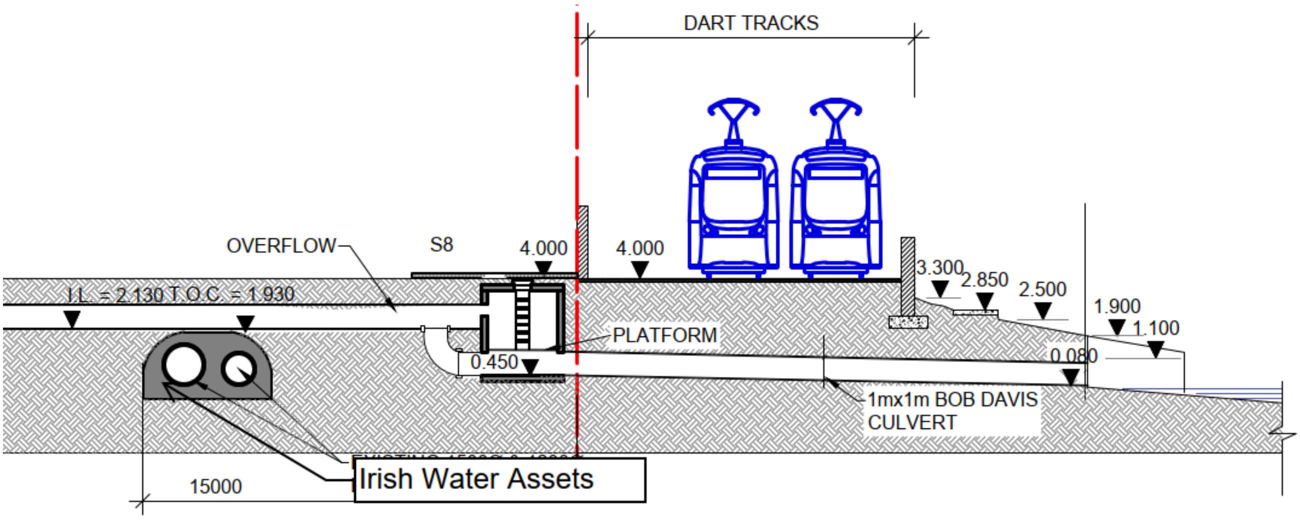


Figure 12.2.19- Proposed Outfall Configuration

The new layout provides more access, increased capacity and on the bases that all mitigation measures are implemented the potential impact of de-culverting stream will have a permanent positive impact.

The flood risk from fluvial, coastal or a combination of both to the site is low.

12.2.7.1 Indirect

The deeper basement footprint under blocks B, C and D to the east of the proposed Riparian strip, sitting as it does in circa 2m of rock will have an imperceptible effect on ground water levels so there are no indirect effects.

12.2.7.2 Cumulative

The site is beside the sea, some tidal response in respect to rising sea levels is expected to influence the ground water. Currently the ground water levels measured range from 1.05m OD to 1.76m OD and the new development plans to have all residential accommodation at 5.2m OD or higher, providing a freeboard of 3.44m OD. Therefore, the risk of flooding due to rising ground water table is low. Carparking and service areas below existing ground levels are contained with watertight concrete construction and access to these areas will be via threshold levels of 4.5mOD and as such are protected to levels in excess of the HEFS clearance criteria adopted and the risk of these areas flooding is low.

The new retaining wall along the northern perimeter will provide additional sea defence after the DART line and the promenade, therefore protecting the site, independent of surrounding infrastructure, to the 4.5mOD level set out.

12.2.8 "Do Nothing" Impact

Bloody Stream – local Flood within the site will remain a potential risk due to system blockage. The flood risk in respect of the overall site will remain low.

Irish Sea – Sea defence will remain reliant on the existing DART Line and the promenade defences.

12.2.9 Mitigation Measures

12.2.9.1 Construction Phase

To reduce the flood risk during the construction phase, the following mitigation measures will be incorporated.

1. The Stream will remain diverted underground.
2. Diversion to be carried out prior to construction works beginning. This removes the possibility of flooding due to the existing blockages.
3. Backup generators and alarm systems will be installed to ensure that in the event water pumps associated with the dewatering system stop, a backup pump system is available to take over.

12.2.9.2 Operational Phase

To reduce the flood risk during the operational phase the following mitigation measures will be incorporated.

1) The capacity of the channel carrying the Bloody Stream across the Howth Road, will be increased from a 450 x 225 culvert to a 450 dia pipe.
2) A water grill is to be provided at the end of the riparian strip to ensure that any large items are captured before entering the underground system.
3) An overflow drain has been provided in the event of a blockage to provide alternative relief route.
4) Opening off riparian strip are set at 4.5m OD. (0.1% AEP + HEFS).
5) Residential accommodation is set above 4.5m OD. (0.1% AEP + HEFS).
6) In the event the overflow is unable to function the surrounding landscape is graded to divert water onto Howth road, away from the development.
7) Access points to the lower areas are to have a raised platform to prevent pluvial flow entering from Howth Road.

8) The stream has been raised a metre higher than it's previous level. This will create a higher velocity and allow better self clearing on exiting onto Baldoyle Bay.
9) Construct a sea defence wall along the coastal perimeter to 4.5m OD. (0.1% AEP + HEFS).
10) Access ramps to the carparks will be set at 0.1% AEP + HEFS prior to descending. This will prevent water from Howth Road entering the lower areas.

All the above reduce the risk of flooding and divert water away from the living areas.

12.2.10 RESIDUAL IMPACTS

The residual impacts relate to the newly created watercourse for the Bloody Stream. This watercourse has been designed to mitigate flooding risk, as set out above.

12.2.11 INTERACTIONS

12.2.11.1 Water

Barrett Mahony have carried out an assessment of the potential impacts of the proposed development will have on the surface water and ground water set out in Chapter 5. This is a requirement to detail how the surface water and ground water will be affected by flooding and mitigation measures required.

12.2.11.2 Public Health

An assessment has been carried out to assess the potential impacts of the Proposed Development on human health within the site. As with all open bodies of water there is a risk of drowning posed to the public. There is a requirement to provide appropriate safety equipment such as life buoys and relevant signage in accessible, visible areas along the riparian strip.

12.2.11.3 Biodiverstiy

Enviroguide have carried out an assessment of the potential impacts of the Proposed Development on the Biodiversity of the Site, set out in Chapter 8. There is a requirement to detail how the habitats, flora and fauna may be impacted a result of flooding at the Proposed Development.

12.2.11.4 Any other Applicable

Maintenance is critical to ensure the areas discussed above are operate as designed. This will be implemented via the management team servicing the development. They will carry out regular servicing/inspections to avoid any blockage build-ups.

12.2.12 DIFFICULTIES ENCOUNTERED IN COMPILING REQUIRED INFORMATION

None

12.2.13 References

1) OPW publication “The Planning System and Flood Risk Assessment Guidelines for Planning Authorities”- WWW.OPW.IE
2) EPA – Guidelines on the information to be contained in environmental impact assessment report – Draft Aug 2017
3) FEM FRAM Study - http://www.floodinfo.ie/
4) Surface Water Management Plan - https://consult.fingal.ie

Appendix 1: Bloody Stream Stormwater Assessment

Bloody Stream Stormwater Assessment

The Bloody Stream flows in a northerly direction from the its source on the Hill of Howth, along the boundary between the Deerpark golf course and Howth Castle. Here the stream flows through a valley lined with 4 No. 2.5m retaining walls designed to control the water in events of heavy rainfall. It then enters an underground system that re-appears before Howth road, creating a water feature as it drops below Howth road and into the underground system. It then crosses the Techrete site, enters a settlement tank system which also services drainage from other developments and outfalls under the DART railway line and into Baldoyle Bay.

The channel length is approximately 1.7km with an upstream level of approximately 100m OD. The catchment area is approximately 132 ha.

Figure 12.2.20-Hydrological and Hydraulic Analysis of Bloody Stream

Hydrological and hydraulic analyses of the Bloody Stream have been undertaken to determine the flow and associated depth in the channel for various return periods.

The flow has been estimated using the Institute of Hydrology Report No. 124 method outlined as below:

Qbar = 0.00108 x Area0.89 x SAAR1.17 x SOIL2.17

Area = 1.3 km2
Soil = 0.45
SAAR = 760mm
Statistical Error = 1.65
Climate Change Factor = 1.3

Qbar (~50% AEP) = 1.12m3/s
Q100 (1% AEP) = 2.20 m3/s
Q200 (0.5% AEP) = 3.27 m3/s
Q1000 (0.1% AEP) = 3.93 m3/s

The proposed channel geometry is approximately 3m wide at the base with 1:3 and 1:2 side slopes at either side.

Using Manning's Equation, the following flow depths have been calculated:

Qbar (~50% AEP) = 0.433m
Q100 (1% AEP) = 0.620m
Q200 (0.5% AEP) = 0.760m
Q1000 (0.1% AEP) = 0.840m

The proposed upstream invert level of the channel is 2.220m OD which gives a top water level of 2.99m OD during the 0.1% AEP fluvial event. The proposed FFL of residential buildings adjacent to the channel is 4.5m OD representing a freeboard of 1.51m.

High Tide Water Level

High water levels near the site have been taken from Point 17 shown on ICPSS map NE/RA/EXT/17 Rev 1.

1 in 2 year (50% AEP) = 2.52m OD (extrapolated value)
1 in 10 year (10% AEP) = 2.75m OD
1 in 200 year (0.5% AEP) = 3.18m OD
1 in 1000 year (0.1% AEP) = 3.34m O

The proposed FFL of residential buildings adjacent to the channel is 4.5m OD representing a freeboard of 1.16m during the 0.1% AEP coastal event.

Joint Probability Analysis

A joint probability analysis has been undertaken for various scenarios to determine the worst-case scenario for combined fluvial and tidal effects. All to be designed to allow for climate change for High End Future Scenario (HEFS) in accordance with OPW.

The scenarios investigated are as follows:

1 in 200 year coastal + 1 in 2 year fluvial
1 in 200-year coastal flood level = 3.18m OD

Depth of water above coastal flood level associated with 1 in 2-year fluvial flow = 0.18m
Combined flood level =3.360 m OD

The proposed FFL of residential buildings adjacent to the channel is 4.5m OD representing a freeboard of 0.22m during the combined 0.5% AEP coastal + 50% AEP fluvial event.

1 in 2 year coastal + 1 in 200 year fluvial.
1 in 2-year coastal flood level = 2.52m OD

Depth of water above coastal flood level associated with 1 in 200-year fluvial flow = 0.4m

Combined flood level = 2.92m OD

The proposed FFL of residential buildings adjacent to the channel is 4.5m OD representing a freeboard of 1.580m during the combined 50 % AEP coastal + 0.5% AEP fluvial event.

Based on the flood levels calculated above and the provision wall provisions provided, the proposed site is located outside 0.1% AEP flood extent. This relates to Flood Zone C and is therefore appropriate for residential and commercial development.

This analysis is carried out to high end future scenario, which includes an allowance for 1 meter sea rise. All openings are set to 4.5m OD, therefore the risk of flooding to the development is low.

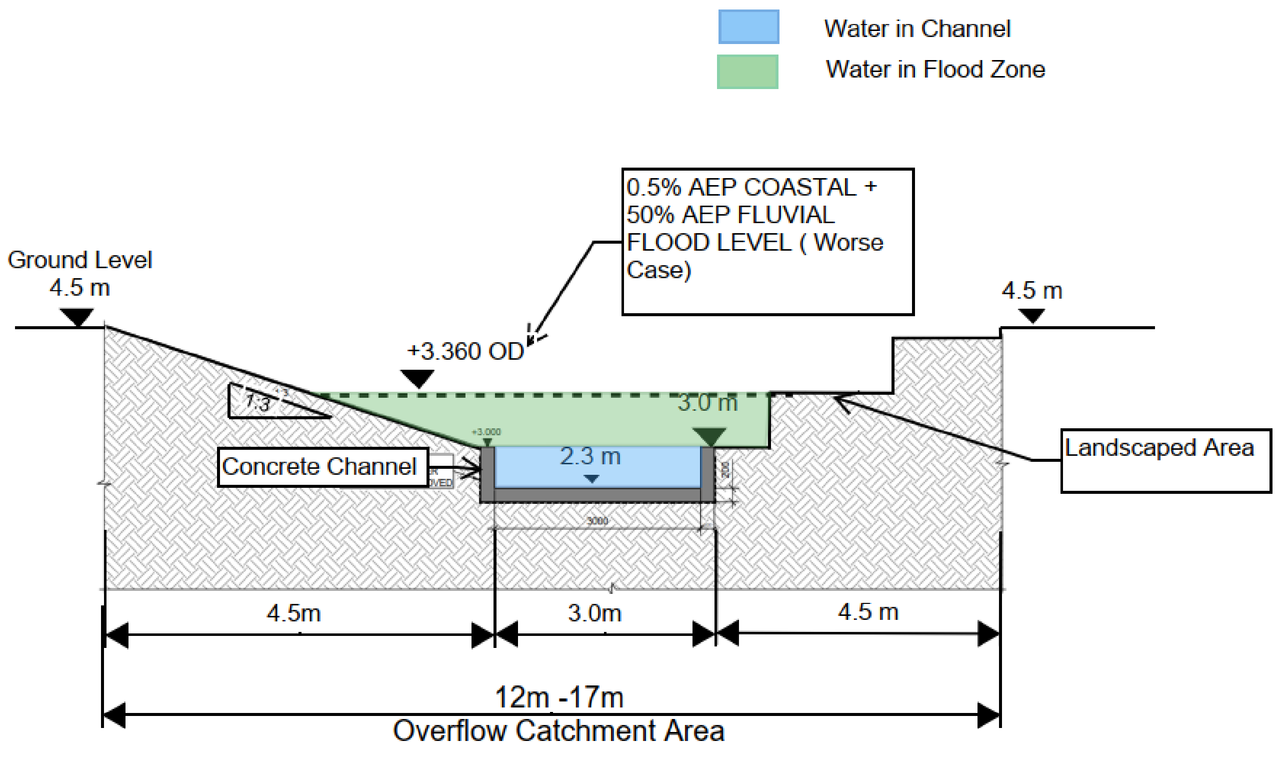
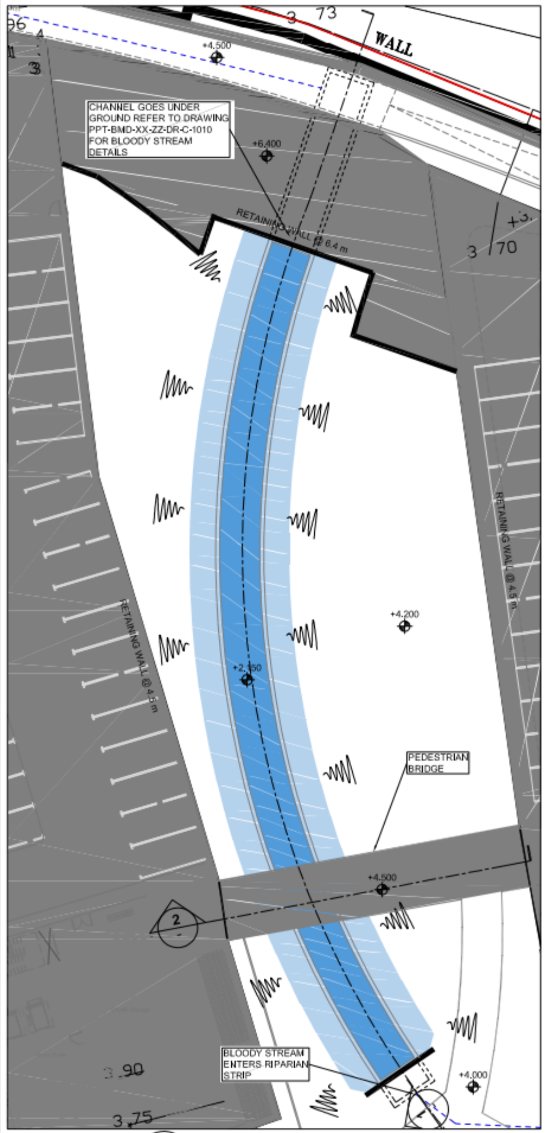


Figure 12.2.21- Fluvial & Coastal Flood Levels

Appendix 2: Flood Risk Assessments



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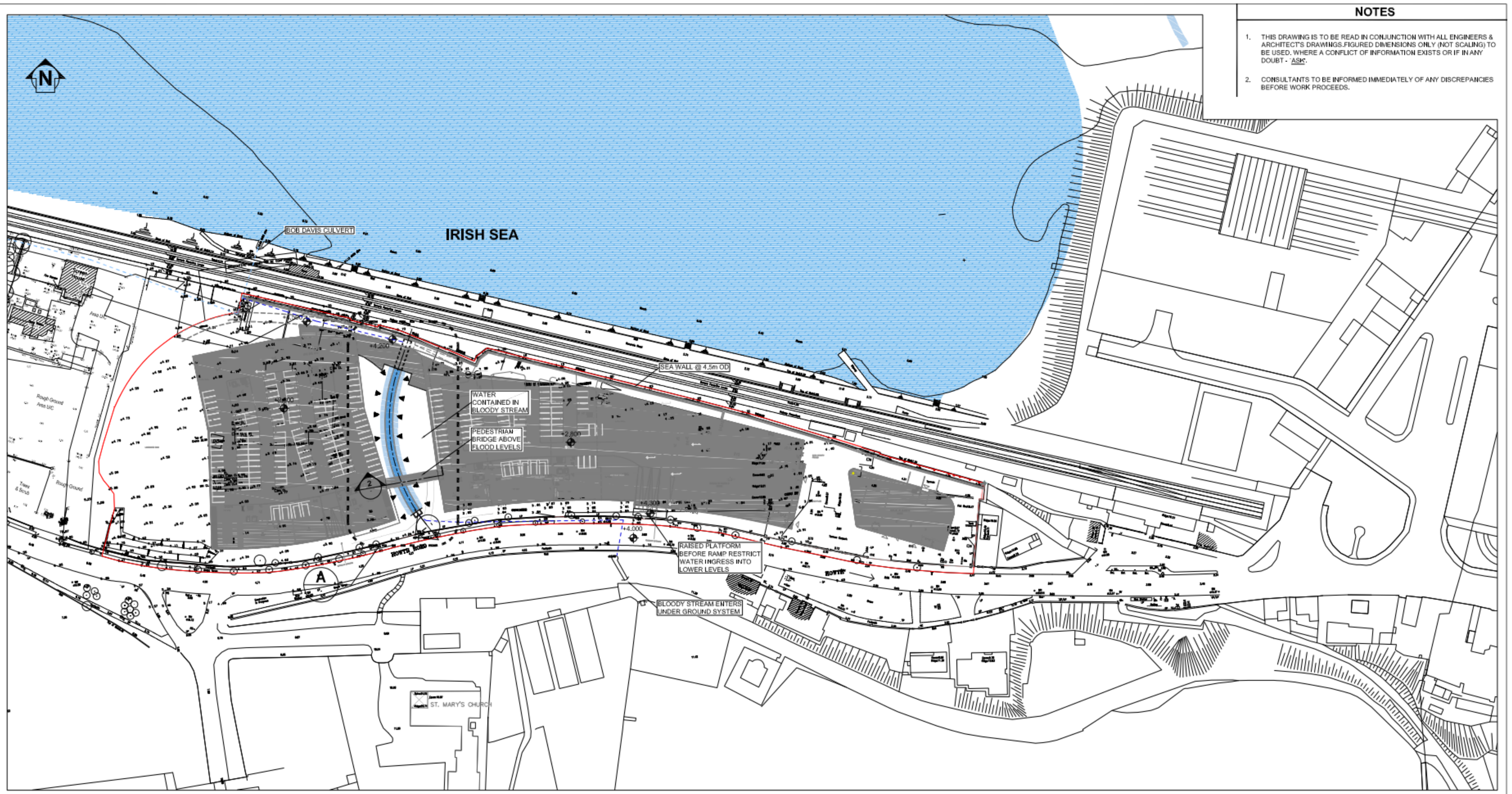

COASTAL & FLUVIAL FLOOD MAP
SCALE @ A1: (NTS)
SCALE @ A3: (NTS)

NOTES

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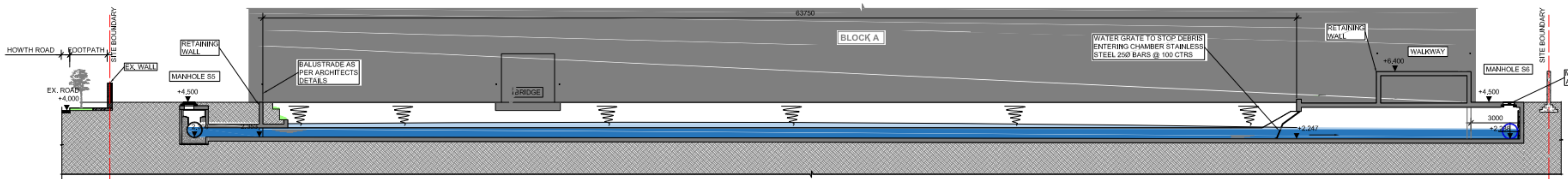

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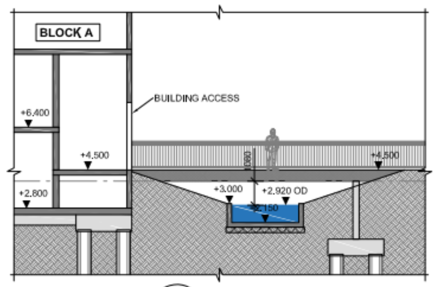

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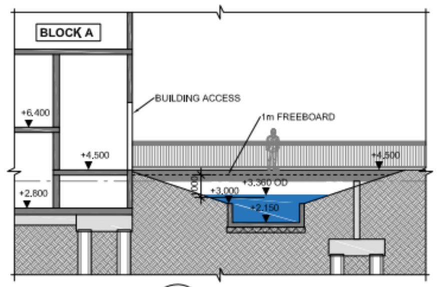
SCALE @ A3: 1:300

1 IN 1000 YEAR FLUVIAL



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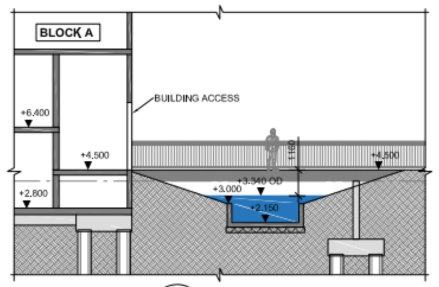
1 IN 200 YEAR FLUVIAL + 1 IN 2 YEAR TIDAL
HIGH END FUTURE SCENARIO (HEFS)



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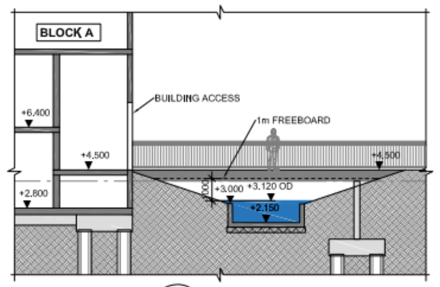

2 SECTION
SCALE @ A1: 1:150
SCALE @ A3: 1:300

1 IN 200 YEAR TIDAL + 1 IN 2 YEAR FLUVIAL
HIGH END FUTURE SCENARIO (HEFS)

LEGEND

BOUNDARY LINE
PROPOSED SW LINE
EXISTING SW LINE

NOTE: FOR FURTHER DETAILS OF THE RIPARIAN STRIP REFER TO DRAWING PPT-BMD-XX-ZZ-DR-C-1010

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P3	10.10.19	ISSUED FOR INFORMATION	MR / MR	VB / VB
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PL1	20.03.19	ISSUED FOR PLANNING	MR / MR	VB / VB
P1	08.03.19	ISSUED FOR COMMENT	MR / MR	VB / VB

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PROJECT TITLE
CLAREMONT PROJECT

BM PROJECT No.
18.386

MODEL REFERENCE
PPT-BMD-XX-ZZ-DR-C-1000.dwg

MODEL REV.
P01

SUITABILITY
S0

DRAWING TITLE
FLOOD RISK ASSESSMENT
COASTAL & FLUVIAL

DRAWING No.
PPT-BMD-XX-ZZ-DR-C-1006

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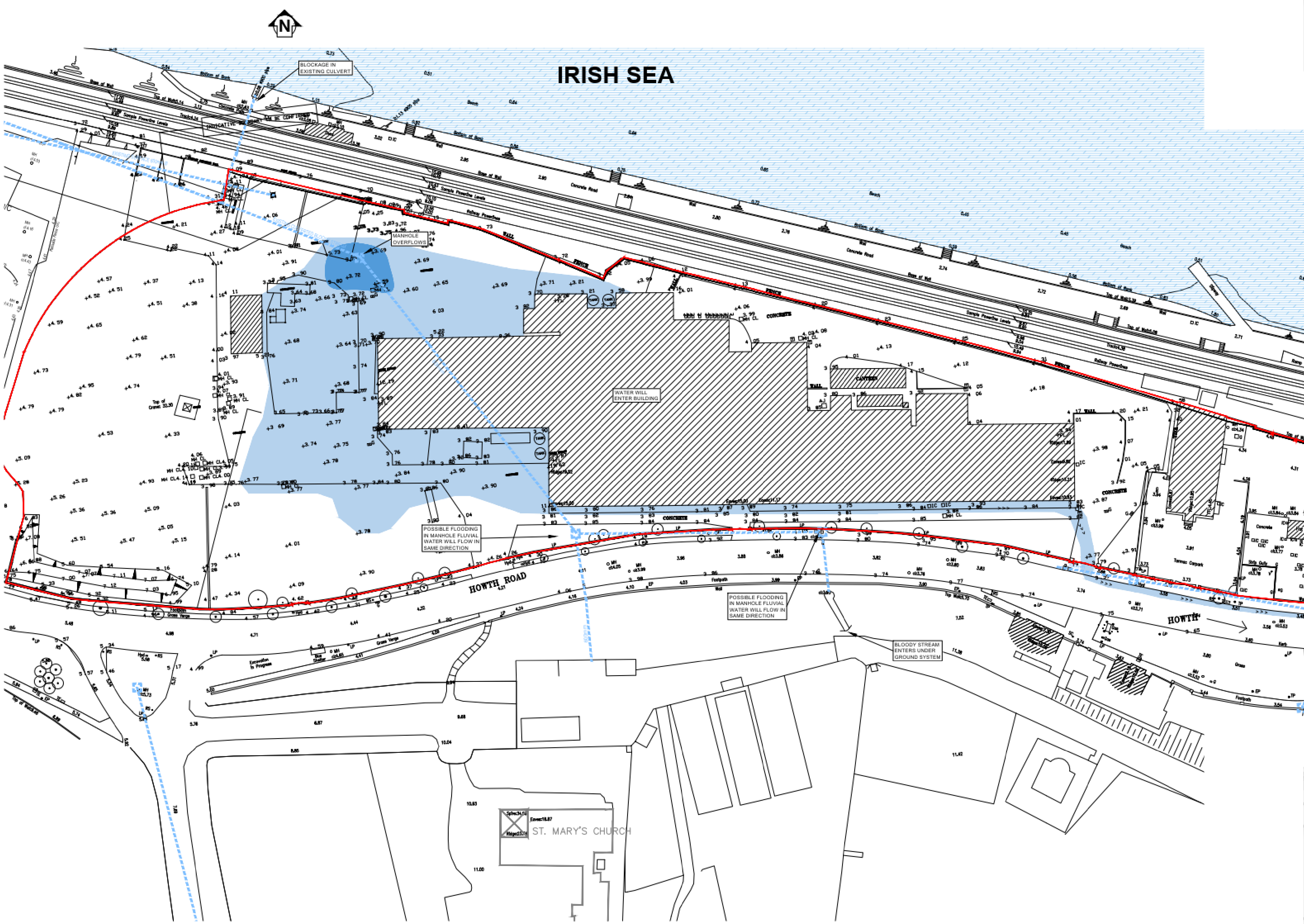

EXISTING LAYOUT BLOCKAGE IN CULVERT FLOOD SITUATION

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DRAWING TITLE
FLOOD RISK ASSESSMENT
EXISTING LAYOUT BLOCKAGE IN CULVERT FLOOD SITUATION

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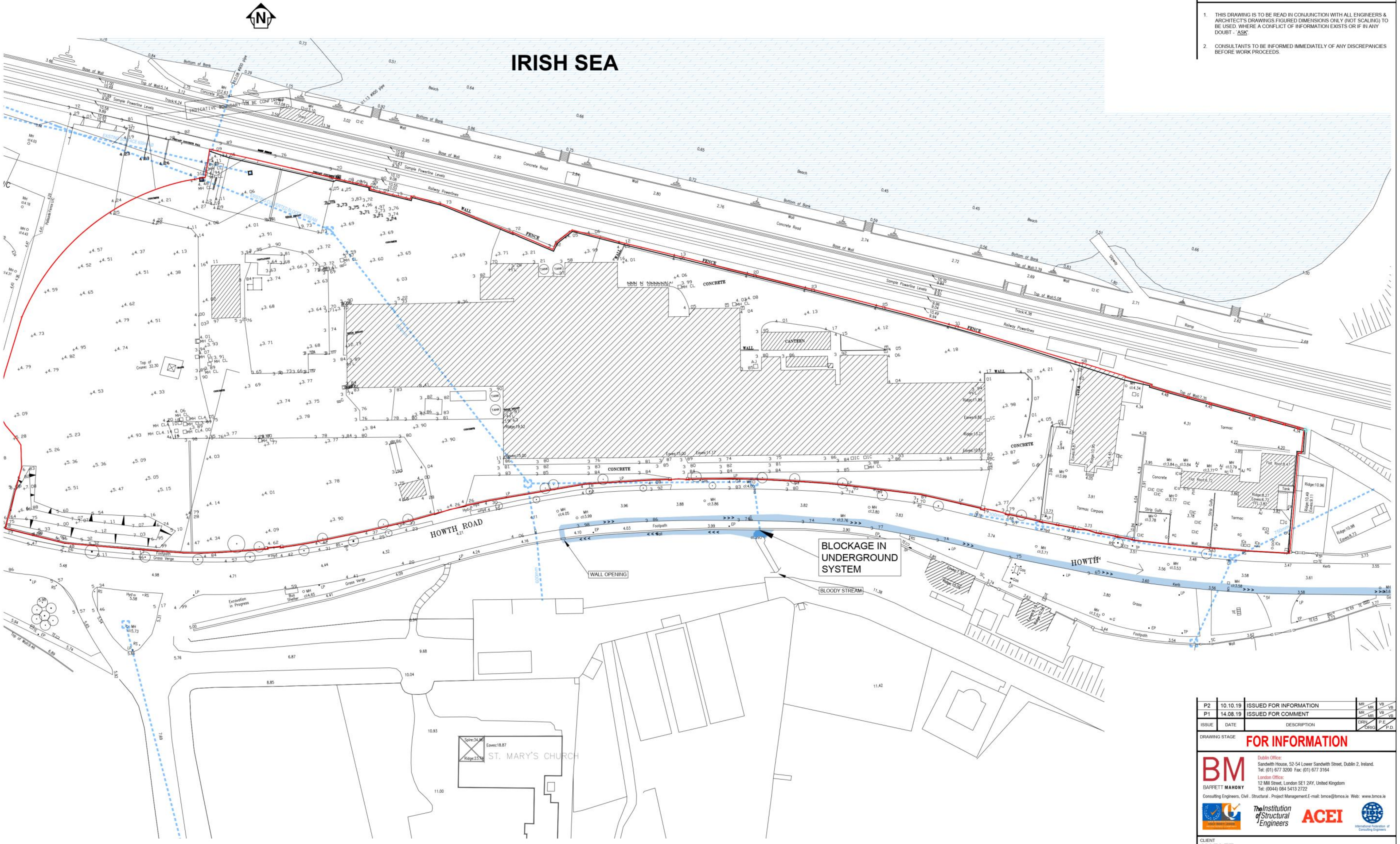
ISSUE **P2**



EXISTING BLOCKAGE BEFORE SITE

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CLAREMONT PROJECT	**18.386**

MODEL REFERENCE	MODEL REV.	SUITABILITY
PPT-BMD-XX-ZZ-DR-C-1000.dwg	**P01**	**S0**

DRAWING TITLE
FLOOD RISK ASSESSMENT
EXISTING BLOCKAGE BEFORE SITE

DRAWING No.	ISSUE
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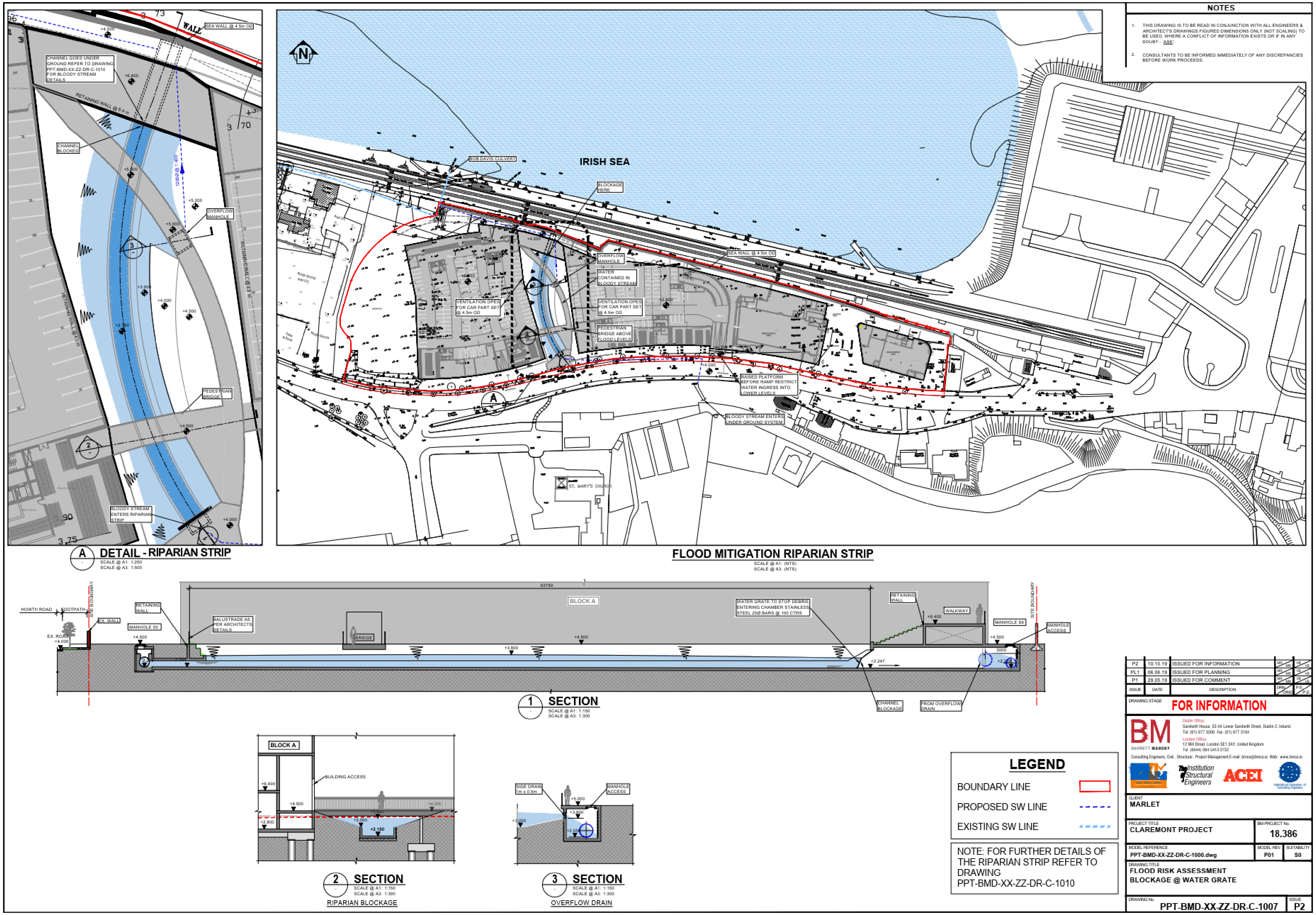
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1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - 'ASK'.
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IRISH SEA
BOB DAVIS CULVERT
BLOCKAGE HERE
SEA WALL @ 4.5m OD
OVERFLOW MANHOLE
WATER CONTAINED IN BLOODY STREAM
VENTILATION OPES FOR CAR PART SET @ 4.5m OD
PEDESTRIAN BRIDGE ABOVE FLOOD LEVELS
RAISED PLATFORM BEFORE RAMP RESTRICT WATER INGRESS INTO LOWER LEVELS
BLOODY STREAM ENTERS UNDER GROUND SYSTEM
ST. MARY'S CHURCH
CHANNEL GOES UNDER GROUND REFER TO DRAWING PPT-BMD-XX-ZZ-DR-C-1010 FOR BLOODY STREAM DETAILS
CHANNEL BLOCKED
RETAINING WALL @ 6.4 m
OVERFLOW MANHOLE
PEDESTRIAN BRIDGE
BLOODY STREAM ENTERS RIPARIAN STRIP
A DETAIL - RIPARIAN STRIP
SCALE @ A1: 1:250
SCALE @ A3: 1:500
FLOOD MITIGATION RIPARIAN STRIP
SCALE @ A1: (NTS)
SCALE @ A3: (NTS)
HOWTH ROAD
FOOTPATH
EX. WALL
EX. ROAD +4.000
RETAINING WALL
MANHOLE S5
BALUSTRADE AS PER ARCHITECTS DETAILS
BLOCK A
BRIDGE
WATER GRATE TO STOP DEBRIS ENTERING CHAMBER STAINLESS STEEL 25Ø BARS @ 100 CTRS
RETAINING WALL
WALKWAY
MANHOLE S6
MANHOLE ACCESS
SITE BOUNDARY
CHANNEL BLOCKAGE
FROM OVERFLOW DRAIN
1 SECTION
SCALE @ A1: 1:150
SCALE @ A3: 1:300
BLOCK A
BUILDING ACCESS
2 SECTION
SCALE @ A1: 1:150
SCALE @ A3: 1:300
RIPARIAN BLOCKAGE
SIDE DRAIN
MANHOLE ACCESS
3 SECTION
SCALE @ A1: 1:150
SCALE @ A3: 1:300
OVERFLOW DRAIN
LEGEND
BOUNDARY LINE
PROPOSED SW LINE
EXISTING SW LINE
NOTE: FOR FURTHER DETAILS OF THE RIPARIAN STRIP REFER TO DRAWING PPT-BMD-XX-ZZ-DR-C-1010
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PL1 06.06.19 ISSUED FOR PLANNING
P1 29.05.19 ISSUED FOR COMMENT
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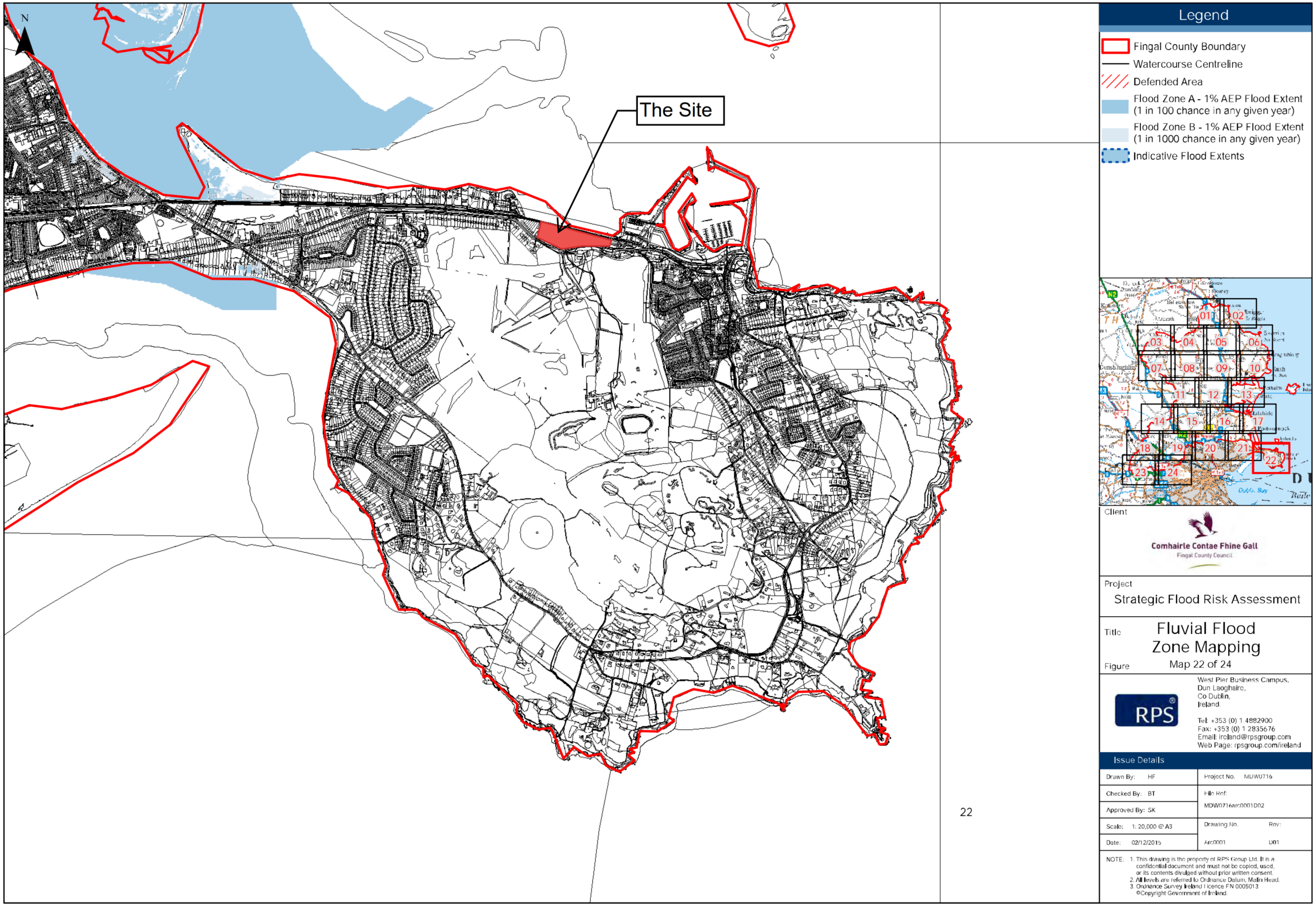
BARRETT MAHONY
CLIENT MARLET
PROJECT TITLE CLAREMONT PROJECT
BM PROJECT No. 18.386
MODEL REFERENCE PPT-BMD-XX-ZZ-DR-C-1000.dwg
MODEL REV P01
SUITABILITY S0
DRAWING TITLE FLOOD RISK ASSESSMENT BLOCKAGE @ WATER GRATE
DRAWING No. PPT-BMD-XX-ZZ-DR-C-1007
ISSUE P2

Appendix 3: Fluvial Flood Plan & Coastal Flood Plan


N
The Site
22
Legend
Fingal County Boundary
Watercourse Centreline
Defended Area
Flood Zone A - 1% AEP Flood Extent
(1 in 100 chance in any given year)
Flood Zone B - 1% AEP Flood Extent
(1 in 1000 chance in any given year)
Indicative Flood Extents
Client
Comhairle Contae Fhine Gall
Fingal County Council
Project
Strategic Flood Risk Assessment
Title
Fluvial Flood
Zone Mapping
Figure
Map 22 of 24
RPS
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Issue Details
Drawn By: HF
Project No. MDW0716
Checked By: BT
File Ref:
MDW0716arc0001D02
Approved By: SK
Scale: 1: 20,000 @ A3
Drawing No.
Rev:
Date: 02/12/2015
Arc0001
D01
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2. All levels are referred to Ordnance Datum, Malin Head.
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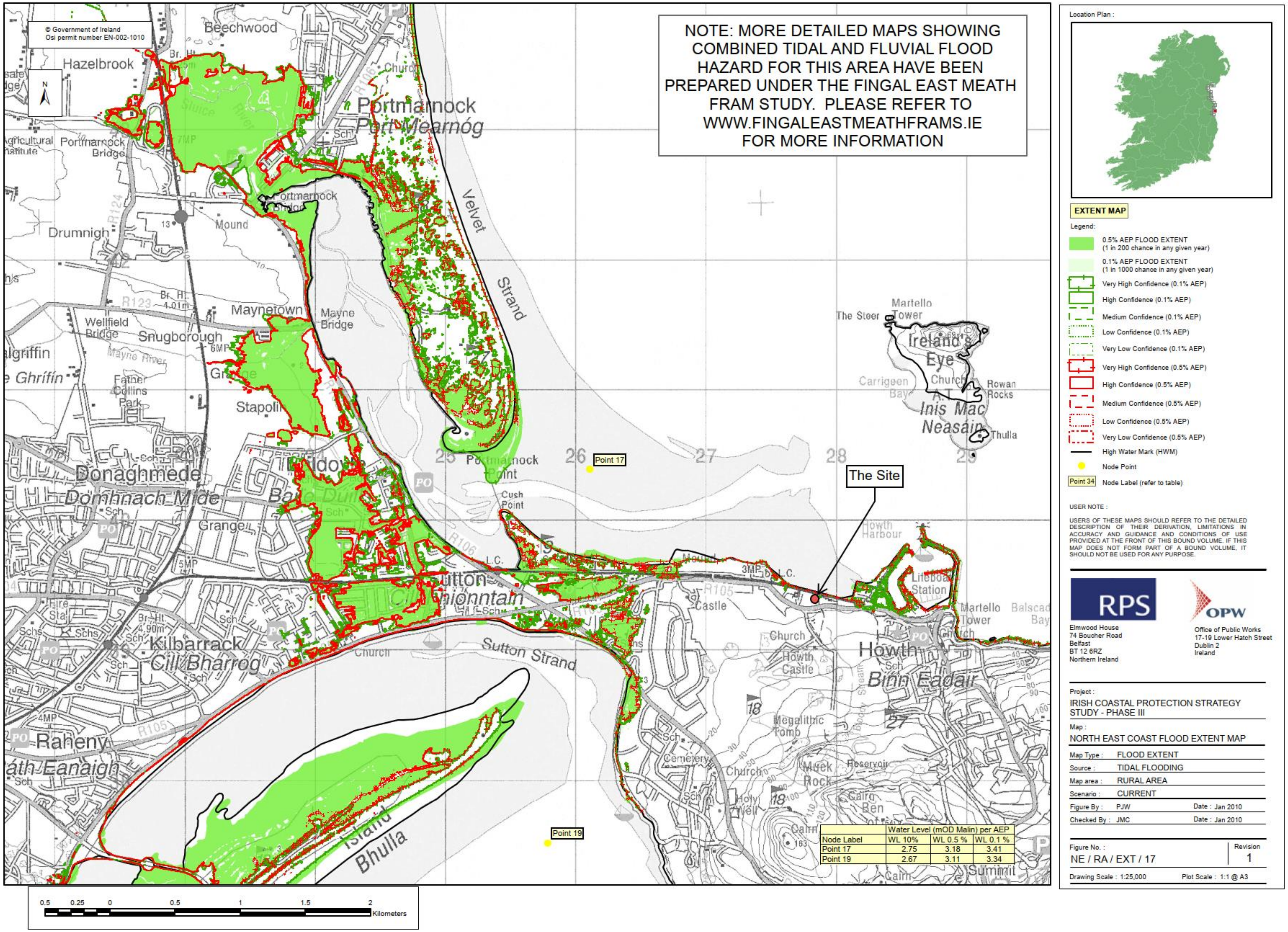

	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5 %	WL 0.1 %
Point 17	2.75	3.18	3.41
Point 19	2.67	3.11	3.34

Chapter 13: Interactions

13.1 INTRODUCTION

The construction, operational and cumulative impacts of the Proposed Development have been assessed within each chapter of the EIAR. This chapter considers the significant interactions of impacts between each of the separate disciplines. Table 13.1 provides a matrix summarising potential significant interactions.

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. Discussions of the nature and effect of the impact is primarily undertaken within each of the relevant chapters, while this chapter identifies the most important potential interactions.

13.2 STUDY METHODOLOGY

A specific section on Interactions is included in each of the environmental topic chapters of the EIAR. This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000, as amended, and Part 10, and Schedules 5, 6 and 7 of the Planning and Development Regulations 2001-2018.

Having regard to the approach taken, the aspects of the environment likely to be significantly affected by the Proposed Development, during both the construction and operational phases, have been considered in detail in the relevant Chapters of this EIAR document. In addition, the interactions between one topic and another have been discussed under each topic Chapter by the relevant specialist consultant, who has assessed the potential impacts from their discipline on other disciplines. This chapter brings together all the individual assessments into one place.

13.3 INTERACTIONS

This section identifies the potential interactions that could occur during construction and operation of the Proposed Development.

13.3.1 POPULATION & HUMAN HEALTH – CHAPTER 3

Population & Human Health has the potential to interact with several disciplines of the EIAR. These are:

<u>Land, Soil and Geology</u> - Exposure of construction workers to contaminated soils has the potential to affect human health. Mitigation measures are put forward to address these impacts. No residual long term impacts on human health are expected.

<u>Air & Climate</u> – Construction stage dust emissions have the potential to impact human health, however, it was determined that the risk to human health is low for all relevant construction activities. Traffic movements during construction and operation are also considered low risk. The impacts of wind are not considered significant. No significant impacts are expected to arise in terms of access to daylight or sunlight from existing and future residents.

<u>Noise and Vibration</u> – During construction there is a risk of noise exceeding acceptable levels for construction. However, the implementation of the mitigation measures and noise monitoring programmes will ensure there are no significant or residual impacts.

Landscape and Visual Assessment – While the change in the land the landscape from current conditions will be notable and will enhance the entrance to Howth.

Material Assets – Traffic will have an impact on human health, both during construction and operation arising from fumes and noise from combustible engines. In relation to Water, there is the risk of migration of surface contaminants during construction. These will be subject to control as set out in the mitigation measures. Waste will impact on human health and these matters have been considered both in construction and operation, as set out in the relevant mitigation measures.

Risk Management – The issues raised in relation to safety during construction as well as risk of flooding, and fire during operation were considered. The risks are considered slight due to the operation of health and safety codes, fire codes and measures in-built in the project design.

13.3.2 LAND, SOILS & GEOLOGY – CHAPTER 4

During the construction phase excavated soil, stone, rock and made ground (c. 70,551m^3) will be generated from the excavations required to facilitate construction of the basement, new foundations and the installation of underground services. It is envisaged that most excavated material will be taken offsite. This material will be taken for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 11.2 and the requirements of the C&D Waste Management Plan will ensure the effect is ***long-term, imperceptible*** and ***neutral.***

Interactions identified in this Chapter include:

Human Health – Exposure of construction workers to contaminated soils has the potential to affect human health. Mitigation measures are included in this chapter and Chapter 14 – Mitigation Measures.

Air & Climate – Dust generation from exposed soils has the potential to affect air quality. Mitigation measures for Air Quality are included in this Chapter and Chapters 6 (Air, Climate and Microclimate), 8 (Biodiversity) and 14 (Mitigation Measures).

Noise and Vibration - Earthworks activities associated with the Proposed Development have the potential to affect Noise and vibration. Excavations and piling works can generate noise resulting from construction plant. Mitigation measures for Noise and Vibration are included in Chapters 7 (Noise and Vibration) and 8 (Biodiversity).

Water – Runoff from exposed soils or contaminated leachate has the potential to affect water receptors. Mitigation measures to manage this risk are included in Chapter 5 (Water, Hydrology and Hydrogeology) and Chapter 8 (Biodiversity).

Traffic – The volumes of surplus soils generated by the Proposed Development will affect construction stage traffic generation. Measures to optimise design and minimise material generation are detailed in Chapters 3 (Population and Human Health) and 8 (Biodiversity). Measures to mitigate against construction stage traffic impacts are detailed in Chapter 11 (Material Assets).

Waste – The volumes of surplus soils generated by the Proposed Development will affect waste generation. Contamination levels in excavated soils affect disposal methods. Mitigation Measures to optimise design, minimise material generation and manage waste are detailed in Chapter 8 & Chapter 11.

13.3.3 WATER, HYDROLOGY AND HYDROGEOLOGY – CHAPTER 5

Interactions identified include:

Material Assets

BCME have carried out an assessment of the potential impact of the Proposed Development on the Material Assets and water utilities. Groundwater dewatering at the Site will be required during bulk excavation works to allow construction of the basement levels at the Site. It is proposed that treated groundwater will be discharge to the public foul sewer network only under a temporary discharge consent from IW.

Land, Soil, Geology and Hydrogeology

Enviroguide have carried out an assessment of the potential impact of the Proposed Development on the existing land, soils, geological and hydrogeological environment. This assessment emphasised the excavation and removal off-site of soil and bedrock, which will result in the removal of the primary contaminant source associated with the current Site condition. It also addresses potential accidental release of construction materials or contaminated materials to ground or water during construction works and importation of fill and aggregates. Measures for the mitigation of these impacts are set out in Chapter 4 (Land, Soil and Geology.)

Biodiversity

Enviroguide have carried out an assessment of the potential impacts of the Proposed Development on the Biodiversity of the Site, with emphasis on habitats, flora and fauna which may be impacted as a result of construction activities, including exaction works and groundwater dewatering, at the Proposed Development. It also 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. Proposed measures for the mitigation of these impacts are set out in Chapter 8 (Biodiversity).

Waste

Enviroguide have carried out an assessment of the potential impacts associated with the waste that will be generated during the Construction Phase as set out in Chapter 11 Material Assets - Waste. There will be a requirement for the handling and storage of waste in addition during the Construction Phase of the Proposed Development.

13.3.4 Air & Climate & Microlclimate – Chapter 6

Air Quality does not have a significant number of interactions with other parameters. The most important interaction is between air quality and human beings. Interactions between air quality and traffic also have the potential to be significant.

Interactions identified include;

Human Health – Construction stage dust emissions have the potential to impact human health, however, it was determined that the risk to human health is low for all relevant construction activities. Best practice dust mitigation measures will be implemented on site and as such impacts to human health are predicted to be imperceptible and short-term.

Traffic – Traffic related emissions have the potential to impact air quality, however, none of the road links impacted by the Proposed Development satisfied the assessment criteria and it was therefore determined that the impact to air quality is imperceptible for the long and short term.

13.3.5 Noise & Vibration – Chapter 7

In compiling this impact assessment, reference has been made to the project 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. Noise and vibration during construction can impact on human health for both construction workers, residents and the population in the vicinity of the site. However, the mitigation measures proposed in the chapter ensure that there will be no significant population human health issues during this period and none in the operational period.

13.3.6 Biodiversity – Chapter 8

Interactions identified include;

Land and Soils – Contaminated soils have been identified on site during ground investigations and have the potential to enter surface water network during construction. Mitigation measures for Land and Soils are included in Chapter 4 and Chapter 8 (Biodiversity) in addition to the accompanying Natura Impact Statement.

Air & Climate – Dust generation from exposed soils has the potential to affect air quality. Mitigation measures for Air Quality are included in Chapter 4, (Land, Soil and Geology) and Chapter 6, (Air Climate and Microclimate).

Noise and Vibration - Earthworks activities associated with the Proposed Development have the potential to affect Noise and vibration. Excavations and piling works can generate noise resulting from construction plant. Mitigation measures for Noise and Vibration are included in Chapter 7.

Water – Runoff from exposed soils or contaminated leachate has the potential to affect sensitive receptors with direct hydrological links to downstream conservation sites. Mitigation measures to manage this risk are included in Chapter 5, Water, Hydrology and Hydrogeology and Chapter 8, Biodiversity, in addition to the accompanying Natura Impact Statement.

Traffic – The volumes of surplus soils generated by the Proposed Development will affect construction stage traffic generation. Measures to optimise design and minimise material generation are detailed in Chapter 5, (Water, Hydrology and Hydrogeology). Measures to mitigate against construction stage traffic impacts are detailed in Chapter 10 (Landscape and Visual Impact).

Waste – The volumes of surplus soils generated by the Proposed Development will affect waste generation. Contamination levels in excavated soils affect disposal methods. Mitigation Measures to optimise design, minimise material generation and manage waste are detailed in Chapter 4, Land, Soil and Geology & Chapter 11, (Material Assets)

13.3.7 ARCHAEOLOGY, ARCHITECTURE & CULTURAL HERITAGE – CHAPTER 9

13.3.7.1 ARCHAEOLOGY

There are potential interactions with the following specialist elements of the project during the construction phase: Architectural and Cultural Heritage, Land, Soils and Geology, Water, Hydrology and Hydrogeology.

Mitigation measures in Chapter 14 will deal with these matters.

13.3.7.2 ARCHITECTURE & CULTURAL HERITAGE

There are potential interaction with the following specialist elements of the project during the construction phase: Archaeology, Land, Soils and Geology, Water, , Hydrology and Hydrogeology and Landscape and Visual Impact Assessment.

Mitigation measures in Chapter 14 will deal with these matters.

13.3.8 LANDSCAPE AND VISUAL IMPACT – CHAPTER 10

The Landscape and Visual Impact Assessment primarily takes into account the proposed architectural and landscape design for the project. However, consideration of this has also been made in the context of the archaeology and the architectural and cultural heritage of the Site.

13.3.9 MATERIAL ASSETS: TRAFFIC, WASTE, & UTILITIES – CHAPTER 11

Air, Noise, Biodiversity, Human Health - The traffic impacts, which are be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified in section **Error! Reference source not found.**. Increased traffic flows during construction, notwithstanding the mitigation measures outlined, have short term temporary impacts in respect of air, noise, biodiversity and human health.

Operational Phase

The Proposed Development includes the delivery of a range of new transport infrastructure which caters for all modes of travel. Pedestrians and cyclists will benefit from this new range of transport infrastructure as these will develop connections with existing urban areas which will enhance the attractiveness, safety and convenience of active modes of travel for journeys both (i) to/from the Proposed Development and (ii) existing urban areas who will be able to benefit from the new shorter routes through the Site.

Increased traffic flows resulting from the Proposed Development, notwithstanding the mitigation measures outlined, do have an impact in respect of air, noise, biodiversity and human health and these impacts are discussed in the appropriate chapters of this EIAR - (Chapters 3 and 8.)

13.3.9.2 WASTE –

LAND AND SOILS

Excavation of soil to facilitate the Proposed Development will include the removal of contaminated and uncontaminated soil from the Site. The mitigations measures set out together with adherence to the CEMP and the CMP for the Proposed Development will ensure the impact is imperceptible with long term positive effect. Land and Soils is fully assessed in Chapter 4 Land Soil, Geology, Hydrogeology of this EIAR.

TRAFFIC AND TRANSPORTATION

There will be a temporary increase in local traffic due to the movement of HGVs associated with waste removal during the Construction Phase of the Proposed Development. There will be a long term increase in vehicle movements associated with waste collection activity during the Operational Phase but these movements will be imperceptible in the context of the overall traffic increase which has been addressed in Chapter 11 (Material Assets, Part 1 Traffic) of this EIAR. Provided the mitigation measures detailed in Chapter 11 (Material Assets, Part 1 Traffic) and the requirements of the OWMP accompanying this planning application are adhered to, the impact will be imperceptible with short to long term neutral effects.

AIR

There is the potential for dust arising from stockpiles of waste during the Construction Phase and from HGV movements during both the construction and operational phases. This has been adequately mitigated and has been assessed in Chapter 6 Air Quality and Climate of this EIAR. The overall impact of waste on air is not significant with a short term negative effect.

ECOLOGY

There is the potential for dust arising from stockpiles of waste during the Construction Phase and from HGV movements during both the construction and operational phases. This has been adequately mitigated and has been assessed in Chapter 6 Air Quality and Climate of this EIAR. Impacts on removal of contaminated material from the Site on water has been assessed in Chapter 4 Land Soil, Geology, Hydrogeology. The overall effect of the Proposed Development on ecology has been assessed in Chapter 8, Biodiversty of this EIAR and in the Natura Impact Statement accompanying this planning application.

The overall impact of waste on ecology is imperceptible with a short term negative effect.

NOISE

Noise from waste management activities has been assessed in Chapter 7 Noise and Vibration of this EIAR.

The overall impact of waste on noise is not significant with a short term negative effect.

13.3.10 Risk Management

There are interactions with Population and Human Health, in terms of risk of accidents and Noise; Land, Soils, and Geology, Surface Water, in terms of risk of pollution; Climate and Air in terms of dust and fumes and Material Assets, Traffic and Transport (potential for accidents during construction). However, subject to implementation of mitigation measures, good working practises and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

The Human Health Risk Assessment (Golders Associates) has identified contaminated soils which may pose an unacceptable risk to human health. The methodology described in the Materials Management & Remedial Strategy Plan mitigates these hazards to human health, via removal of contaminated material and non-hazardous soil as a physical barrier, in addition to other management controls.

In terms of human health, the operational impacts are likely to be not significant. During operation, there is the potential for a number of facility and traffic related emissions (e.g. NO^2, PM^{10}, $PM^{2.5}$, CO, benzene, NOx, VOCs and CO^2) to the atmosphere. These are likely to have an imperceptible impact on local air quality.

Flood Risk Assessment

Biodiversity – Contamination of water receptors has the potential to affect aquatic ecology. Mitigation measures to manage this risk are included in Chapter 4 and Chapter 8.

Land & Soils – Runoff from exposed soils or contaminated leachate has the potential to affect water receptors. Mitigation measures to manage this risk are included in Chapter 5 and Chapter 8.

13.4. SUMMARY TABLE OF INTERACTIONS

The table below sets out a broad summary of the interactions described above.

Table 13.1: Interactions

Interaction	Population & Human Health		Biodiversity		Land & Soils		Air & Climate		Noise & Vibration		Water		Archaeology, Architecture & Cultural Heritage		Landscape		Material Assets: Traffic, Waste, & Utilities		Risk Asssesment	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Population & Human Health			✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓
Biodiversity					✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗	✓	✗	✓	✗
Land & Soils							✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✓	✗	✓	✗
Air & Climate									✓	✓	✓	✓	✗	✗	✗	✗	✓	✓	✓	✗
Noise & Vibration											✓	✓	✓	✓	✓	✗	✓	✓	✓	✗
Water													✓	✓	✓	✓	✓	✓	✓	✓
Archaeology, Architecture & Cultural Heritage															✓	✓	✓	✗	✓	✗
Landscape																	✗	✗	✗	✗
Material Assets: Traffic, Waste, & Utilities																			✓	✗
Risk Assessment																				

✓ Interaction

✗ No Interaction

13.5 CONCLUSION

The interactions between different disciplines have been examined and considered within the EIAR team and sufficient mitigation measures have been put in place to ensure that no compounding of impacts will occur.

Chapter 14
Mitigation Measures

14.1 INTRODUCTION

The purpose of this chapter is to summarise the mitigation measures proposed in each chapter.

14.2 POPULATION AND HUMAN HEALTH

In order to protect the amenities enjoyed by nearby residents, premises and employees, a Construction and Environmental Management Plan (including traffic management) should be prepared by the contractor and implemented during the construction phase.

14.3 LAND, SOIL AND GEOLOGY

Mitigation measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include:

- Management and control of soil and bedrock during bulk excavation and export from the Proposed Development;
- Management and control of water during construction including dewater of groundwater for the construction of the basement
- Management and control of imported soil and aggregates from off-site sources;
- Fuel and Chemical handling, transport and storage;
- Accidental release of contaminants – notify relevant statutory authorities

Control and Management of Soil and Bedrock

Managing Contaminated Soil and Excavation of Contamination Hot Spots

Prior to excavation, a detailed review of the final cut and fill model will be carried out to confirm cut and fill volumes. Detailed quantities of material to be excavated will be verified through accurate survey techniques by the groundworks contractor at the construction phase. Confirmation of final hotspot volumes will be provided and incorporated into an excavation plan.

The specific types and quantities of waste are detailed in Chapter 11 – Material Assets Waste of this EIAR.

As set out in Section 4.3.15, a number of contaminated soil and hazardous soil hotspots on-site that are required to be excavated for off-site for disposal. It is noted that a large portion of the Site requires some form of excavation works. Many of the hotspots that require remediation fall within the excavation areas and these will be removed off-site for appropriate disposal at suitably licensed waste facilities. The main areas for hotspot removal relate to asbestos and TPH. The asbestos and TPH hotspots are indicated in the MMRP (Golder, 2019c) report and identified in plans provided in Volume 3 Chapter 4 Appendix A.

It is noted that the delineation of hazardous hot spots as identified for excavation reports will need to be completed once buildings and the Site infrastructure are removed. The extent of the hazardous hotspots will be determined through additional testing to refine the volume of hazardous materials to be exported off-site for disposal.

The Contractor will undertake their works such that all potentially contaminated hotspots can be removed without any risk of environmental impact. An excavation plan will be established by the contractor prior to the commencement of any excavation. The plan shall take into account the findings of the Site Investigation Reports produced by Golder (refer to Volume 3 Chapter 4 Appendix A).

It is intended that the basement bulk excavation will be a 'dry excavation' through a robust methodology for installation of the secant pile wall and dewatering methodologies that will be developed by the contractor in accordance with the recommendations of the Dewatering Design (Minerex, 2019) report (Volume 3 Chapter 4 Appendix C).

Where appropriate, suitable batters or retained vertical walls will need to be maintained on excavation faces to ensure the stability of adjacent ground, structures and services. During excavation adjacent to existing/nearby structures, roadways, services etc., the construction of temporary support may be required, or ground may need to be excavated then backfilled in stages to ensure that contamination is removed without affecting the stability of structures etc. (i.e. panel excavation).

A sampling and analysis plan will be provided by the Environmental Consultant appointed by the Contractor which will address all required sampling and analysis following the removal of the buildings and infrastructure on the Site. Excavation of these areas will not take place until the Site has been investigated and the soil has been classified.

Verification sampling will be carried out to confirm the findings in the Golder, 2019a site investigation report and to verify the removal of the contaminated material. This shall be carried out in accordance with the sampling and analysis plan for the development. The removal of contaminated soil will be supervised by a competent and qualified consultant.

Records will be maintained according to the waste records procedures and including photographs of the removal of contaminated material. A log of all contaminated material removed will be maintained on-site.

All contaminated soil from excavations will be handled in accordance with the procures outlined in the Waste Management and Management of Stockpile sections of the OCEMP (Enviroguide, 2019a) and must have due regard to the procedures for stockpile management outlined in the MMRP (Golder 2019c) (refer to Chapter 4 Appendices) report in order to protect ground and surface water and minimise airborne dust.

Asbestos Waste Management

An asbestos survey has been completed which identified asbestos-containing materials (ACMs) on-site; in the buildings and in the made ground. All works will be carried out by a suitably qualified specialist contractor. The asbestos removal contractor/Demolition contractor will prepare an asbestos removal plan of work in accordance *the Safety Health and Welfare at Work (Exposure to Asbestos) Regulations* 2006-2010.

Asbestos contaminated soil hotspots are largely classified as non - hazardous in nature and also fall largely within the excavation areas that are to be removed off-site for disposal to an appropriately licenced landfill.

It is noted that Site design has incorporated that some hotspots will remain on-site in accordance with the findings MMRP (Golder, 2019c) report through engineering barriers such as maintenance of a clean soil barrier >1m below finished level or construction of an impermeable barrier such as paved finishes, this relates to human health related hotspots only.

Waste asbestos will be removed by an authorised and licenced contractor who is competent and experienced in the area of asbestos removal. Asbestos containing waste will only be removed from the Site by a haulier permitted to transport this waste and shall be delivered to an appropriately licenced hazardous waste management facility.

The normal measures required to prevent airborne dust emissions and associated nuisance arising from site work will be in place including measures to prevent uncovered soil drying out leading to wind pick up of dust and mud being spread onto the local road network. This will require additional wetting at the point of dust release, dampening down of uncovered soil during dry weather and wheel cleaning for any vehicles leaving the Site.

Vehicles transporting material with potential for dust emissions to an off-site location shall be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

Excavation of Bedrock

Monitoring will be undertaken to ensure that there are no impacts on geological structure associated with rock breaking. It is noted that the quantity of bedrock removal will be localised.

Importation of Soil and Aggregates

Contract and procurement procedures will ensure that all aggregates and fill material required for the development are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations.

The importation of aggregates or topsoil for use in fill, landscaping etc. shall be subject to management and control procedures which shall include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development. Therefore, any unsuitable material will be identified prior to unloading / placement on-site.

Exportation of Soil and Aggregates

All waste will be removed off-site in accordance with the requirements outlined in the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BCME, 2019a) and the CDWMP (BCME, 2019d) (refer to Volume 3 Chapter 4 Appendices) and will be managed in accordance with all legal obligations. It will be the contractor’s responsibility to either; gain a waste collection permit or, to engage specialist waste service contractors who will possess the requisite authorizations, for the collection and movement of waste off-site. Material will be brought to a facility which currently holds an appropriate waste facility permit or licence for the specified waste types.

Waste Permitting, Licences & Documentation under the Waste Management (Collection Permit) Regulations 2007, as amended, a collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO), must be held by each waste collection contractor.

Any other relevant waste permits required for any proposed processing of materials shall be obtained prior to construction at the Site if required.

All waste will be documented prior to leaving the Site. All information will be entered into a waste management system kept on the Site.

Vehicles transporting material with potential for dust emissions to an off-site location shall be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

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 deployed to ensure that public roads are kept free of debris.

The wheels of all Lorries will be washed / cleaned prior to leaving the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

Piling Methodology

The proposed piling methodology as detailed in the CMP (BCME, 2019a) and the OCEMP (Enviroguide, 2019a) report (refer to Volume 3 Chapter 4 Appendices) will minimise the potential for introduction of any temporary conduit between contaminated materials and underlying groundwater. Piles that require rock sockets will be drilled under bentonite or cased to rock head level, to ensure stability of the bore through the water bearing sands. CFA piles will be carefully monitored to ensure positive pressure in the concrete below the auger head as it is retracted.

The combined development is 90% hardstanding, with a significant amount concrete slabbed. The slab will be broken out using a rock breakers and materials either sent off-site or used for the piling matt depending on the quality and quantity. Dust dampeners will be used to control dust. It is anticipated that additional hardcore will have to be brought to the Site to form the piling mat. The piling mat for the basement will be formed first, this will then be recycled and used to form the piling mat under Block A. The estimated quantity of hardcore equates to 3000m^2 by 600mm deep, giving a volume of 1,800m^3 of hardcore. When piling is complete, this will be removed off-site in accordance with all legal obligations and sent to appropriately licensed/permitted receiving waste facilities.

Management of Stockpiles

Segregation and storage of wastes generated during works will be segregated and temporarily stored on-site (pending removal or for re-use on-site) in accordance with the CMP (BCME, 2019a) report (refer to Appendix B), the CDWMP (BCME, 2019d) and the CEMP (Enviroguide, 2019a) report (refer to Volume 3 Chapter 4 Appendices).

While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows:

- A suitable temporary storage area shall be identified and designated;
- All stockpiles shall be assigned a stockpile number;
- Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings;
- Erroneous pieces of concrete shall be screened from the stockpiled soils and segregated separately;
- Non-hazardous and hazardous soil (if required to be stockpiled) shall be stockpiled only on hard-standing or high-grade polythene sheeting to prevent cross-contamination of the soil below;
- Soil stockpiles shall be covered with high-grade polythene sheeting to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust;

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to disposal. An excavation/stockpile register shall be maintained on-site showing at least the following information:

- Stockpile number;
- Origin (i.e. location and depth of excavation);
- Approximate volume of stockpile;
- Date of creation;
- Description and Classification of material;
- Date sampled;
- Date removed from the Site;
- Disposal/recovery destination; and
- Photograph;

Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery; and
- Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

Handling of Chemicals, Waste Materials and Fuel

Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable).

Fuel, oils and chemicals used during the construction stage are classified as hazardous. If fuel is stored on-site for machinery and construction vehicles, then areas around fuel tanks and draw off points will be bunded and clearly marked. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Oils and chemicals used and stored on-site will also be will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage into the local surface water network or groundwater. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

Portable generators or similar fuel containing equipment will also be placed on suitable drip trays.

Emergency procedures will be developed, and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures for in the event of accidental fuel spillages.

Concrete Works

The cementitious grout used during the construction of the basement and the riparian strip will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

All ready-mixed concrete shall be delivered to the Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be removed offsite. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

Control and Management of Groundwater

Groundwater will be encountered during the construction works in particular the basement excavation. All excavations will be encompassed by secant pile wall around the basement excavation to allow dewatering and dry excavation. Where water must be pumped from the excavations, water will be managed in an in accordance with best practice standards (i.e. CIRIA – C750) and regulatory consents. Water will not be discharged to open water courses (e.g. the Bloody Stream or shore) and will be disposed to foul sewer.

Groundwater in the excavation will be controlled based on the methodology outlined in the Dewatering Design (Minerex, 2019) report (refer to Volume 3 Chapter 4 Appendices). The treatment system will be installed on-site for the duration of the project to meet the requirements of the discharge licence but will typically include a number of stages of settlement and filtration to remove sludge, suspended solids, free-phase hydrocarbons (oils) and dissolved phase hydrocarbons to ensure the conditions of the temporary discharge consent are met.

The groundwater removed will be discharged into the public sewer in accordance with the necessary consent/licence issued under Section 16 of the *Local Government (Water Pollution) Acts* and Regulations and must be obtained from IW. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements. All dewatering will be undertaken in strict compliance with the conditions of the discharge licence for the construction phase of the Proposed Development.

A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer. The monitoring programme shall be designed by the Environmental Consultant assigned to the project and shall include analysis of samples by an accredited laboratory for all parameters detailed in the monitoring programme. The specific analytical suite and compliance values and points for groundwater will be determined in accordance the recommendations of the MMRP (Golder, 2019c) (Volume 3 Chapter 4 Appendix A).

Water is anticipated to be treated and pumped to a holding area where it will be sampled and tested by the Contractor prior to discharge. Upon receipt of analysis results and screening against required consent limits, the Contractor will arrange the appropriate disposal, with the groundwater treated and discharged to foul sewer in accordance with temporary discharge consent.

If free product is identified during works, in the case of an accidental release appropriate remediation measures would be required depending on the nature and extent of any contamination caused under such a scenario. The contamination would be assessed in accordance with the recommendations of the MMRP (Golder, 2019c) (Volume 3 Chapter 4 Appendix A). If it is identified that remediation is required to mitigate any identified potential risk associated with the incident remedial measures would include excavation and removal of contaminated soil, removal of any free-phase materials or liquids via vac tanker or in-situ remediation methods to address soil and groundwater this will be pumped, and removed off-site via tanker to a licensed waste disposal facility. In the event of such a scenario, the dewatering operation will be immediately stopped and investigated, and the relevant authorities notified.

The full details of the dewatering works can be found in the CMP (BCME, 2019a) report and OCEMP (Enviroguide, 2019a) report (refer to Volume 3 Chapter 4 Appendices).

Control and Management of Surface Water Runoff

There may be a temporary increase in the exposure of the underlying groundwater during earthworks due to the temporary removal of hardstanding areas. Silt laden and contaminated runoff associated with exposed soils and stockpiling of excavated soils across the Site may also migrate into the underlying groundwater. Accordingly, pollution prevention controls/ mitigation measures as detailed in the CMP (BCME, 2019a) report and the OCEMP (Enviroguide, 2019a) report (refer to Volume 3 Chapter 4 Appendices) will be implemented during the construction of the Proposed Development to prevent off-site impacts to surface waters and groundwater.

The Contractor is to ensure that no contaminated water/liquids leave the Site (as surface water run-off or otherwise), enter the local storm drainage system or direct discharge to the Baldoyle Bay SAC.

Inspection and Monitoring

The inspection and monitoring stage of the construction activities increase the effectiveness of environmental mitigation, as this addresses any environmental problems that may be occurring and assists in intervention and response at an early stage.

Sentinel wells will be installed for the purposes of sampling gas and groundwater in order to monitor the impacts of the works and identify trends arising which may indicate appropriate measures to be undertaken.

In addition, the area of made ground in the south west corner of the basement excavation will continue to be monitored via the installed well until such time as the earthworks are complete.

Gas, groundwater and surface water monitoring and sampling/testing rounds will be undertaken, before, during and after the earthworks works; this will comprise:

- Pre-earthworks - 3no. weekly visits over a two-month period;
- During earthworks – 1no. per month for duration of earthworks; and
- Post-earthworks – 3no. visits monthly post completion of earthworks.
- Results from the monitoring rounds will be provided in monthly reports to be completed and assessed against Tier 1 screening values and will comprise previous monitoring round (cumulative) datasets undertaken and allowing information to be graphically displayed for identification and review of trends.

All gas, ground and surface water monitoring including monitoring of Baldoyle Bay will be carried out in line with the recommendations in MMRP (Golder, 2019c) and the detailed dewatering plant that will be developed for the construction phase.

Waste Auditing and Site Inspection

Inspection of the waste compound will be undertaken on a daily basis by the Environmental Officer. A full site walkover shall also be undertaken to check for any detectable nuisances such as odour, vermin, noise, dust or other such nuisance.

Waste audits will be carried out at regular intervals to monitor waste management practices, record keeping, traceability of all waste arising and removed from the Site and evidence of acceptance at the end destination.

14.4 WATER

14.4.1 Construction Phase

The mitigation measures set out below are particular to water. This is to minimise the overlap with Chapter 4, Land, Soil and Geology.

Handling of Chemicals, Waste Materials and Fuel

Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable).

Fuel, oils and chemicals used during the construction stage are classified as hazardous. If fuel is stored on-site for machinery and construction vehicles, then areas around fuel tanks and draw off points will be bunded and clearly marked. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Oils and chemicals used and stored on-site will also be will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage into the local surface water network or groundwater. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.

Portable generators or similar fuel containing equipment will also be placed on suitable drip trays.

Emergency procedures will be developed, and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures for in the event of accidental fuel spillages.

Concrete Works

The cementitious grout used during the construction of the basement and the riparian stream will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

The proposed piling methodology as detailed in the CMP (BCME, 2019a) and the OCEMP (Enviroguide, 2019a) will prevent any risk of dispersion of grout from the piling bore (e.g. through the use of bentonite or quick cure grout).

Basement construction will be within a ‘dry box’ (within the secant pile wall and robust dewatering) thereby removing any potential for contact of cementitious materials with groundwater.

All ready-mixed concrete shall be delivered to the Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be emptied into a skip. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

Control and Management of Groundwater

Groundwater will be encountered during the construction works in particular the basement excavation. All excavations will be encompassed by secant pile wall around the basement excavation to allow dewatering and dry excavation. Where water must be pumped from the excavations, water will be managed through robust dewatering and water treatment methodologies in accordance with the MMRP (Golder, 2019c), the OCEMP (Enviroguide, 2019a), the CMP (BMCE, 2019a) and the CDWMP (BCME, 2019d), the dewatering plan (Minerex, 2019), (see Volume 3 Chapter 4 Appendices), best practice standards (i.e. CIRIA – C750) and regulatory consents. Water will not be discharged to open water courses (e.g. the Bloody Stream or shore) and will be disposed to foul sewer.

Robust dewatering methodologies in accordance with the MMRP (Golder, 2019c), Dewatering Plan (Minerex, 2019), (Volume 3 Chapter 4 Appendices), best practice standards (i.e. CIRIA – C750) and regulatory consents to minimise the potential impact on the local groundwater flow regime and associated receptors, namely the Baldoyle Bay SAC water regime.

Groundwater in the excavation will be controlled based on the methodology outlined in the Dewatering Design (Minerex, 2019) (Volume 3 Chapter 4 Appendix A). The treatment system will be installed on-site for the duration of the project to meet the requirements of the discharge licence but will typically include a number of stages of settlement and filtration to remove sludge, suspended solids, free-phase hydrocarbons (oils) and dissolved phase hydrocarbons to ensure the conditions of the temporary discharge consent are met.

There will be no direct discharge of groundwater from the site to groundwater or surface water. The groundwater removed will be discharged into the public sewer in accordance with the necessary consent/licence issued under Section 16 of the *Local Government (Water Pollution) Acts and Regulations* and must be obtained from IW. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements. All dewatering will be undertaken in strict compliance with the conditions of the discharge licence for the Construction Phase of the Proposed Development.

A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer. The monitoring programme shall be designed by the Environmental Consultant assigned to the project and shall include analysis of samples by an accredited laboratory for all parameters detailed in the monitoring programme. The specific analytical suite and compliance values and points for groundwater will be determined in accordance the recommendations of the MMRP (Golder, 2019c). In addition, as detailed in the Minerex, 2019 dewatering plan (Volume 3 Chapter 4 Appendices), there will be continuous automatic text alarmed monitoring of key parameters such as flow rate, pH and suspended solids.

Water is anticipated to be treated and pumped to a holding area where it will be sampled and tested by the Contractor prior to discharge. Upon receipt of analysis results and screening against required consent limits, the Contractor will arrange the appropriate disposal, with the groundwater treated and discharged to foul sewer in accordance with temporary discharge consent.

If free product is identified during works, in the case of an accidental release appropriate remediation measures would be required depending on the nature and extent of any contamination caused under such a scenario. The contamination would be assessed in accordance with the recommendations of the MMRP (Golder, 2019c) (Volume 3 Chapter 4 Appendix A). If it is identified that remediation is required to mitigate any identified potential risk associated with the incident remedial measures would include excavation and removal of contaminated soil, removal of any free-phase materials or liquids via vac tanker or in-situ remediation methods to address soil and groundwater this will be pumped, and removed off-site via tanker to a licensed waste disposal facility. In the event of such a scenario, the dewatering operation will be immediately stopped and investigated, and the relevant authorities notified.

The full details of the dewatering works can be found in the CMP (BCME, 2019a) and OCEMP (Enviroguide, 2019a) in Volume 3, Chapter 4 Appendices.

Control and Management of Surface Water – Protection of the Bloody Stream

During the excavation phase, the Bloody Stream will be re-routed. It is proposed that the Bloody Stream will be temporarily diverted via a 750mm diameter fully enclosed concrete pipe as per IW guidelines until the development is complete. This eliminates the possibility of contamination from the works above. To ensure no damage from plant/activity above the pipes will be encased in 150mm concrete.

Discharges to the Bloody Stream during the Construction Phase of the Proposed Development will not be permitted.

Post construction, the Bloody Stream will be de-culverted through the site creating a riparian strip. The riparian strip will be one of the last areas to be completed. This will involve construction of an open concrete channel with an impermeable base spanning the breadth of the site, underground drainage connections at either end, a settlement chamber and landscaped banks on either side of the channel. During the connection of the stream to the new route, a pump will be used to divert the water to safe location in the new channel while the connection is being completed.

The proposed riparian stream will be constructed above the water table and therefore will not be in contact with groundwater. As mentioned above, the cementitious grout used during the construction of the riparian stream will avoid any contamination of groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

Control and Management of Surface Water Runoff

Surface water collected throughout the Construction Phase of the Proposed Development will be pumped through a treatment system to remove elevated suspended solids and hydrocarbon sheen as set out in the Minerex, 2019 dewatering plan. The treated water will be discharged to foul sewer only under licence from IW. The Contractor is to ensure that no contaminated water/liquids leave the Site (as surface water run-off or otherwise), enter the local storm drainage system or direct discharge to the Baldoyle Bay SAC.

As mentioned above, there will be no direct discharge of groundwater from the site to ground or surface water. However, there may be a temporary increase in the exposure of the underlying groundwater during earthworks due to the temporary removal of hardstanding areas. Silt laden and contaminated runoff associated with exposed soils and stockpiling of excavated soils across the Site may also migrate into the underlying groundwater. Accordingly, pollution prevention controls/ mitigation measures including correct handling and storage of potentially polluting substances. All measures as detailed in the CMP (BCME, 2019a) and the OCEMP (Enviroguide, 2019a) will be strictly implemented during the Construction Phase of the Proposed Development to prevent off-site impacts to surface waters and groundwater.

As part of the overall construction methodology, sediment and water pollution control risks arising from construction-related surface water discharges will be considered. All works carried out as part of these infrastructure works will comply with all Statutory Legislation including *the Local Government (Water Pollution) acts*, 1977 and 1990 and the contractor will cooperate fully with the Environment Section of Fingal County Council in this regard.

Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground. A temporary connection to mains foul sewer (subject to relevant consent from IW) will be constructed in accordance with IW and FCC guidelines.

Inspection and Monitoring

The inspection and monitoring stage of the construction activities increase the effectiveness of environmental mitigation, as this addresses any environmental problems that may be occurring and assists in intervention and response at an early stage.

Sentinel wells will be installed for the purposes of sampling gas and groundwater in order to monitor the impacts of the works and identify trends arising which may indicate appropriate measures to be undertaken.

In addition, the area of made ground in the south west corner of the basement excavation will continue to be monitored via the installed well until such time as the earthworks are complete.

Gas, groundwater and surface water monitoring and sampling/testing rounds will be undertaken, before, during and after the earthworks works; this will comprise:

- Pre-earthworks - 3no. weekly visits over a two month period;
- During earthworks – 1no. per month for duration of earthworks; and
- Post-earthworks – 3no. visits monthly post completion of earthworks.
- Results from the monitoring rounds will be provided in monthly reports to be completed and assessed against Tier 1 screening values and will comprise previous monitoring round (cumulative) datasets undertaken and allowing information to be graphically displayed for identification and review of trends.

All gas, ground and surface water monitoring including monitoring of Baldoyle Bay will be carried out in line with the recommendations in MMRP (Golder, 2019c) and Dewatering Plan (Minerex, 2019) in Volume 3 of this EIAR.

14.4.2 Operational Phase

Ongoing regular maintenance of the green roofs and the riparian strip will be required to ensure that the positive impacts on water quality and hydrology including the Baldoyle Bay SAC will be required for the Proposed Development. This will be incorporated into the overall management strategy for the Proposed Development.

14.5 AIR QUALITY AND CLIMATE, INCLUDING MIRCOCLIMATE

14.5.1 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 Volume 3 Chapter 6 Appendix 3) and Outline Construction Environmental Management Plan (OCEMP) (see Volume 3 Chapter 4 Appendix E) are adhered to, the air quality impacts during the construction phase will be not be significant. In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles 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.

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.

Prior to commencement of the demolition works, all asbestos containing materials identified by the Management Asbestos Survey and Refurbishment and Demolition Survey will be removed by a suitably trained and competent person. Asbestos containing materials will only be removed from site by a suitably permitted/licenced waste contractor and will be brought to a suitably licenced facility. The Health and Safety Authority should be contacted in relation to the handling of asbestos and material should be dealt with in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations* 2006, as amended and associated approved Codes of Practice.

Human Health

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. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be negative, short-term and imperceptible with respect to human health.

14.5.2 WIND

Operational Phase

The proposed mitigation measures for this development is landscaping using tree plantings as shown in Figure 6.91, 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 6.92. These introduce a pressure drop in the model and therefore causes the wind to reduce its speed when passing through the trees, as expected in reality. The CFD plot shown in Figure 6.92 demonstrate this effect.

The use of trellis, pergola structures and planters are suggested to mitigate the wind impact on the terraces.

14.5.3 DAYLIGHT/SUNLIGHT

Operational Phase

Early stage testing concluded that the “developed design” maintained good Average Daylight Factors while optimizing the largest balcony area for living spaces. Furthermore, in large scale developments it is common to see ground floor apartments receive lower amounts of daylight when compared to the upper levels. In order to mitigate this design constraint, the lower level apartments are designed for the maximum amount of glazing that is feasible to ensure that the development still receives good levels of light penetration.

Due to the orientation of the development the potential for impacting on surrounding areas has been minimised due to the East – West axis of the development and the u -shape of the buildings which allows for the sunlight to be maximised within the development and surrounding areas.

14.6 NOISE

Construction Phase

All construction works will be required to operate within the Construction Noise Limits Outlined in Table 7.4 of the EIAR. The contractor will be required to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014.

All construction works will be required to operate within the Construction Vibration Limits Outlined in Table 7.5 of the EIAR.

Operational Phase

The operation of all fixed plant installations will be designed to achieve the internal noise criteria included in Table 7.7 of the EIAR.

14.7 BIODIVERSITY

Construction Phase

The following mitigation measures have been agreed in consultation with Barrett Mahony Consulting Engineers and Walls Construction. The below text is taken from the Construction Management Plan (BMCS, 2019a), Flood Risk Assessment Report (BMCE, 2019b) and outline Construction Environmental Management Plan (OCEMP Enviroguide 2019) contained in Volume 3, Chapter 4 Appendices.

Noise

Noise control audits will be conducted at regular intervals through the Construction Phase of the development. In the first instance it is envisaged that such audits will take place monthly. This subject to review and the frequency of audits may be increased if deemed necessary. The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions. To this end, consideration will be given to issues such as the following:

- Hours of operation being correctly observed;
- Opportunities for noise control ‘at source’;
- Optimum siting of plant items;

- Plant items being left to run unnecessarily;
- Correct use of proprietary noise control measures;
- Materials handling;
- Poor maintenance; and
- Correct use of screening provided and opportunities for provision of additional screening.

Dust

Dust Management Plan

The objective of dust control is to ensure that no significant nuisance occurs at nearby sensitive receptors. To develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA. Effective site management regarding dust emissions will be ensured by the formulation of a dust management plan (DMP) for the site. The key features of the DMP are:

- the specification of a site policy on dust;
- the identification of the site management responsibilities for dust;
- the development of documented systems for managing site practices and implementing
- management controls; and
- the development of means by which the performance of the dust management plan can be assessed.

See Volume 3 Chapter 6 Appendix 6.3 for Dust Minimisation Plan.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies. At the planning stage, the siting of construction activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs:

- During working hours, technical staff shall be on site and available to monitor dust control methods as appropriate;
- Complaint registers will be kept on site detailing all telephone calls and letters of complaint received about construction activities, together with details of any remedial actions carried out;
- It is the responsibility of the contractor always to demonstrate full compliance with the dust control conditions herein; and
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust using best practise and procedures. During the excavation of the basement, it is envisaged areas of rock will be encountered. This will be broken out using a rock breaker and the dust controlled using spray cannons. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed, and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are highlighted below.

Dust Control – Site Roads

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. However, effective control measures can easily be enforced. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency[8] ranging from 25 to 80%. This means that speed restrictions alone have the potential to reduce dust by up to 80%

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles;
- Bowsers will be available during periods of dry weather throughout the construction period.
- Research has found that the effect of watering is to reduce dust emissions by 50%. The bowser will operate during dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Dust Control – Land Clearing/Earth Moving

Land clearing / earth-moving during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.
- During excavation of contaminated materials, use of water will be controlled and managed to prevent generating contaminated runoff.
- An asbestos survey has been completed which identified asbestos-containing materials (ACMs) on site; in the buildings and in the made ground. An asbestos removal plan will be authored prior to commencing work on site. All works will be carried out by a suitably qualified specialist contractor. All ACMs will be managed in accordance with the relevant regulations.

Dust Control – Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

The regular watering of stockpiles has been found to have an 80% control efficiency.

Dust Control – Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures.

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered with tarpaulin always to restrict the escape of dust;

- Public roads outside the site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- If practicable, a wheel wash facility will be employed at the exit of the site so that traffic leaving the site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

Surface Water

Protection of the Bloody Stream

During the excavation phase, the Bloody stream will be re-routed. The stream will continue to flow underground through a 750mm diameter pipe diversion until the development is complete. This eliminates the possibility of contamination from the works above. To ensure no damage from plant/activity above the pipes will be encased in 150mm concrete. Post construction, the Bloody Stream will de-culverted through the site creating a riparian strip.

The riparian strip will be one of the last areas to be completed. This will involve, construction of an open concrete channel spanning the breadth of the site, underground drainage connections at either end, a settlement chamber and landscaped banks on either side of the channel. The riparian strip will be of varying width, with graded 1:3 banks on either side. Before the streams channel disappears under the raised walkway and outfall into the sediment chamber located under the access road at rear of the development. A grate will be fitted over the outfall drain in the pond, which will stop any debris entering the culvert. To ensure water is always present in the pond, it will be set at a lower level to the outfall. By doing this it will slow the pace of the river and act as a sediment chamber.

Groundwater

Shallow groundwater may be encountered during the construction works in particular the basement excavation. Where water must be pumped from the excavations, water will be managed in an in accordance with best practice standards (i.e. CIRIA – C750) and regulatory consents. Water will not be discharged to open water courses (e.g. the Bloody Stream or shore) and will be disposed to foul sewer.

Disposal to sewer will require, a consent/licence issued under Section 16 of the *Local Government (Water Pollution) Acts* and Regulations and must be obtained from Irish Water. Any such discharge licence is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment (e.g. settlement/filtration, hydrocarbon separation etc.) and monitoring requirements. All dewatering will be undertaken in strict compliance with the conditions of the discharge licence for the project.

A treatment system will be installed for the duration of the project to meet the requirements of the discharge licence but will typically include a number of stages of settlement and filtration to remove sludge, suspended solids, free-phase hydrocarbons (oils) and dissolved phase hydrocarbons.
A monitoring programme will be implemented to ensure that water quality criteria set out in the discharge licence are achieved prior to discharging to the sewer.

Flooding

The Bloody stream is introduced to the site via a 3m channel traversing the site in a landscaped riparian strip. The riparian strip will be approximately 65m long with a varying width of minimum 12 meters and reaches a depth in the centre of over 2 meters below ground level for the development. It is intended that the riparian strip will be a designated flood zone in the development.
Several steps are proposed to mitigate flooding of the Bloody Stream:

- A water grate is to be provided at the end of the strip, this will ensure that any large items are captured before entering the underground water system.
- At the end of the strip the channel flows into manhole S6 this has a sediment chamber 3 meters long, before outflowing in a 900 diameter pipe at 0.150m higher than the base of the chamber. This manhole is in the access road running along the northern perimeter of the site and is easily accessible for maintenance.
- The section of the channel running underground has a clear head height of 2 meters. This allows further access for maintenance and clearance.
- An overflow drain has been provided in the event of blockage, an alternative route is available.

All the above precautions are designed to mitigate blockages that could result in flooding.

Dewatering

All excavations will be encompassed by secant pile wall around the basement excavation to allow dewatering and dry excavation. Extracted groundwater will be treated on site and disposed to sewer only under a temporary discharge consent. To achieve this disposal route, a temporary water treatment facility (including holding tanks) will be constructed on the site, and other apparatus as required to ensure the conditions of the temporary discharge consent are met (this will include activated carbon filtration, siltbusters etc.). Water is anticipated to be treated and pumped to a holding area and sampled and tested by the Contractor prior to discharge.

Upon receipt of analysis results and screening against required consent limits, the Contractor will arrange the appropriate disposal, with the groundwater treated and discharged to foul sewer in accordance with temporary discharge consent (to be arranged by the Contractor). The Contractor is to ensure that no contaminated water/liquids leave the site (as surface water run-off or otherwise), enter the local storm drainage system or direct discharge to the Baldoyle Bay SAC. Excavations and potentially contaminated stockpiled soils will be constructed/located/sheeted in a manner that ensures leachate generation is limited and water is contained within the site boundary. These measures will ensure in addition with the measures detailed in Section 8.4.3 that the worst case scenario will not occur.

If free product is identified during works, this will be pumped, and removed off-site via tanker to a licensed waste disposal facility. Full details of the dewatering plan are contained in Volume 3 Chapter 4 Appendix C.

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 bat activity survey is carried out at the appropriate time of year by a qualified ecologist in order to determine the presence of any potential roosts.

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.
If possible, works should be carried out during the winter months (October to March) as there would be less likelihood of bats roosting in the buildings during this time. Any demolition work should be undertaken in a slow, careful and sensitive manner, which will allow any bats present a chance to escape.

In the event a roost is accidentally exposed despite mitigation, all works must cease, and NPWS contacted in order to obtain the required derogation licence.

It is recommended that a bat ecologist be retained for the duration of the demolition works.

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.

Boxes should be erected:

- On straight limb trees with no crowding branches or other obstructions for at least 3m above and below the position of the bat box,
- On trees with a diameter wide and strong enough to hold the required number of boxes, at a height of 3-5m to reduce the potential of vandalism and predation of resident bats,
- In groups of three bat boxes per tree arranged at the same height facing North, Southeast and Southwest. This ensures a range of temperatures are available to residing bats.

It is concluded that the proposed demolition of the three buildings, specifically B1, with the above mitigation measures implemented, including a derogation licence and presence of a bat specialist ecologist onsite during demolition, will have a negligible impact on bat species in the area given the plentiful supply of mature trees to the south and the erection of the bat boxes as a compensatory measure.

Post planning a bat contour assessment will be undertaken to ensure that foraging and commuting habitat can be accommodated within the development and ensure no long-term loss of foraging and commuting habitat. There is also a potential to create habitat for roosting bats, with erecting the bat boxes.

Operational Phase

Night-time Light Pollution

The external site lighting installation will be designed in line with the following industry standards, best practice guidelines and local authority guidelines:

- Fingal County Council Public Lighting Standards;
- ET101:2008 National Rules for Electrical Installations;

- ET211:2003 Code of Practice for Public Lighting;
- EN 13201 Road Lighting Standards;
- BS 5498:2013 Code of Practice for Design of Road Lighting;
- Luminaires will be selected to ensure that when installed, there shall be zero direct upward light emitted to the sky (all output light shall be at or below 90◌̊ to the horizontal) to help prevent sky glow from light pollution in the night sky;
- The luminaires shall have a luminous intensity classification of between G4 and G6 to IS EN 13201-2:2003/BS 5489-1:2013 and recommendations of Institute of Lighting Professionals and Bat Conservation Trust 'Bats and Lighting in the UK' documentation and Bat Conservation Ireland Guidance Notes for Planners, Engineers, Architects and Developers December 2010;
- The light emitted from light fittings shall have no photo biological risk and shall be categorised as 'Exempt Group' in relation to emissions of Blue Light, Infrared and Ultra Violet Radiation in accordance with EN 62741:2008;
- The luminaires shall have a luminous intensity classification as per the recommendation of IS EN 13201-2:2003, BS 5489-1:2013 and the Institute of Lighting Professionals;
- Guidance for the Reduction of Obtrusive Light GN01:2011, produced by the Institute of Lighting Professionals;
- All luminaires shall comply with IS EN 60598; and
- All luminaires shall be energy efficient LED source fittings with sharp cut off optics.

14.8 ARCHAEOLOGY, ARCHITECTURE AND CULTURAL HERITAGE

Construction phase

Established mitigatory measures involve the excavation under licence of a series of test trenches across the site post-demolition. Should archaeological deposits be encountered, a report detailing the extent and nature of the material will be submitted to the statutory authorities for further consideration. With the agreement of the statutory authorities the area can be opened up and the material excavated by hand.

Should there be no archaeological material recorded over the programme of test trenching, a monitoring brief to be undertaken over the course of development will establish (or not) the presence of archaeological deposits on the site. Where archaeological material is found to be present, development work will cease across the area identified and any deposits will be excavated by hand, subject to agreement with the statutory authorities.

14.9 LANDSCAPE AND VISUAL IMPACT

Operational Phase

Tree planting should be undertaken along Howth Road and within the western extent of the site in order to moderate the adversity of visual impacts on the approach into the village, generate a strong sense of approach at this primary gateway location and to integrate the development with the sylvan character of Howth Road.

Planting proposed throughout the proposed development (including that which can be considered mitigation), would have limited influence on the effects on landscape and visual receptors in the wider landscape.

Monitoring

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified professional and planting works undertaken during the planting season, on completion of civil engineering and building work.

All landscape works will be subject to an establishment phase where monitoring of the mitigation measures will form part of the ongoing landscape management. This will include the appropriate and timely replacement of planting failures. Prior to completion of the landscape works, a competent landscape contractor will be engaged and a detailed maintenance plan, scope of operation and methodology will be put in place.

14.10 MATERIAL ASSETS – TRAFFIC, WASTE AND UTILITIES

14.10.1 TRAFFIC

This section details the measures which will mitigate the traffic impacts detailed within this section of the EIAR.

In this regard we will detail mitigation measures which will offset any traffic impacts predicted for both the construction and operational phases of the Proposed Development.

Mitigation measures describe any corrective measures that are either practicable or reasonable, having regard to the potential impacts discussed above.

Construction Phase

The following measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the road network.

Road Network Construction Stage Measures to be implemented:

To ensure the road network will have a slight impact with short term temporary slight effects, the following migration will be incorporated.

- To reduce the potential impact with morning traffic particularly between the hours of 8am and 9am, no HGV's will be allowed to leave site during this period. However, vehicles coming to site will be against morning traffic and will therefore have minimal impact on the local road network. These vehicles will be able to enter site and wait in the waiting area, if necessary, be loaded and ready to leave site after 9am.
- Works in Howth road will be carried out in a strip process, limiting the extent of works at any given time and given the existing width of the road across the site frontage two way traffic will be managed at all time.

- Informing workers and expected visitors regarding access arrangements and parking provision to ensure an appropriate mode of travel is chosen; By enforcing this the potential impacts of road delays will be slight and have short term neutral effect.
- Clear and appropriate signage within the site to advise of permitted routes, speed limits, safety requirements.
- Any recommendations with regard to construction traffic management made by the Local authority will be adhered to.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- Provision of sufficient on-site parking and compounding to ensure no overflow of construction generated traffic onto the local network.
- A dedicated ‘construction site’ access / egress system will be implemented during the construction phases.
- Site offices and compound will be located within the site boundary. The site will accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas. This will prevent visitors or employees parking on the surrounding streets.
- A series of ‘way-finding’ signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Truck wheel washes will be installed at construction entrances necessary to ensure Howth Road is kept clean.

Pedestrian Construction Stage Measures to be implemented:

To ensure the potential impact of the proposed development on the pedestrian routes will be slight with short term temporary neutral effect the following mitigation measures have been incorporated.

- Promote usage of public transport by site staff by clearly displaying local bus, DART and rail services with a map and timetable indicating routes and travel times.
- Works carried out in Howth Road, pedestrians will be directed via a temporary footpath, which will be clearly marked out and separated from the vehicle users. This will only be for short periods when drainage and utility connections works are being carried out in Howth Road.
- Only Safe-Pass accredited personnel will be permitted on site and daily in-out attendance records will be maintained.
- Hoarding to be set up around the perimeter to prevent pedestrian access.
- Signage to be implemented to clearly indicate navigation routes around the site.
- Provide bike parking locations on site to promote the usage of cycling by site staff.

Operational Phase

The following mitigation measures are proposed for the operational phase of the Proposed Development with reference to the road network:

Road Network Operational Stage Measures to be implemented:

Given that the critical junction under analysis, Sutton Cross, is congested, it is appropriate that there is a comprehensive set of mitigation measures envisaged to minimise car usage by residents and visitors to the Proposed Development. The measured are detailed as follows:

- Available Car club spaces on site
- Limited on-site car parking spaces

Limiting on-site car parking spaces

It is proposed within this development to provide car parking space for 70% of the 512 no. apartment units proposed.

14.10.2 WASTE

Construction Phase

The following mitigation measures are included:

Uncontrolled release of waste to the receiving environment

All waste materials will be dealt with in accordance with regional and national legislation namely the Waste Management act, 1996, as amended and all subordinate regulations.

A Construction Waste Manager will be dedicated to ensuring the mitigation measures are implemented.

In the event of an environmental pollution incident, the local authority will be notified immediately.
Waste will be stored and managed in line with the OCEMP and CMP pending collection by a permitted waste contractor.

Dedicated areas for waste skips and bins will be identified across the site. These areas will be easily accessible to waste collection vehicles.

A stockpile compound will be designated at the site and in line with the CMP and CEMP for the Proposed Development.

All construction wastes will be stored in a secure segregated area in suitable containers which identify the waste material to be deposited in order to encourage good segregation, recycling and recovery.

Waste materials will be stored remote from any sensitive receptors such as water courses, drains and preferably on impermeable hardstand or in sealed containers.

Wastes identified for re-use will be stored separately to avoid the risk of mixing with wastes destined for off-site recovery.

While waste classification and acceptance at a waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows:

- A suitable temporary storage area shall be identified and designated;

- All stockpiles shall be assigned a stockpile number;
- Soil waste categories will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on site drawings;
- Non-hazardous and hazardous soil (if required to be stockpiled) shall be stockpiled only on hard-standing or high grade polythene sheeting to prevent cross-contamination of the soil below;
- Soil stockpiles shall be sealed to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust;
- When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to disposal.

An excavation/stockpile register shall be maintained on site showing at least the following information:

- Stockpile number;
- Origin (i.e. location and depth of excavation);
- Approximate volume of stockpile;
- Date of creation;
- Description and Classification of material;
- Date sampled;
- Date removed from site;
- Disposal/recovery destination; and
- Photograph;

Stockpile management will be carried out in accordance with the CEMP and the mitigation measures therein for dust management.

Waste storage and movement will be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable); and

Waste will be stored on site, including concrete, asphalt and soil stockpiles, in such a manner as to:

- Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
- Prevent hazards to site workers and the general public during Construction Phase (largely noise, vibration and dust).

Wastes arising will be taken to suitably registered/ permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate.

There are numerous licensed waste facilities in the Eastern Midlands Waste Region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the Proposed Development would be in line with daily activities at these facilities.

The inspection and monitoring stage of the construction activities increase the effectiveness of environmental mitigation, as this addresses any environmental problems that may be occurring and assists in intervention and response at an early stage. Daily inspection of the waste compound and stockpile areas and is to be undertaken throughout the construction Phase . This will be carried out by the appointed Construction Waste Manager.

Excess Quantities of Waste Arising

The management of waste will be in accordance with the *Eastern–Midlands Regional Waste Management Plan 2015-2021* and *the National Hazardous Waste Management Plan 2014-2020* and will be in compliance with *the Waste Management Act 1996*, as amended and all associated regulations.

The contractor will establish recovery/reuse/recycling targets for the site and these will be reviewed in relation to waste arisings and removal records to encourage continuous improvement of recycling rates.

The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste segregation will be implemented to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery.

Consignment of waste to treatment facilities

The transport and consignment of waste will be in compliance with the Waste Management Act 1996, as amended and all associated regulations.

Wastes arising will be taken to suitably registered, permitted or licenced waste management facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate.

Waste will be transported from site by holders of Waste Collection Permits issued by the National Waste Collection Permit Office which authorise the collector to collect waste in the area and to transport the specific waste type to the destination facility.

A register of waste collection contractor waste collection permits will be maintained on site.
Waste will be consigned to facilities which are authorised to accept the waste type and which hold the appropriate waste management facility permit or EPA licence.

Waste records will be maintained and a register of all waste consignments from site will be recorded at the site in line with the requirements set out in the CMP and CEMP. Waste records will include documentation from the destination facility for each load of waste received.

Waste audits will be carried out at regular intervals to monitor waste management practices, record keeping, traceability of all waste arising and removed from site and evidence of acceptance at the end destination.

The removal of all waste from site shall be supervised at all times.

Waste shall only be consigned from the site to destinations which are licenced by the EPA, hold a waste management facility permit or certificate of registration issued by the relevant local authority and for which planning permission is in place thus confirming that the waste destination has been fully assessed through the regulatory consent process in relation to potential impacts on the environment.

Detailed waste records for each consignment of waste shall be maintained in accordance with the CEMP for the Proposed Development . Records must include confirmation of receipt of waste materials at the destination facility.

Classification of excavated soil and stone

Waste soil and stone excavated at the site will be classified as set out in the CEMP and consigned to facilities which are licenced to accept that classification.

Stockpiles will be manged in accordance with the stockpile management measures set out in the CEMP to ensure traceability of all waste soil and stone material and corresponding classification and sampling results.

Waste soil and stone shall only be consigned from the site to destinations which are licenced by the EPA, hold a waste management facility permit or certificate of registration issued by the relevant local authority and for which planning permission is in place thus confirming that the waste destination has been fully assessed through the regulatory consent process in relation to potential impacts on the environment.

Contaminated soils must be removed from site under the supervision of a suitably qualified Environmental Consultant. A sampling and analysis plan will be provided by the Environmental Consultant appointed by the Contractor which will address all required sampling and analysis following the removal of the buildings and infrastructure on site in order to classify the waste for removal off site.

Excavation works will be monitored by a suitably qualified person to ensure contaminated soil is identified and segregated from any potentially uncontaminated soil, where encountered. Additional soil testing will be required in order to reclassify soil and the material will be required to be classified as hazardous or non-hazardous using the HazWasteOnline application (or other similar application) and then classified as inert, non- hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC for acceptance of waste at landfills.

Removal of asbestos containing materials and contaminated soil

Contaminated soils must be removed from site under the supervision of a suitably qualified Environmental Consultant.

All contaminated soil excavation will be handled in accordance with the procedures outlined in the Waste Management and Management of Stockpile sections of the CEMP and will have due regard to the measures set out in the Golder Associates Ireland Limited, October 2019. Materials Management & Remedial Strategy Plan Claremont Development Site, Howth.

Excavation works will be monitored by a suitably qualified person to ensure contaminated soil is identified and segregated from any potentially uncontaminated soil, where encountered.

Additional soil testing will be carried out order to reclassify soil and the material will be required to be classified as hazardous or non-hazardous using the HazWasteOnline application (or other similar application) and then classified as inert, non- hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC for acceptance of waste at landfills.

Contaminated material will be removed from site for treatment or disposal as appropriate. The contaminated material will either be suitable for recovery or disposal in Ireland depending on the limitations of the receiving facility's licence. If not suitable, the material will require recovery or disposal abroad and will be exported in accordance with the requirements of Transfrontier Shipment of Wastes (TFS) Regulations.

Soils containing asbestos will be managed in accordance with the measures set out in OHSS Safety Consultants October, 2019 *A Risk Assessment for Mechanical Handling Soils/Stones Containing Asbestos* (See Volume 3 Chapter 4 Appendix D) including:

- Wetting at the point of dust release;
- Damping down of exposed soil during dry weather;
- Measures to prevent material being transferred onto the local road network (eg wheel wash);
- Measures to prevent soil being transferred off site by workers on their clothes or feet.

The quantity of asbestos present in soil on this site is very small and normal good construction practice will be in place during the works. The soils excavated are likely to be very damp however provision will be made for additional use of water to minimise the release of dust during handling. Good site management measures to prevent mud being transported onto the local road network on vehicle wheels or workers taking the soil home in their vehicles, on their feet or on their clothes will be in place in line with the CEMP. It is therefore anticipated that exposures to airborne fibre will be negligible.

Asbestos containing waste must be removed from site according to the Asbestos Removal Plan of Work prepared for the Proposed Development.

The asbestos removal contractor/Demolition contractor is required under the *Safety Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010* to develop a plan of work prior to commencing demolition activities. This plan of work (POW) will specify how the ACM's will be removed, transported and disposed of. The POW will also have details of quantities and receipts for the quantities of ACMs taken off site including List of Waste Coding (17-06-05 or 17-06-01). The plan of work must be submitted to the Health and Safety Authority (HSA) 14 days in advance of the works commencing and as part of the notification of the project. Both the HSA and Local Authority inspectors or waste enforcement officers have powers to inspect the POW and the site under the asbestos regulations.

The POW will be based on the HSA guidelines for removal of asbestos containing materials. A competent independent analyst will be employed on the project to oversee the asbestos removal works and to undertake air monitoring and clearance testing as required by the regulations. All of these reports can be made available to the regulatory bodies.

Asbestos containing waste will only be removed by competent persons and transferred offsite by a suitably permitted hazardous waste contractor and will be brought to a suitably authorised hazardous waste facility.

Traffic management

Waste loading and removal should be carried out in line with the Traffic Management Plan for the Construction Phase of the Proposed Development and in accordance with measures outlined for traffic management in the CMP and the CEMP.

Operational Phase

Demand for waste services in the area as a result of increased residents, retail and non-retail uses.

Increased demand for waste services in the area requires adequate waste collection, treatment and disposal facilities. Waste will be managed in accordance with the OWMP for the development.

Lack of proper segregation and recycling

The management of waste will be in accordance with *the Eastern–Midlands Regional Waste Management Plan 2015-2021* and the *National Hazardous Waste Management Plan 2014-2020* and will be in compliance with *the Waste Management Act 1996*, as amended and all associated regulations.

Waste shall be managed in line with the OWMP for the Proposed Development.

Adequate receptacles of a suitable type and size shall be provided and shall include at a minimum receptacles for the source segregation of mixed general waste, mixed dry recyclable waste and source segregated biodegradable kitchen and garden waste (commonly known as 'compost' or 'brown' bins).

Waste shall be presented for collection in compliance with the Fingal County Council Storage, Presentation and Collection of Household Waste Bye-Laws 2006 (hereinafter referred to as 'the bye-laws'). Waste collections shall be frequent enough so as not to allow bin storage areas to over fill. This shall be a condition of contract with the appointed waste management contractor.

Residents and tenants should receive information in relation to waste prevention, reduction, the proper segregation of waste and the correct method of deposit in the waste storage compound. Information on nearby bring banks and recycling centres should be furnished to the residents and tenants of the Proposed Development to encourage recycling.

Improper collection, transport or disposal of waste

All collections must take place in compliance with conditions of the waste contractor's Waste Collection Permit for the region and in line with any Local Authority Bye-Laws and the *Waste Management (Waste Collection Permit) Regulations 2007* as amended. All tenants are obliged by law to avail of the waste management service and must comply with local Bye-Laws and Statutory Instruments in relation to the presentation of waste for collection.

Waste collection vehicles will service the bins and the empty bins will be returned to the waste storage area.

Records of the collections will be maintained by the management company for the development including reports from the facilities to which the waste is taken.

Access and egress of the waste collection vehicles will be in accordance with the Traffic Management Plan for the facility. *BS 5906: 2005 – Waste Management in Buildings – Code of Practice* has been taken into consideration when detailing vehicular access and egress to the development for the purposes of waste collection.

Runoff from bin stores and Poorly designed bin storage areas

Poor design of bin storage areas may lead to poor usage, poor segregation and recycling rates and safety issues, unauthorised use of these facilities, vandalism or fly tipping.

The design of the waste compound areas shall be in line with The Department of Housing, Planning and Local Government published guidelines in March 2018 – "*Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities*". These Guidelines detail the provisions that need to be made for the storage and collection of waste materials in apartment schemes. These guidelines have been taken into account when preparing the design of the waste compound area.

The bin compounds will have the following provisions as minimum:

i. **Access:** The bin compounds will be accessible for the mobility impaired.

ii. **Lighting:** Bin compounds will have adequate lighting. Energy saving lighting operated on sensors is proposed. This is to ensure that waste will not be tipped in dimply lit areas and that the areas does not pose as a safety risk.

iii. **Spillage & drainage:** A non-slip surface will be provided to prevent slips or falls, and the compounds will have adequate drainage which will be directed to foul sewer.

iv. **Security:** The bin compounds will have restricted access and will be accessible by tenants and residents only. Security measures will be in place and CCTV will be provided in the bin compounds. This is to prevent unauthorised access to the bins by the general public.

v. **Ventilation:** A natural vent will be provided. All vents will be ducted to an external opening so that the bin storage areas will not cause an odour nuisance, taking into account the avoidance of nuisance for habitable rooms nearby.

vi. **Signage:** Pictorial signage will be provided to show residents and tenants what wastes can and cannot be placed in each bin. All signage will be provided by the management company appointed. This will be a requirement in their agreement to ensure this is included in any agreement with a waste contractor or provided by them directly.

vii. **Environmental nuisance:** The compounds will be enclosed areas to avoid environmental nuisances such as litter. Regular waste collections will be required from the waste collection providers to prevent any other environmental nuisances such as odour or vermin. The management company appointed will be required to ensure there is adequate vermin control in place.

viii. **Vehicular Access:** Both compounds have ample space provided for waste collection vehicles to access the development and to collect the bins. Vehicular access for waste collection is included in the traffic management plan for the development.

Bins not collected on time (Inclement weather or industrial strike action could lead to waste not being collected on time)

Contracts with the property management company will include:

- provision for adequate budgets to provide the appropriate waste management services and receptacles.
- Requirements for ongoing monitoring of waste contractors permits and recovery and recycling data from the development.
- Provision of waste education and awareness information to tenants and residents.

14.10.3 UTILITIES

WATER

Water Supply

Construction Phase

- Contact the local authority to adhere to the measures required for introducing a new watermain connection
- To reduce leaks, prior to connection to the public watermain, all watermains in the development will be tested and cleaned to the requirements of Irish Water.

Operational Phase

- The water demand for the development was calculated using Irish Water-Water Guidelines. This calculation and drawings were sent to Irish water and have been approved. A statement of Design Consent has been issued on the bases that upgrade works listed are carried out. This ensures that the correct figures have been used to determine water usage of the development. Irish Water Reference: 7287699079
- The site water main system will be metered as directed by the Council to facilitate detection of leakage and the prevention of water loss.
- Dual & low flush toilets and water economy outlets will all be considered to reduce the water demand.

Foul Water Drainage

Construction Phase

Effluent generated on the site from the contractor’s sanitary facilities will be discharged to a holding tank and removed off site by a certified waste removal contractor in accordance with the requirements of the Waste Management Act of 1996 and 2001. Any other arrangements would be subject to agreement with FCC Drainage Division.

Foul Water Drainage Construction Stage Measures to be Implemented:

- Road sweeping and/or wheel wash facilities should be provided, as required;

- All onsite sewers should be tested and surveyed prior to connection to the public sewer to prevent any possibility of ingress of ground water;
- All sewers will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur;
- Any leakage from the foul sewer will be cordoned off and the contaminated effluent and soil collected and disposed by licensed contractors.

Operational Phase

- The foul water discharge for the development was calculated using Irish Water-Wastewater Guidelines. This calculation and drawings were sent to Irish water and have been approved. A statement of Design Consent has been issued with no upgrades required This ensures that the correct figures have been used to determine wastewater discharge for the development. Irish Water Reference: 7287699079
- Any foul water leakage could result in contamination of groundwater in the area. The current foul sewer drainage system that is on site will be replaced. Placing a new system on site reduces the overall risk of leakage from damaged sewers.
- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

GAS

Construction Phase

- The locations of the gas network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase.
- The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with Gas Networks Ireland (GNI).
- Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the gas network in close proximity to the works area. This will ensure that the underground gas network will not be damaged during the construction phase
- All works in the vicinity of GNI infrastructure will be carried out in ongoing consultation with GNI and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live gas mains.
- Where new services are required, the Contractor will apply to GNI for a connection permit where appropriate and will adhere to their requirements.

Operational Phase

- The gas demands during the operational phase on the existing gas network are considered to be low due to the NZEB energy efficient design, thermal performance of the buildings and the use of renewable technology to reduce the heating demand.

TELECOMMUNICATION

Construction Phase

- The locations of the telecommunications network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase.
- The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with the relevant telecommunication provider.
- Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the telecommunications network in close proximity to the works area. This will ensure that the underground telecommunications network will not be damaged during the construction phase.
- All works in the vicinity of the telecommunications providers infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with any requirements or guidelines they may have.
- Where new services are required, the Contractor will apply to the relevant provider for a connection permit where appropriate and will adhere to their requirements.
- It is considered that any likely impacts to overhead cables in the vicinity will be mitigated by applying standard construction practices.

Operational Phase

- The telecommunications demand during the operational phase on the existing telecommunications network is considered to be imperceptible due to the resilience built into the networks by the relevant providers.
- The design and construction of the required Telecommunication services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

ELECTRICITY

Construction Phase

- The locations of the electricity network infrastructure relative to the proposed works will be confirmed as part of the Detailed Design Phase.

- The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.
- Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase
- All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB Networks and will be in compliance with any requirements or guidelines they may have have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.
- Where new services are required, the Contractor will apply to ESB Networks for a connection permit where appropriate and will adhere to their requirements.

Operational Phase

- The power demands during the operational phase on the existing electricity network are considered to be imperceptible due to the energy efficient design including LED lighting, high performance heating equipment.
- The design and construction of the required electrical services infrastructure in accordance with the relevant guidelines and codes of practice is likely to mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

14.11 RISK MANAGEMENT

Construction Phase

During construction, the following strategies will be put in place, with detailed control measures:

- Construction Safety & Health Plan
- Construction Environmental Management Plan
- Emergency & Incident Response Plan
- Traffic Management Plan
- Materials Management & Remedial Strategy

Asbestos containing materials (in buildings and soils) will be removed by a specialist contractor and transported with a permitted haulier to a licensed facility.

Working adjacent to the DART line will be coordinated with an ongoing liaison with Irish Rail, and their required control measures put in place.

Operational Phase

During operation, fire safety will have been mitigated via consideration during the design stage of the project and ongoing control by the estate management company. The possibility of falls from height have been managed during the design stage via compliance with building regulations.

The open Bloody Stream is designed with a riparian strip that will be a designated flood zone. Other measures for mitigating flooding of the Bloody Steam include:

- A water gate to collect any large items before entering the underground section.
- Installation of an easily accessible manhole for maintenance.
- Underground section has been designed to facilitate access for maintenance personnel.
- An alternative overflow route has been provided, in the event of blockage.

14.11.1 FLOOD RISK MANAGEMENT

Construction Phase

To reduce the flood risk during the construction phase the following mitigation measures will be incorporated.

1. The Bloody Stream will remain diverted underground.
2. Diversion to be carried out prior to construction works beginning. This removes the possibility of flooding due to the existing blockages.
3. Backup generators and alarm systems will be installed to ensure that in the event water pumps stop, a backup pump is ready to take over.

Operational Phase

To reduce the flood risk during the operational phase the following mitigation measures will be incorporated.

1) The capacity of the channel carrying the Bloody Stream across the Howth Road, will be increased from a 450 x 225 culvert to a 450 dia pipe.
2) A water grill is to be provided at the end of the riparian strip to ensure that any large items are captured before entering the underground system.
3) An overflow drain has been provided in the event of a blockage to provide alternative relief route.
4) Opening off riparian strip are set at 4.5m OD. (0.1% AEP + HEFS).
5) Residential accommodation is set above 4.5m OD. (0.1% AEP + HEFS).
6) In the event the overflow is unable to function the surrounding landscape is graded to divert water onto Howth road, away from the development.
7) Access points to the lower areas are to have a raised platform to prevent pluvial flow entering from Howth Road.
8) The stream has been raised a metre higher than its previous level. This will create a higher velocity and allow better self clearing on exiting onto Baldoyle Bay.
9) Construct a sea defence wall along the coastal perimeter to 4.5m OD. (0.1% AEP + HEFS).

10) Access ramps to the carparks will be set at 0.1% AEP + HEFS prior to descending. This will prevent water from Howth Road entering the lower areas.

All the above reduce the risk of flooding and diverts water away from the living areas.